Magnetic Orbitals in the Real World

The First Visual Revelation of Quantum Geometries in the Macroscopic World

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MAGNETIC ORBITALS

CHAPTERS

KEYWORDS

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ABSTRACT

The direct observation of **atomic orbital shapes** in the macroscopic world had never been reported. This study presents the first **experimental three-dimensional visualization** of atomic orbital geometries through the use of **real magnetic fields**. By employing a **bipolar Hall sensor** operating in **dynamic mode** at a **constant angle**, field configurations were detected that match in detail the solutions of the **Schrödinger equation** for the **hydrogen atom**.

The results indicate a **structural connection** between the probabilistic concepts of quantum mechanics and observable macroscopic phenomena, suggesting a new paradigm of **unification between classical and quantum physics** based on experimental data.

The study also provides a **replicable procedure** for generating **magnetic orbitals**, offering a precise method for the **three-dimensional reconstruction** of the magnetic field and for the **predictive control of dipole interactions**, thus proposing a methodology for **magnetic tomography** applicable to the study of fields and material structures.

The observed geometries are not anomalous: a classical magnetic field can exhibit shapes strikingly similar to Schrödinger solutions because **both systems are governed by shared geometric constraints and harmonic solutions.** Making this correspondence explicit clarifies the link and prevents misinterpretations.

INTRODUCTION

Empirical Approach to Field Structure

This work proposes a **non-conventional yet rigorously empirical approach** to the study of the **three-dimensional structure of magnetic fields** and their possible correlation with the **quantum geometries of atomic orbitals**.

Through a series of experiments conducted with **simple instrumentation**, but based on an **extremely rigorous methodological protocol**, it was possible to obtain stable and repeatable field patterns that show remarkable analogies with the theoretical configurations predicted by quantum mechanics.

Instrumentation and Methodology

The experimental core of the investigation relies on the use of a **bipolar Hall sensor**, operated in **dynamic mode at a constant angle**, allowing the point-by-point reconstruction of **field shapes and polarity variations** in three-dimensional space.

This methodology enables a **physical and observable representation** of structures that, until now, were confined exclusively to the mathematical description of **wavefunctions**.

In this context, the orbitals are not simulated or calculated: they are **directly detected as actual configurations of the magnetic field**.

Intersection Between Classical Phenomenology and Quantum Concepts

The results show that several fundamental concepts of quantum mechanics, including **wavefunction collapse**, **superposition**, and **entanglement**, can be interpreted as phenomena linked to **observable geometric interactions** between the observer, the measuring instrument, and the field itself.

Although these analogies do not imply direct physical equivalence between classical and quantum domains, they suggest a possible **structural continuity** between the two, challenging the traditional strict separation between classical mechanics and quantum mechanics.

If confirmed, this perspective would indicate the existence of a **shared geometry** capable of describing phenomena at different scales, based not on mathematical abstractions but on **direct observation of fields through repeatable methodologies**.

Implications and Application Domains

The implications of this research are broad and multidisciplinary.

The ability to observe and map three-dimensional field shapes with such precision could find application in:

- physics of materials
- advanced magnetic technologies
- sensors and electronic devices
- studies of field coherence
- educational and outreach methodologies
- investigations into the structural nature of physical phenomena

This variety of potential applications arises from the central element of the method: **simple replicability**, achievable even with non-specialized tools and without the need for complex equipment.

Method Accessibility and Interdisciplinary Collaboration

This work has been designed to be **accessible, verifiable, and replicable** even outside the academic context.

The structure of the document integrates images, experimental diagrams, detailed operational descriptions, and a language as clear as possible while maintaining the rigor required for scientific validation.

Finally, some theoretical reflections and comparative analyses were developed in collaboration with an **artificial intelligence**, with the goal of broadening the analysis and situating the experimental results within a **wider conceptual framework**, useful for future developments and investigations.

THEORETICAL PRINCIPLES OF REFERENCE

Quantum mechanics is the physical theory that describes the behavior of **matter and energy at the atomic and subatomic scale**.

Unlike classical mechanics, which is based on **continuous and deterministic quantities**, quantum mechanics introduces a **probabilistic description of reality**, in which physical properties do not exist in a defined way until they are measured.

One of the central concepts of the theory is the **atomic orbital**: a region of space where there is a certain probability of finding an electron.

These shapes do not represent precise trajectories, but rather **probability distributions** described by **wavefunctions**, solutions to the **Schrödinger equation**.

Each orbital is determined by a combination of **quantum numbers**:

- n (principal quantum number): indicates the energy level of the orbital
- l (angular quantum number): determines the shape of the orbital (spherical, bilobed, etc.)
- m (magnetic quantum number): defines the orientation of the orbital in space
- s (spin quantum number): specifies the intrinsic orientation of the electron

These theoretical structures, despite their extraordinary predictive power, have **never been directly observed**.

The graphical representations found in scientific textbooks are reconstructions obtained through complex calculations, not photographs of reality.

Another key concept is **quantum superposition**, according to which a particle can exist in multiple states simultaneously, and the **collapse of the wavefunction**, which occurs at the moment of observation, reducing all possibilities to a single outcome.

The research presented here proposes a new approach: investigating the possibility that these shapes - until now considered mere mathematical projections - may also **emerge at the macroscopic level**, through the interaction of **real magnetic fields** observed in a controlled manner.

In other words, the hypothesis is explored that the **geometry of atomic orbitals** is not an abstraction, but a **concrete manifestation of the magnetic field**, visible with the proper detection method.

Throughout this work, the aim is not only to reproduce these shapes experimentally, but also to compare them with theoretical models and to evaluate whether the rules of quantum mechanics - including **superposition**, **collapse**, **entanglement**, and **tunneling** - can be **reinterpreted as measurable physical interactions**, rather than purely probabilistic phenomena.

MAGNETS and ORBITALS

Hydrogen as an Archetype of Matter - Equivalence Between Atomic Orbitals and Magnetic Orbitals

One of the most significant results of this research is the finding that the **three-dimensional configurations** obtained through the **angular detection method** using **bipolar Hall sensors** and **axially magnetized magnets** show a **strikingly precise correspondence** with the theoretical solutions of the **Schrödinger equation** for the hydrogen atom.

This correspondence is not merely qualitative: the geometries of the **s, p, d, and f orbitals** emerge with symmetries, nodes, and topological continuities fully consistent with those predicted by quantum mechanics, despite being obtained through a **purely experimental procedure** with no prior mathematical modeling.

A Magnet as an Elementary Field System

The hydrogen atom represents the simplest quantum system, composed of an electron bound to a proton in a central potential.

Similarly, an **axially magnetized magnet** constitutes one of the simplest and most stable field generators available in the macroscopic world.

Its axial geometry, together with its polar symmetries, generates a field whose **three-dimensional structure closely mirrors the shape of the hydrogen wavefunctions**, with the fundamental difference that, in this case, the structures correspond to **measurable physical fields** and not to probability densities.

Field Shapes as Recurring Structures

Experimental observations indicate that:

- the observed shapes are not local anomalies
- they do not depend on sensor sensitivity
- they are not geometric artifacts
- they represent **stable and replicable configurations** of the magnetic field

These recurring structures exhibit an **intrinsic geometric coherence**, suggesting that certain aspects of quantum shapes may also manifest in the macroscopic domain when a **dynamic, angular, symmetry-controlled measurement system** is employed.

A Shared Geometry Across Physical Domains

The analogies observed between **quantum orbitals** and **magnetic orbitals** do not imply any direct physical equivalence between electric charges and magnetic elements, but highlight a more general principle:

the shapes of natural fields may organize according to recurrent geometric structures, independent of physical scale or interaction type.

This observation opens interpretative possibilities that will be explored in later chapters, but within the context of this introduction it is sufficient to emphasize that:

- the magnet serves as a macroscopic model
- hydrogen serves as a microscopic model
- and the **geometry of the field** provides an intersection point useful for understanding and analyzing both systems

Toward a Map of Magnetic Orbitals

The stable and repeatable reproduction of these geometries makes it possible to consider the magnetic field not only as a directional vector, but as a **three-dimensional volumetric structure** that can be mapped, documented, and classified with criteria analogous to those used in the study.

The construction of a **map of magnetic orbitals** therefore represents one of the **applicative and descriptive objectives** of this work, providing a **useful tool** for the **analysis, replication and comparison** of the **observed field shapes**.

SENSOR CONSTRUCTION

General Description of the Instrument

The experimental core of this research is a **magnetic field detection instrument** specifically designed to represent **three-dimensional magnetic orbitals**, structurally **isomorphic to the atomic orbitals** of the hydrogen atom. At the base of the device is a **4-pin Hall effect sensor**, operated at its **maximum operating voltage** (in this case 12 V).

Although similar sensors are commonly integrated in commercial magnetic pens, such devices are **heavily limited**: they are powered through resistors that reduce the voltage to about 3 V, compromising both **sensitivity** and **range**.

Using the sensor at **full power** allows not only a **clear identification of magnetic polarities**, but also enables, as will be shown in the methodological section, the **detection of the magnetic field up to over 20 cm** (in the presence of high-intensity magnets).

This range is more than sufficient to reconstruct **large, coherent, and three-dimensionally defined field shapes**.

Ergonomics and Structural Requirements

A fundamental aspect of the instrument’s design is its **ergonomics**. The sensor must be:

- **compact**
- **lightweight**
- **easy to handle**
- **easily orientable in space** (see FIG. 3)

This is because the detection procedure is **dynamic**, requiring **continuous movements, rotations, angle variations, and displacements** in three-dimensional space. An instrument that is too bulky or rigid would introduce **measurement errors** and make **continuous field mapping** difficult.

Main Components

The following components are required for constructing the sensor:

- 1 **Hall Effect Sensor** (CC6470, CS477H, WSH416 or equivalents)
- 2 **LEDs of different colors** (for polarity discrimination)
- 2 **560 Ω resistors** (or according to LED voltage)
- 1 **12 V battery**
- 1 **switch**
- 1 **compact enclosure** to facilitate handling

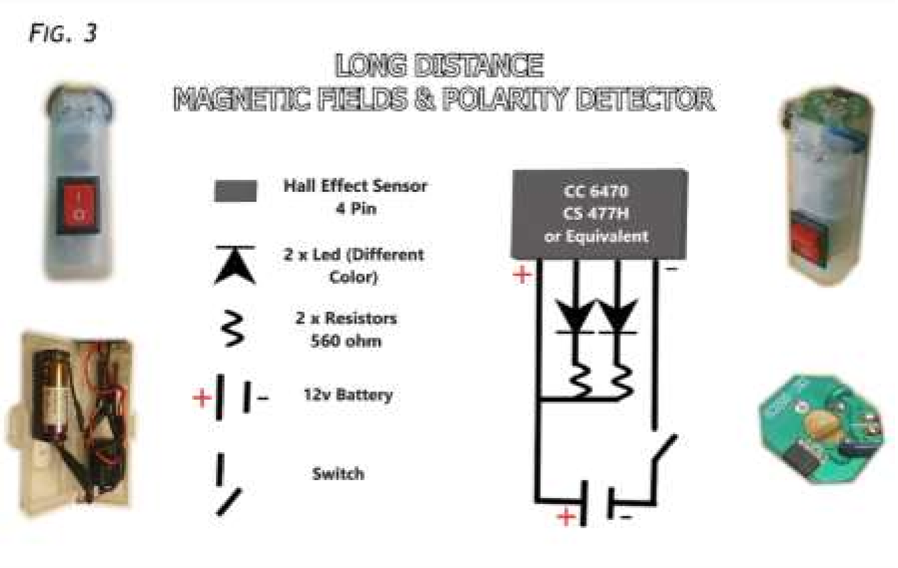
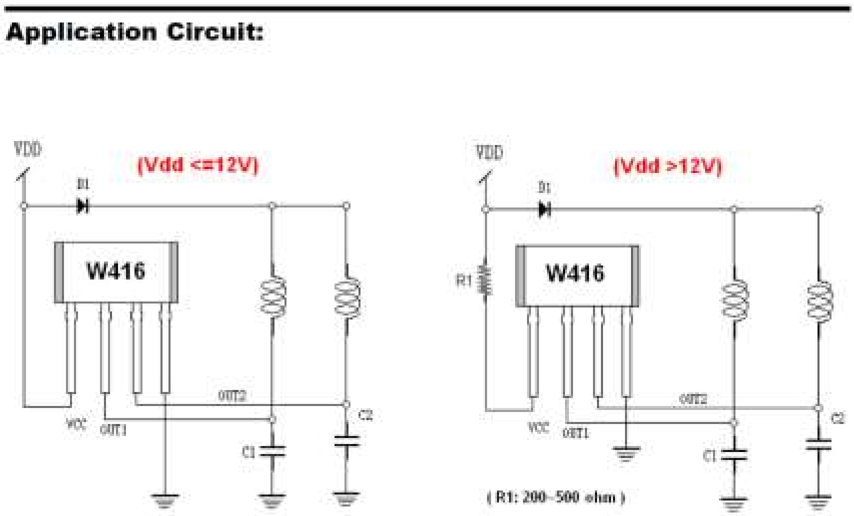
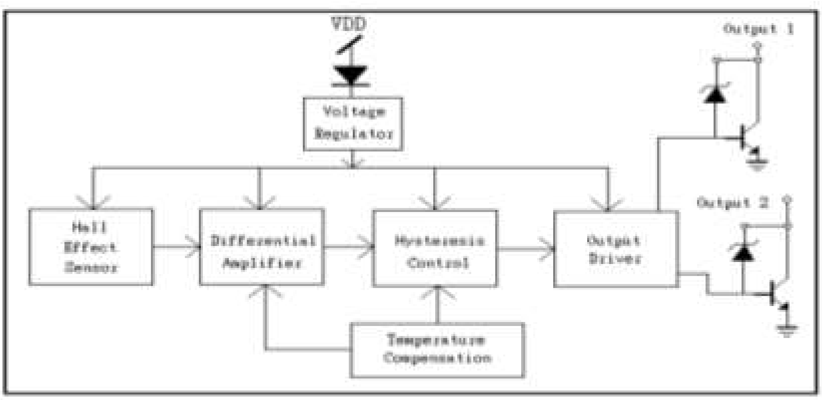


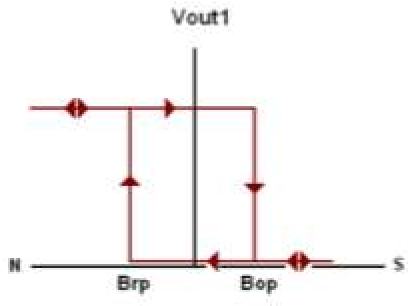
FIG 3: Components and Construction Diagram for Long-Range Magnetic Field and Polarity Detector – Do not buy the sensor; recover it from a 12V Fan for 3D Printers or PCs.

Hall Sensor Detection Mechanism





Current Deflection: When a magnetic field is present, the flow of electrons within the Hall sensor is deflected, creating a measurable potential difference, calculated independently for each polarity - as shown in the diagram below, taken directly from the WSH416 datasheet.



Sensitivity to Perpendicular and Non-Perpendicular Field Components

The **Hall sensor** used in this research exhibits **strong sensitivity to the perpendicular components** of the magnetic field, providing an **accurate and consistent measurement** of the field distribution in that direction. This is its **primary and most documented property**.

However, experimental analysis reveals an even more interesting behavior: the sensor is capable of providing **useful information about non-perpendicular components** as well, thus contributing to the **reconstruction of a complete three-dimensional field shape**.

This additional feature becomes **geometrically evident** only when the sensor is used according to the **dynamic detection method** illustrated in the next chapter.

It is indeed the combination of:

- **fixed angle**
- **controlled movement**
- **constant orientation**
- **continuous variation of distance**

that allows the sensor to transform its readings into a **coherent three-dimensional map**, in which not only **local intensity values** are detected, but also the **global geometries and field structure**.

Magnetic Characteristics:

Characteristics	Symbol	Quantity	Ta= -20°C to +100°C Min	Typ.	Max	Unit
Operate Point	Bop	Grade A Grade B Grade C		25 30 50	50 70 120	Gauss
Release Point	Brp	Grade A Grade B Grade C	-50 -70 -120	-25 -30 -50		Gauss
Hysteresis Window	Bop-Brp			40	200	Gauss

Orientation and Measurement Dynamics

The activation of the **sensor LED** represents, at each measurement point, a **local collapse of field information**: it is as if the sensor, at that instant, determines the **actual position of the magnetic polarity** in space, analogous to **wavefunction collapse** in quantum mechanics.

From an interpretative point of view, the device acts as a **local physical observer** of the field. At each angular step, the sensor determines:

- **presence or absence of polarity**
- **relative orientation with respect to the magnet axis**
- **three-dimensional position** within the detection space

This **dynamic procedure** has enabled the reconstruction of the **entire three-dimensional magnetic field map** around an axial magnet, with **point-by-point resolution** that is coherent, repeatable, and compatible with the **visual morphology of atomic orbitals**.

The parallel with experiments such as the **double-slit** is particularly interesting: electrons exhibit **wave-like behavior** until the moment of observation, when they collapse into a defined position - subsequent chapters.

Similarly, experiments with this new method show a **potential collapse of field information** that varies with each **observation angle**.

In fact, it is the **act of observation** itself that determines the **geometry detected**:

the angle at which the measurement is performed dictates which geometry emerges, and only by maintaining this angle constant throughout mapping is it possible to obtain **coherent and recognizable shapes**, identical to those predicted for all atomic orbitals.

This concept will be explored further in the chapter dedicated to the **Detection Method**, with detailed examples.

Advantages Compared to Other Instruments

Unlike **iron filings**, **compasses**, or **magnetic visualization chambers**, this type of sensor:

- **does not self-orient**, but responds to **user-controlled angular input**
- provides a **clear digital signal**, minimizing **subjective interpretation**
- allows **temporal reconstruction of the field**, point by point, generating **orbitals coherent in both shape and polarity distribution**

Conclusion

The detection instrument, combined with the **method developed in this research**, represents a **simple yet highly innovative technology**, capable of **directly revealing magnetic field shapes** that are normally invisible.

Its **replicability**, **ease of construction**, and **coherence with quantum models** make it a **fundamental tool** for the **visualization and study of three-dimensional magnetic orbitals**, offering a **new experimental perspective** on field behavior.

Two Perspectives of the Magnetic Field

Classical Perspective (Maxwell's Equations)

- **Iron filings**: the filings show a **macroscopic representation of the magnetic field**, aligning along its **lines of force** as predicted by Maxwell's equations.

- **Classical magnetic field**: described as a **continuous system of lines** extending in space, representing the **average forces exerted on moving charges**.

Quantum Perspective (Probabilistic Mechanics)

- **Hall sensor**: the sensor provides a **fine, point-by-point local measurement** of the field, potentially influenced by phenomena **compatible with electron wavefunction collapse** contributing to the field.

- **Quantum magnetic field**: using **current-based measurement**, and therefore electrons, reveals **structures detailed down to the harmonics considered in quantum mechanics**.

The two perspectives are **not contradictory but complementary**, describing the **same field at different levels of detail**.

Overall Interpretation

The **magnetic field around a magnet is unique**, but its manifestation depends on the **measurement instrument used**. Observing a magnet with different instruments means accessing **different aspects of the same physical reality**.

Both **iron filings** and the **Hall sensor** provide valid information, but at **different conceptual levels**.

- **Unique magnetic field**: there is only one field, but its representation depends on the **observation method**.
- **Complementarity**: the classical and quantum views integrate, providing a **more complete understanding** of the phenomenon.

In short, the **measurement context** determines how the field appears: classical for **average phenomena**, quantum for **finer and probabilistic structures**.

Different Sensor Sensitivities

Using **different sensors** or **different supply voltages** may suggest that the resulting magnetic field shape could vary. However, after **hundreds of experimental boards**, a clear result emerges: the **magnetic orbital shape never changes**. What varies is only the **extent of the detected shape**, not its **geometry**. The shape remains **invariant regardless of**:

- **sensor type**
- **component sensitivity**
- **supply voltage**
- **magnet intensity used**

This invariance is consistent with **quantum mechanical predictions**. The two figures below demonstrate this clearly. The shapes are **proportional to each other** and were detected with **both the same and different sensors**, maintaining the **same detection orientation**.

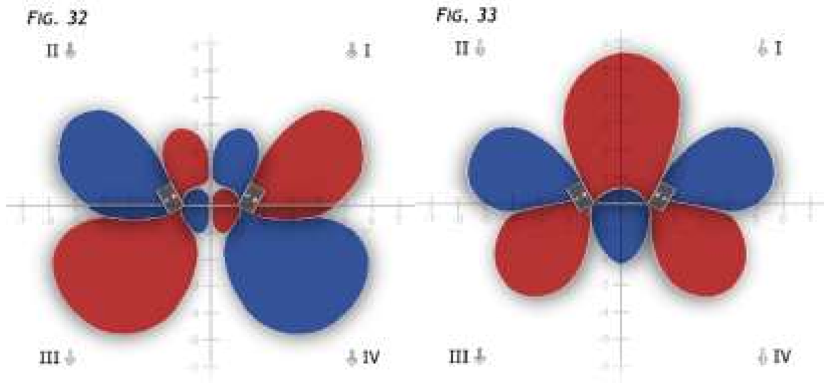


FIG 32: Dynamic Table – 2 Magnets in ATTRACTION at a distance of 2 cm, with a 60° angle relative to their axis – Side view of Rectangular Neodymium Magnets N35, 30(length) x 10(width) x 5(thickness)
FIG 33: Dynamic Table – Same magnets and same conditions but in REPULSION

These shapes are in proportion to each other, and were detected both with the same sensor and with different sensors, in the same detection direction. As we can observe, the **polarities extending vertically between the magnets** have completely different characteristics, which do **not** depend on the sensor's power, but on the **orientation of the polarities between the magnets**.

If the sensor's power had been the determining factor, we would have observed that the two polarities at the center of the magnets in FIG. 32 (those near the axis in quadrants I–II), which extend up to about **3 cm**, would have appeared as extended as the central one in FIG. 33, which reaches nearly **6 cm** in length.

The shapes remain **unchanged regardless of the sensor's power**, because they are **intrinsic forms of the Magnetic Field**, which are also **accurately described in Quantum Mechanics**.

SUPPLEMENTARY VIDEO: https://youtu.be/3L_n4zxlyZA

DETECTION METHOD

Premise

Although the **magnetic field detection** is performed using a **bipolar Hall sensor** that provides a **Boolean signal** (presence or absence of polarity), the interpretation of the detected points cannot be considered **digital in the classical sense**.

Each point represents a **local collapse of the spatial field distribution**. Only the **coherent union of all points** - while maintaining the **same detection angle** - allows the reconstruction of a **continuous, three-dimensional, structured shape**, analogous to the geometry predicted by the **wavefunction of atomic orbitals**.

In this sense, the **Boolean data** ceases to be isolated information: it becomes part of an **emerging geometry**. The sensor operates by sampling **discrete, binary points** in space.

Accumulating a sufficient number of these points generates a **constellation** that, if interpreted as a connected set, defines a **stable perimeter** - the geometry identified in this research as the **magnetic orbital**.

Using **raw analog values** without thresholding would instead produce a **complex distribution**, difficult to visualize, characterized by a **diffuse, less interpretable field map**.

Introducing an **intrinsic North/South threshold**, made possible by the sensor's **constant voltage**, allows **coherent, comparable, and repeatable measurements**.

It is precisely this **binarization process** that allows the **orbital perimeter** to emerge clearly, avoiding a **disordered cloud of points**.

Nonetheless, the **most physically faithful representation** remains a **variable density distribution of the magnetic field**, conceptually analogous to the **probabilistic distribution of electrons** in quantum mechanics.

A more extensive discussion on this topic will be presented in the chapter dedicated to **magnetic and electromagnetic field quantization**.

Regarding **magnetic multipole models**, these are mathematical expansions describing **ideal field distributions** (dipole, quadrupole, octupole, etc.).

However:

- **no known multipole generates toroidal topologies**
- **no multipole produces closed and symmetric lobes** like those experimentally detected
- **no multipole reproduces recurring structures** such as the "donuts" observed in measurements parallel to the magnet axis

This confirms that the shapes obtained do **not derive from classical multipole theory**, but from a **direct interaction between field geometry and observation method**, more akin to **quantum projection concepts** than to purely classical field descriptions.

The **detection method** presented in this research thus constitutes a **true innovation in three-dimensional representation of macroscopic magnetic fields**.

Using a **bipolar Hall sensor** under controlled conditions, it has been possible to **reconstruct with high precision** the geometry of the field generated by **permanent magnets**, obtaining shapes **perfectly overlapping the atomic orbitals of the hydrogen atom**.

Dynamic Bipolar Detection at Constant Angle

The device designed in this research, defined as a **Long-Distance Magnetic Field and Polarity Detector**, is able to detect the **perimeter of individual field bubbles (lobes)** thanks to **immediate polarity identification**.

Following the logic of the method, it is possible to reconstruct the **complete magnetic field shape** through:

- **many single detection points**
- **coherent union of points**
- **strict adherence to the measurement angle**

Exactly like a **connect-the-dots game**, but executed with **scientific and geometric criteria**.

Classical Mechanics Interpretation

Using a **Hall sensor**:

- **maximum field detection** occurs when the sensor is perpendicular
- **weaker values** occur when the field is nearly parallel to the sensor

From a geometric viewpoint:

- the sensor simply shows an **LED on or off**
- this is sufficient to determine the **lobe shape**
- information contained in **intensity variations** becomes **spatial information**

In other words, the sensor is **constructing the field image** through values that manifest as **perimeter points**.

It is this combination of **Hall sensor + dynamic method + constant angle** that generates the **complete geometry of the magnetic field** for that specific angle. In summary:

“**There is a maximum probability of finding the electron around the nucleus**” → “**There is a specific shape for each measurement angle**.”

Regardless of quantum interpretations, the results are:

- **real**
- **repeatable**
- **verifiable**
- **obtained in the macroscopic world**

For the first time, shapes calculated from the **Schrödinger equation** can be **physically measured** in a **non-quantum context**.

Operational Procedure

1 - **Magnet Preparation**

- Fix a **regular magnet**, preferably a cube, on a sheet of paper.
- The magnet must have **axial magnetization**.
- Position it **axially parallel to the sheet**, so that viewed from above, **North is on top and South below** (FIG. 7).

2 - **Importance of Detection Angle**

As previously discussed, the entire method depends on a **single detection angle**. It is essential to:

- **maintain the same angle for all points**
- **not rotate the sensor**
- **not tilt the device**

Only in this way are **coherent and realistic magnetic orbitals** obtained.

3 - **Detection Parallel to the Magnetization Axis**

To build a **vertical detection table** (parallel to the magnet axis):

- place the sensor **vertically**
- move it **up-down and right-left**
- use **rulers and squares** for precise positioning
- **always maintain the same vertical direction** of the sensor (parallel to the magnet axis)

The **constancy of the angle** is what ultimately allows the **real shape of the magnetic orbital** to be obtained.

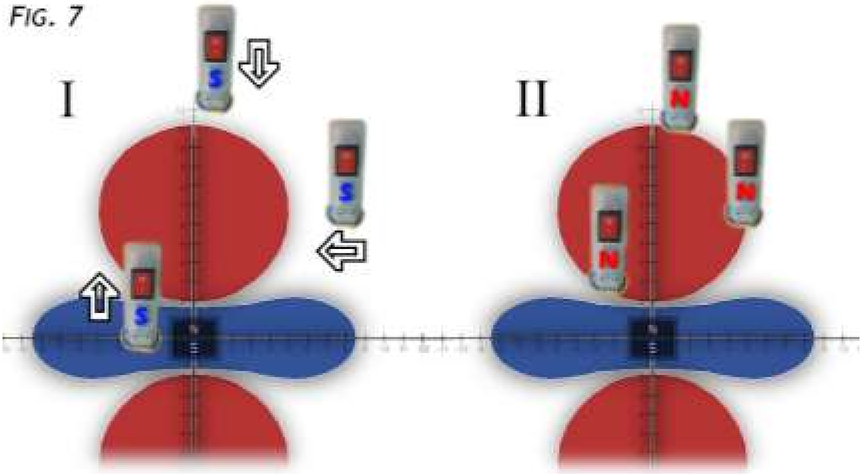


FIG 7.I: Approach with the sensor, extremely slow, precise, and with a fixed angle
FIG 7.II: Detection of selected points along the perimeter of the figure

The sensor is capable of **switching polarity** as soon as you approach the **edge of a polarity bubble** (FIG 7.II), so movements must **always be slow and precise**, and go **from outside toward the inside** of the bubble to reconstruct its perimeter (FIG 7.I). As soon as the sensor detects a polarity switch, **mark that point with a pencil** (FIG 7.II).

SUPPLEMENTARY VIDEO: https://youtu.be/m2Weq9r4HZY

The **operating principle** of this technique is based on the need to **reset the sensor to the opposite polarity** before each new measurement point. In **stand-by mode**, the device keeps the **LED corresponding to the last detected polarity** lit, even if it is no longer immersed in the magnetic field.

Consequently, when mapping a **north-polarity bubble**, it is essential **before each detection** to set the sensor to the **south polarity**, using either an **external magnet** or directly exploiting the **opposite-polarity bubbles** generated by the **same magnet under investigation**.

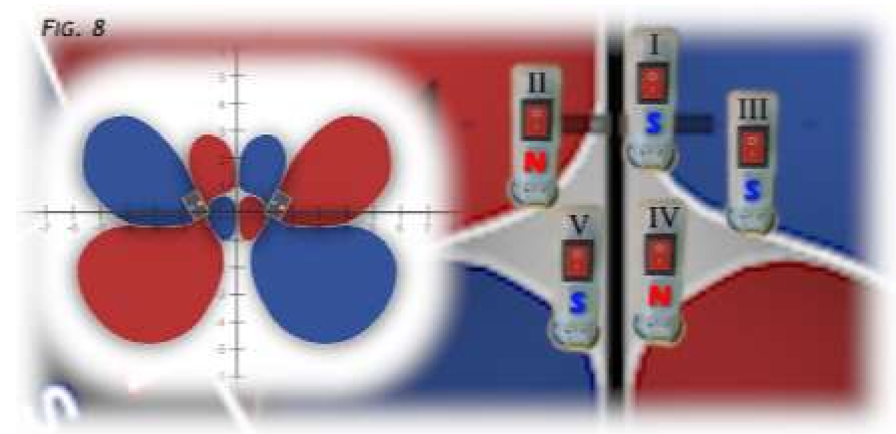


FIG 8: Sequence marked with numbers on the sensors, for complex detections within the neutral points between the polarity bubbles; a specific order is not important, but the alternation between polarities—above-below, right-left—supports the process..

Alternatively, you could simply create single points by **alternating one point on a north bubble with one on a south bubble**. Even though this method may feel a bit chaotic or dynamic when mapping out the entire shape, this **alternating pattern will become necessary** whenever you need to identify **"neutral points"** - those that lie in the middle of multiple polarities, such as in **interactions between two or more magnets** (FIG 8).

In such cases, it's better to proceed by marking **one point at a time** between both polarities, moving **left-right or top-bottom**, always without changing the **sensor's angle** (FIG 8 – I, II, III, IV, V).

Naturally, the **more detection points** you mark, the **higher the resolution** and definition of the polarity shape.

FIG. 9

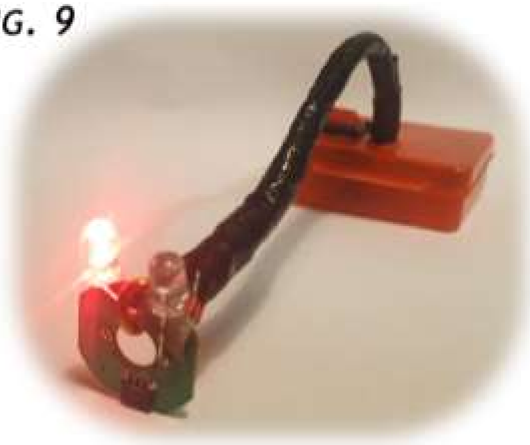


FIG 9: Construction method of the sensor, which distances the battery from the magnetic field being measured to avoid distortions. The sensor and LEDs remain close together for quick visualization of polarity changes.

It is important to emphasize that a **vertical scan from north to south** is **not equivalent** to a scan from south to north. The **overall shape** remains similar, but the **field metric** may be altered, with variations in the **size of the central torus** or the **lateral lobes**.

For this reason, it is **not possible to rotate the sensor** to complete the detection "in reverse" after crossing the diameter.

If the scan starts **from north to south**, once the diameter is crossed, it is necessary to **continue using the back side of the sensor**, maintaining the **original direction**. The instrument shown in **FIG 9** allows the **battery to be kept away from the field under analysis**, preventing distortions during this critical phase of measurement.

Once the detection is completed, **geometrically defined and remarkably regular figures** emerge. These must be **digitized with a scanner** (not photographed) to **preserve their proportions**.

Once acquired, they can be **traced and refined** using any **editing software**; **Premiere Pro** proves particularly effective thanks to **multilayer management** and the **pen tool**, which allows **rapid generation of filled bubbles with transparency and gradients**.

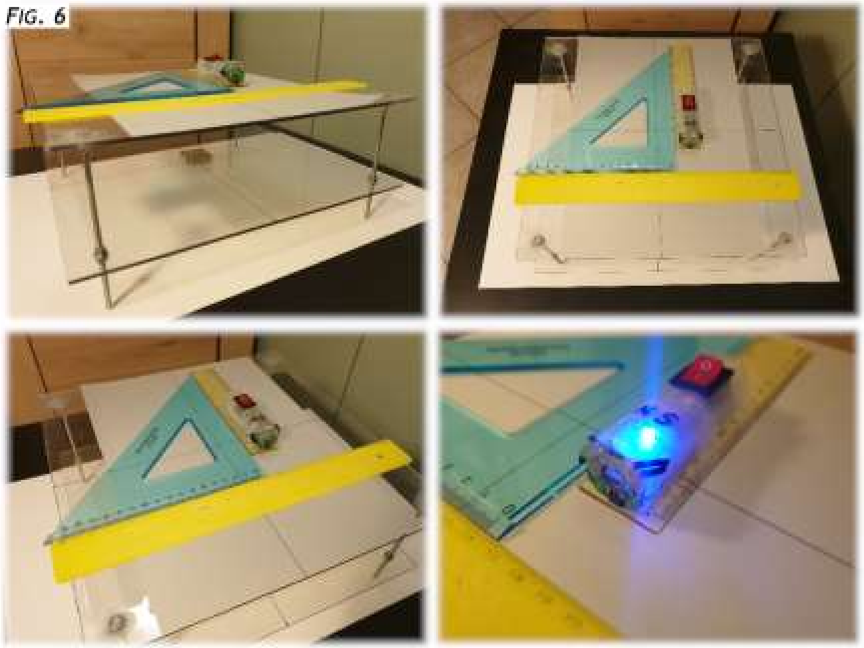


FIG 6: Complete Detection Setup with Sensor Mounted on a Ruler and 2-Plane Instrument, with the Lower Plane at an Adjustable Distance for Measurements at Various Distances from the Magnet

To obtain a **three-dimensional reconstruction** of the magnetic structures, it is necessary to perform **measurements at different distances** (**FIG 6**), similar to a **CT scan**, and then **reconstruct them** using **modeling software**. Even simple tools like **Paint3D** have proven adequate for this purpose.

Here is the **Final Result**, which will be presented in more detail in the **following chapters**.

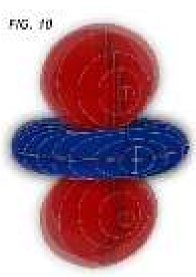


FIG 10: Multiple measurements of the magnetic field of a simple magnet at different distances, later assembled to form a 3D image

This image was created using Premiere Pro for the individual boards, and Paint3D for the 3D composition.

Reproducibility and Precision

The combination of **method simplicity**, **accurate angular control**, and the **quality of the sensors used** makes the procedure highly **reproducible**.

Even in **unshielded environments**, the measurements are **consistent and replicable**. Each figure can be **confirmed by independent observers** without the need for **expensive instruments** or **complex mathematical models**.

This methodology therefore represents a **visual, accessible, and pedagogically effective approach** to the study of **magnetic field structures**, with direct implications for understanding the **geometry of quantum systems**.

Theoretical Implications

The **correspondence between the detected shapes and the orbitals of the hydrogen atom** suggests that the **macroscopic magnetic field**, when measured consistently, exhibits the **same geometric constraints as subatomic systems**.

This result provides a **solid foundation** for a possible **unified view of classical and quantum phenomena**, and opens the way to the **hypothesis of structural equivalence** between **macroscopic magnets** and **elementary particles**.

SUPPLEMENTARY VIDEO: https://youtu.be/i_lSMSggpe0

EXPERIMENTAL RESULTS 2D

STUDY & DYNAMIC BOARDS

Introduction

The first boards presented are in **2D**, with the aim of introducing **fundamental concepts** before the **three-dimensional visualization** of the **magnetic orbitals**.

These boards represent **internal sections of D and P orbitals**, consistent with the **probabilistic field equations**.

So far, we have shown how to obtain **precise images** of the **magnetic field**, particularly in terms of **shape**.

In this section, **two distinct methods** for the **interpretation of polarities** will be introduced.

Note: To facilitate interpretation, the boards include **arrows indicating the angle and direction** of measurement in each quadrant.

If the **type of board** or **measurement direction** is not specified, refer to these arrows. Here is one of the **most important moments** of this research.

THE 2D SECTIONS OF THE MAGNETIC ORBITALS - STUDY BOARDS

Below are **three examples of measurements** with **different angles** and **appropriately mirrored polarities**. Magnets used: **Neodymium N52**, **axial magnetization**, **cubic shape**, 25 mm side.

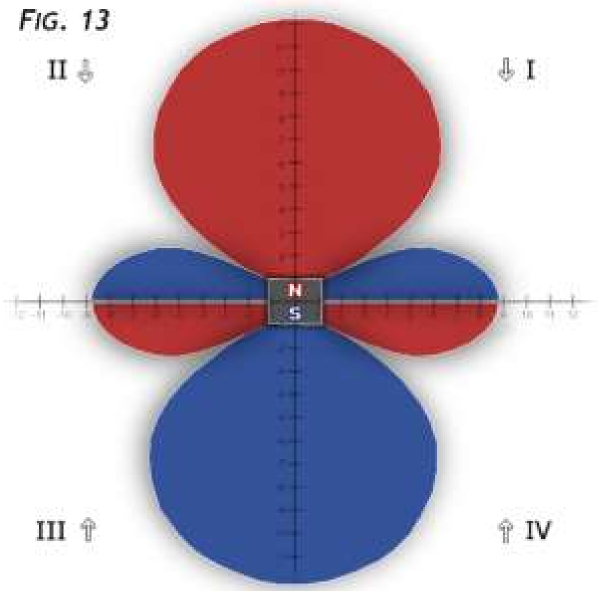


FIG 13: STUDY BOARD – Vertical Detection (Parallel to the Axis) – With mirrored polarities beyond the diameter

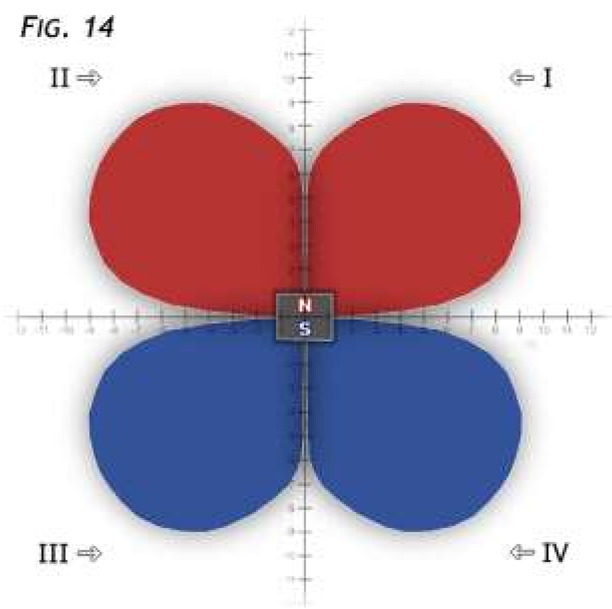


FIG 14: STUDY BOARD – Horizontal Detection (Parallel to the Diameter) – With mirrored polarities beyond the axis

FIG. 15

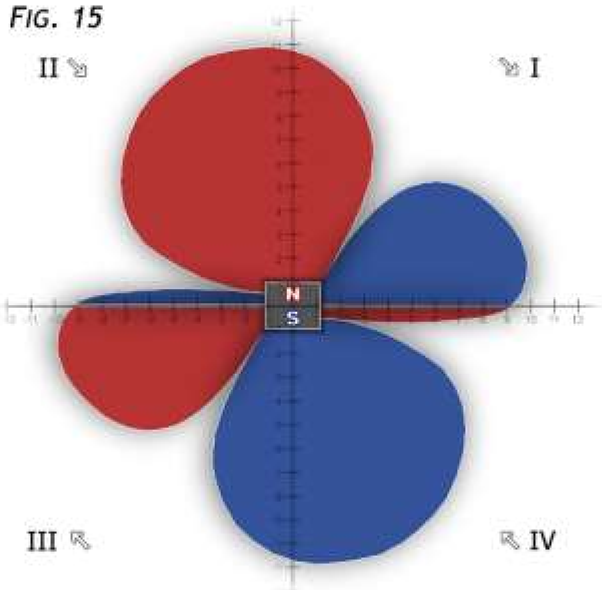


FIG 15: STUDY BOARD – 45° Detection (Relative to the Magnet) –
With mirrored polarities beyond the diameter

Analyzing the **vertical measurement** (FIG 13) or the **45° measurement** (FIG 15), the presence of **two additional polarities** of the magnet emerges laterally, extending beyond the diameter and sometimes above the opposite face.

However, it is necessary to consider **another reading mode**.

The **study boards** are constructed based on the **conventional representation of magnets** (north and south) and are more suitable for **theoretical study** than for **practical application**.

To explain this, ask yourself a simple question:
"A complete representation of magnetic field polarities is usually constructed to interact with which object?"

In reality, if we eliminate all **non-magnetic matter** and the various subsets, the answer is only one:

"For interaction with any other DIPOLE."

Knowing this, representing a board by **mirroring the polarities** (once the study phase is over) becomes somewhat **unrealistic**, because if you chose to interact with another "magnetic object" to dynamically exploit the guidance of the board, you would need a **monopole**.

Let's look specifically at the **two different types of boards**, both, for example, with **vertical measurement** (comparison also valid for boards with any measurement angle).

Note: When I talk about **interactions respected in the boards**, for better visual reference, I mean that if the **first attractive interaction** has the **color red**, every subsequent **attractive interaction** must also be **red**, and the same applies for **repulsive interactions**.

FIG. 16

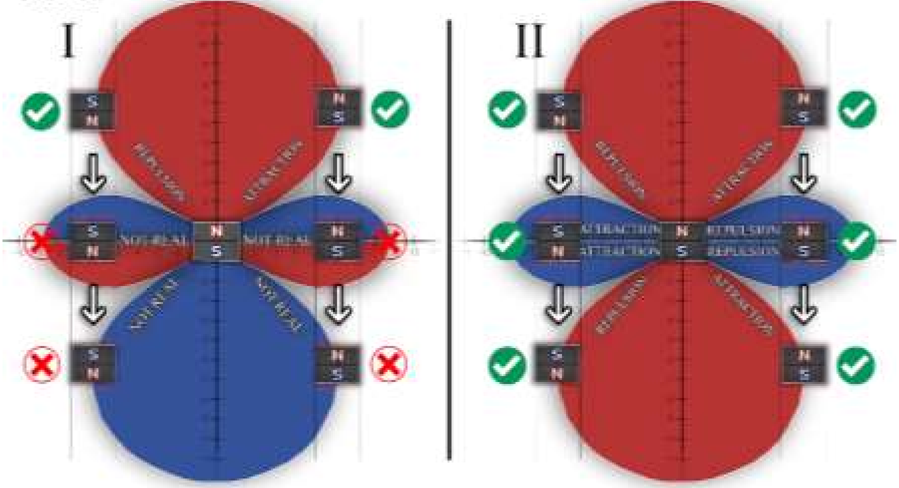


*FIG 16.I: **STUDY BOARD** (with mirrored polarities beyond the diameter) – Sequence of dynamic interactions between magnets not respected*
*FIG 16.II: **DYNAMIC BOARD** (continuous polarities) – Sequence of dynamic interactions between magnets all respected*

STUDY BOARD - FIG 16.I - If I take **2 magnets**, position them in **opposite orientations** (right and left), and slide them **from top to bottom** near the magnet under analysis, we can observe that this **mirrored board** does **not respect the true dynamics of reality**; to use it successfully, I would need to **rotate the magnets** once the diameter is surpassed.

DYNAMIC BOARD - FIG 16.II - With this type of board, if I perform the same actions, what I will obtain is: **attraction - repulsion - repulsion - attraction**, or also **repulsion - attraction - attraction - repulsion**; in this way, **all interactions occurring in reality are respected**.

And all this happens because we know that after passing the **diameter of the magnet under analysis**, everything will be inverted, **but it will also be inverted for the magnet used for interaction**.

It should be emphasized that **study boards** remain important, precisely because we need to be aware of the **different characteristics of the field** with its **various polarities**.

SUPPLEMENTARY VIDEO: https://youtu.be/Uf1_cp8qqj4

This reasoning introduces the **fundamental concept**: the **Hall effect sensor** can be interpreted as **equivalent to the magnetization of the dipole used for interaction**.

When using **dynamic boards**, and considering references to **quantum mechanics** that will be discussed later, it is advisable to **overcome the north/south distinction** and focus solely on **phenomena of attraction and repulsion**.

In this way, the **dynamic board (FIG 16.II)** allows for the **correct interpretation of the real dynamics of the field**, without confusion caused by the presence of multiple bubbles of the same color.

Only **dynamic boards** show analogies with **quantum mechanics**, probably because the **Schrödinger equations** describe interactions between **atomic dipoles** that respect the dynamics of the real world, even at a microscopic scale.

And so, here are the … **DYNAMIC BOARDS** …

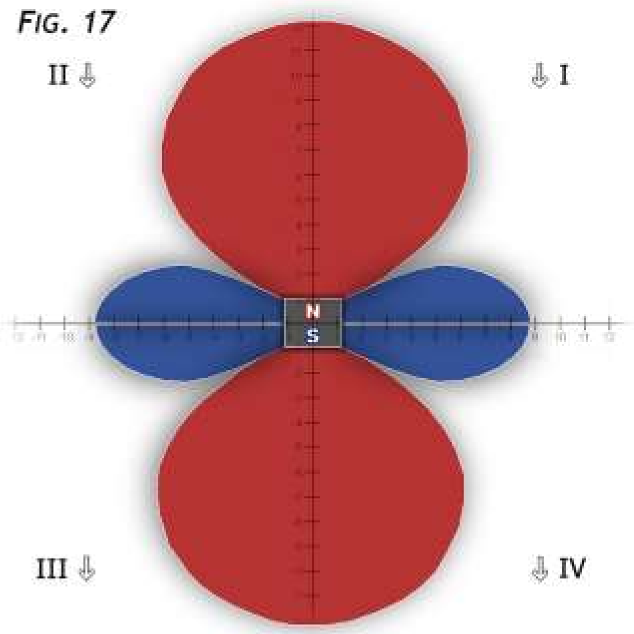


FIG 17: DYNAMIC BOARD – Vertical Detection (Parallel to the Axis) – With continuous detection – Central section of Atomic Orbital D – Quantum Numbers: n=3, l=2, mz=0

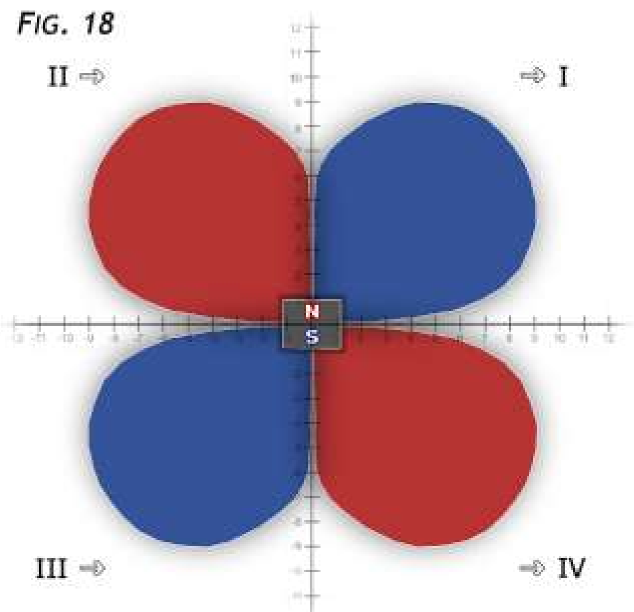


FIG 18: DYNAMIC BOARD – Horizontal Detection (Parallel to the Diameter) – With continuous detection – Central section of Atomic Orbital D – Quantum Numbers: n=3, l=2, mz=±1 (superposition)

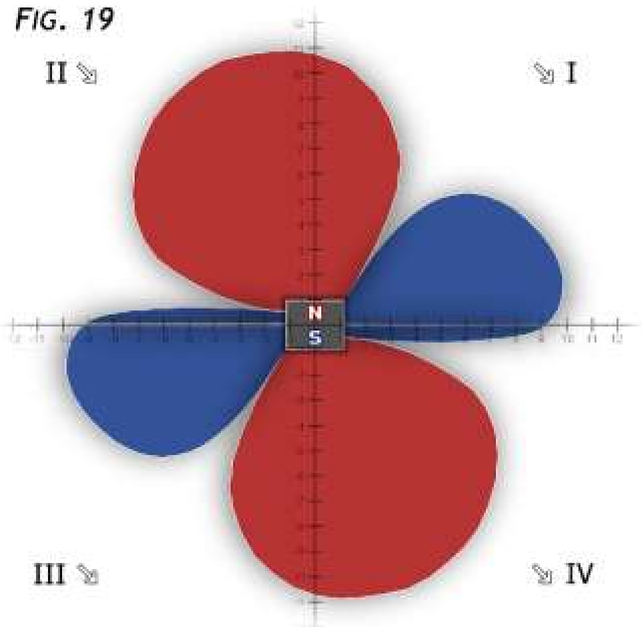


FIG 19: DYNAMIC BOARD – 45° Detection (Relative to the Magnet) –
With continuous detection – Experimental Board that will be useful later in this Research

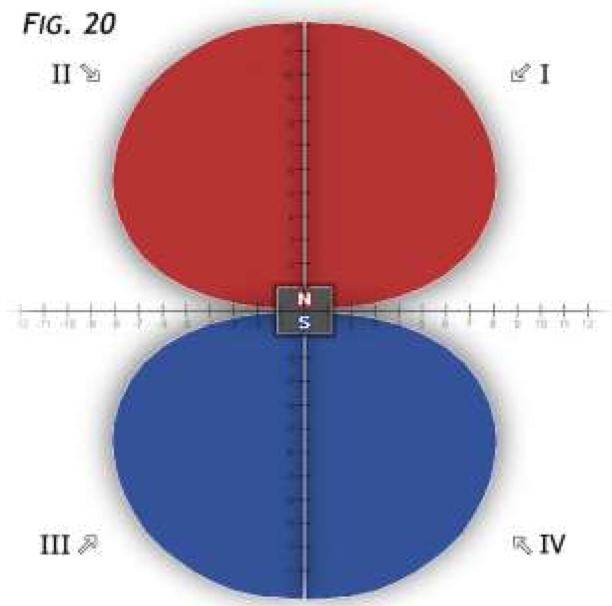


FIG 20: DYNAMIC BOARD – 360° Detection (Relative to the Magnet) –
Sensor always pointing toward the magnet for each detection point – Central section of Atomic Orbital P – Quantum Numbers: n=2, l=1, mz=0

These boards **do not change their shape at all** - it is only the **concept of their use** that shifts to enable proper interaction with other dipoles.

In fact, as we can see in **FIG 17** or **FIG 19**, that **side polarity of opposite sign** I previously mentioned (which in 3D would appear as a **toroidal ring**), and which, in the **Study Boards**, is interpreted simply as a "**strange extension of the polarities above the diameter**," - here instead becomes a **Real Independent Polarity**, one that can be **verified, experimented with, and applied**.

EXPERIMENTAL RESULTS 3D

MAGNETIC ORBITALS

How is it possible to obtain a **three-dimensional representation** of the magnetic field generated by a **permanent magnet** or an **electromagnet**?
It is necessary to use a **two-plane setup**: the magnet is placed on the **lower plane**, while the **upper plane** is used for **bidimensional scans**, progressively moving away from the source. Each **2D measurement**, acquired at a specific distance, constitutes a **single section**. The collection of sections - arranged in order of distance, exactly like a **CT scan** - allows the reconstruction of the **three-dimensional volume of the field**. Please refer to the **supplementary videos** included in the chapter on the measurement method.

The first time I started recording the measurement points, I had **no expectation** of the shapes that would emerge. I proceeded by systematically marking each point and noting the **corresponding polarity** next to it. Only at the end, by **joining points with the same polarity**, did **surprising geometries** appear - shapes already familiar in the context of **quantum mechanics**. It is important to emphasize that the first three comparisons presented in this chapter were obtained using **the same magnet**, modifying exclusively the **sensor's measurement angle**. This result allows direct observation of how the **spatial geometry of the field changes** according to the orientation of the measurement point - a **concrete analogy** with the behavior of quantum orbitals when their angular states vary. This represents one of the **first experimental demonstrations**, on a macroscopic scale, of **geometrical rules analogous to those in the quantum domain**.

Once the reconstruction mechanism was understood, I compared the obtained shapes with the **solutions of atomic orbitals predicted by the Schrödinger equation**. The goal was to identify **formal correspondences** between the geometries of the detected magnetic field and the **probabilistic profiles of electron orbitals**. On the **left of the figures** are the **canonical representations of theoretical orbitals**, while on the **right**, the corresponding **3D reconstructions obtained with the Hall effect sensor** are shown.

FIG. 54

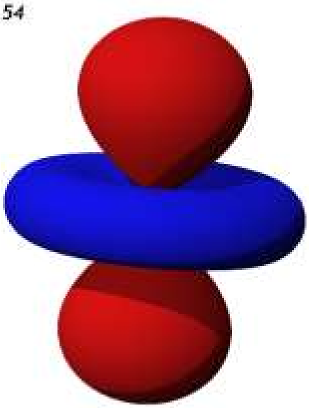


FIG. 55

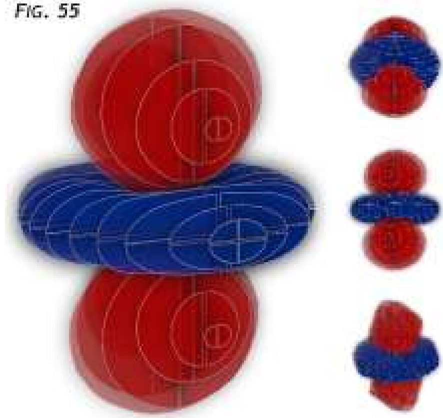


FIG 54: Wikipedia – Atomic Orbital D – Quantum Numbers: n=3, l=2, mz=0
FIG 55: Dynamic Board – Vertical Detection: Parallel to the axis of a magnet with axial magnetization. 3D effect recreated by overlapping multiple boards detected at different distances from the magnet

By observing **FIGs 54 and 55**, it is possible to notice an **extremely precise correspondence** between the two representations, both in the **geometry of the main polarities** and in the **ring structure** that surrounds the nucleus and the magnet.

The **internal inclination of the detection lines** in the central region of the ring, the **lateral bulging**, and the **overall proportions between the polarities** are also particularly evident.

In my opinion, this is one of the **strongest pieces of evidence** that allows us to completely **rule out the hypothesis of mere coincidence**: the probability of recreating such a **specific and complex shape** with a Hall effect sensor and a simple magnet is extremely low.

To achieve **high-quality results**, it is advisable to use **very powerful magnets**, such as **Neodymium N52**, preferably with **simple and regular geometries**. A **magnetic cube** generally represents the ideal choice.

It is nevertheless important to note that, even when **varying the shape of the magnet**, if the **axis and diameter** remain approximately comparable, the **general structure of the field** tends to remain **unchanged**.

FIG. 56

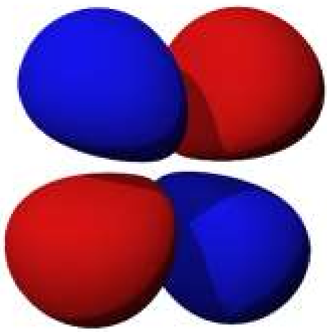


FIG. 57

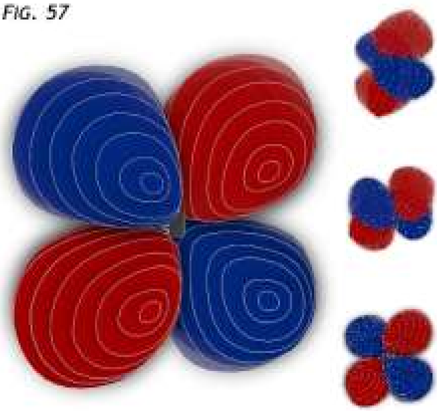


FIG 56: Wikipedia – Atomic Orbital D – Quantum Numbers: n=3, l=2, mz=±1 (superposition)
FIG 57: Dynamic Board – Horizontal Detection: Perpendicular to the axis of a magnet with axial magnetization. 3D effect recreated by overlapping multiple boards detected at different distances from the magnet

Even in the comparison between **FIG 56 and FIG 57**, significant correspondences emerge. In particular, we can observe:

- the regions of highest density closest to the main polarities and more spread out along the diameter of the magnet;
- the characteristic narrowing toward the center;
- the position of the terminal bulge of the polarity regions, surprisingly consistent with that predicted by the theoretical orbital.

It is therefore evident that, simply by **changing the observation angle of the same magnet**, the morphology of the magnetic field does not merely deform, but **radically alters its overall structure**.

Indeed, with a vertical measurement, **two main polarity regions and a central ring** appear (**FIG 55**), whereas with a horizontal measurement, **four distinct polarity lobes** emerge, positioned in completely different locations (**FIG 57**).

This variation clearly demonstrates the **angular nature of the field geometries**, perfectly analogous to the behavior of quantum orbitals.

FIG. 58

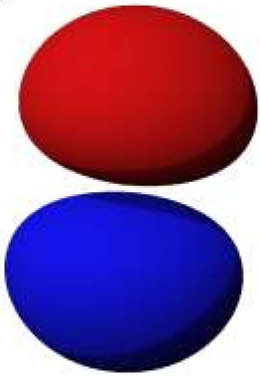


FIG. 59

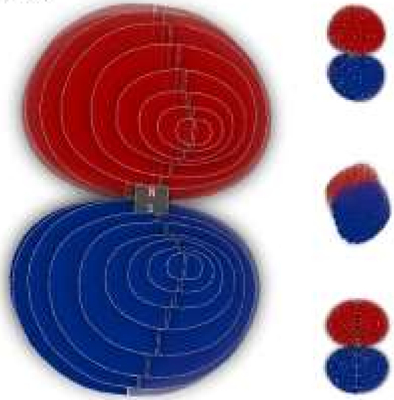


FIG 58: Wikipedia – Atomic Orbital P – Quantum Numbers: n=2, l=1, mz=0
FIG 59: Dynamic Board – 360° Detection around the magnet (marking each point with the sensor always pointed towards the magnet). 3D effect recreated by overlapping multiple boards detected at different distances from the magnet

The detection of this mapping (**FIG 59**) was particularly challenging. The reason I created this specific chart was to attempt a measurement that would be completely **perpendicular to that of a compass**.

I had to **gradually rotate the sensor 360°**, always pointing it toward the magnet, which meant respecting a different angle for each detection point, approaching from the outside toward the center of the polarity bubbles, **with one fixed angle at a time**, calculated beforehand.

Later, I discovered that there was an **identical orbital** (**FIG 58**). In this case, the key features to note are the **compression of the bubble at the top** and the **angled bulge** that forms on the sides.

Given the particular nature of the **360° scanning**, which is unlike any other fixed-angle detection, I believe this specific orbital is trying to **tell us something different** from all the others... By examining some of the more complex shapes, I began exploring precise **interactions between magnets**, aiming to recreate as many mappings as possible that **match the features of the primary atomic orbitals**.

FIG. 60

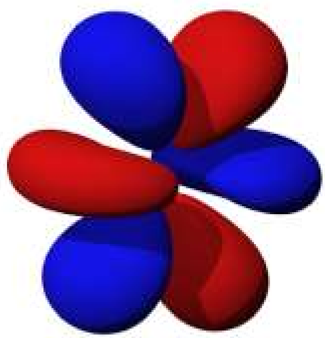


FIG. 61

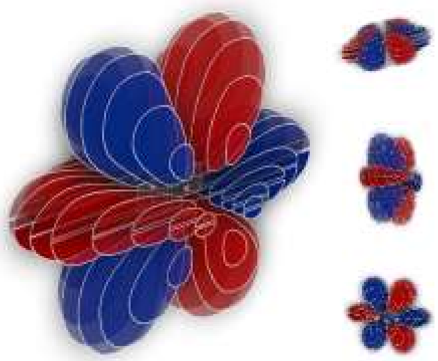


FIG 60: Wikipedia – Atomic Orbital F – Quantum Numbers: n=4, l=3, mz=±1 (superposition)
FIG 61: Dynamic Board – Vertical detection of 2 parallel magnets with axial magnetization in attraction, attached to each other – 3D effect recreated by overlapping multiple boards detected at different distances from the magnets

In these figures, we find the same sequence of polarities, the proximity of the two upper bubbles, and the greater extension of the lobes stretching along the diameter.

The proportions between the larger and smaller lobes in the actual magnetic field (**FIG 61**) perfectly match those of the corresponding theoretical orbital (**FIG 60**).

However, an important question arises:

Why, for these orbitals and the subsequent ones, is it necessary to use two separate magnets?

It is possible that, as the quantum numbers increase, a more complex magnetic field is required to correctly represent the orbital geometries, including not only higher energy but also orientation, distance, and the relationship between the polarities.

FIG. 62

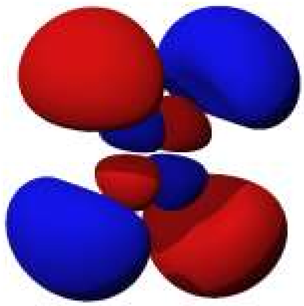


FIG. 63

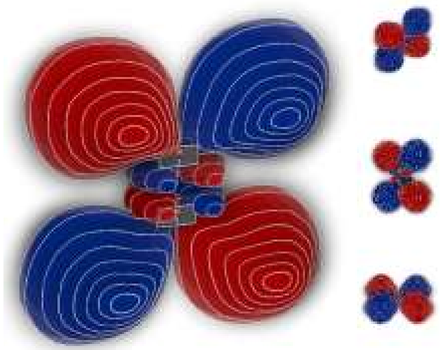


FIG 62: Wikipedia – Atomic Orbital D – Quantum Numbers: n=4, l=2, mz=±1 (superposition)
FIG 63: Dynamic Board – Horizontal detection: Perpendicular to the magnets' axis – 2 magnets facing each other in attraction at a distance of 2 cm. 3D effect recreated by overlapping multiple boards detected at different distances from the magnets

Here as well (**FIG 62-63**), the main characteristics appear to be respected:

- the **closer proximity** between the large bubbles extending from the external main polarities;
- the **proportion** between the large and the small central bubbles;
- their **position**, all clustered in the center;
- and the **shape** that forms in the central neutral point (even if it seems larger in the magnetic field, that's only because the sensor isn't as powerful as an equation).

Had I not positioned the magnets that way, at that specific **distance** and in **attraction**, I would not have been able to generate that particular configuration.

As we've said before, we're not just talking about injecting more energy by adding the magnetic field of another magnet; in this case, it seems we also need to consider the **SHAPE**, the **POLARITIES**, and the **ORIENTATION** of that added energy!

FIG. 64

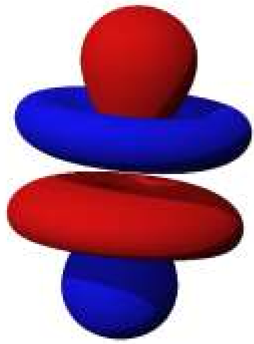


FIG. 65

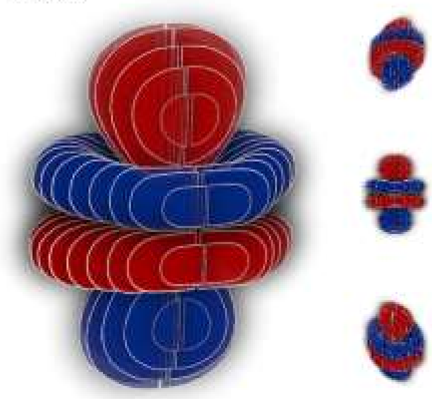


FIG 64: Wikipedia – Atomic Orbital F – Quantum Numbers: n=4, l=3, mz=0
FIG 65: Dynamic Board – Vertical detection: Parallel to the magnets' axis – 2 magnets in repulsive interaction, attached axially with acrylic glue. 3D effect recreated by overlapping multiple boards detected at different distances from the magnets

This detection was particularly challenging due to the **magnetic configuration**, which required attaching magnets together using **faces with the same polarity** - for example, I had to connect the **south pole** of one magnet axially to the **south pole** of another. Needless to say, there was a fair amount of **bloodshed and acrylic glue**, because these magnets were quite large and made of **N52 neodymium**.

I must say, the first time I tried it, they **practically exploded after a few seconds**, as I hadn't glued them properly. The energy trapped within was almost **tangible**… Yet the resulting shape **perfectly matches** that of the reference orbital, from the main polarity bubbles to the **two toroidal lobes** extending upward.

If I were to assign a value to the field, the **main polarities** are heavily affected by the forced magnetic flux variations caused by connecting the magnets in this unnatural way, which significantly **diminishes their original magnetic strength**.

On the contrary, the **energy radiating from the toroidal lobes** is the **strongest encountered** so far in any of the mappings.

FIG. 66

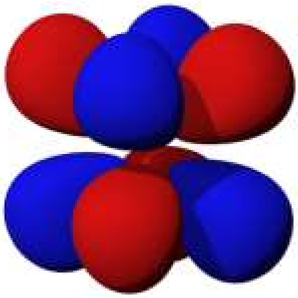


FIG. 67

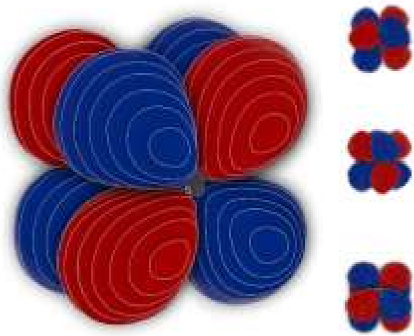


FIG 66: Wikipedia – Atomic Orbital F – Quantum Numbers: n=4, l=3, mz=±2 (superposition)
FIG 67: Dynamic Board – Horizontal detection of 2 parallel magnets with axial magnetization in diametrical attraction, attached to each other – 3D effect recreated by overlapping multiple boards measured at different distances from the magnets

This is the only orbital so far where I had to perform the detection **from above and below the magnets**, rather than from the side like all the others. Essentially, I had to place the magnets flat on the sheet, so that the **polar faces were oriented toward me**, instead of sideways.

The magnets were attached **in attraction**, aligned along their diameter, with the **detection aimed at the short side** of the magnets (details provided in the next chapter).

This magnetic orbital (**FIG 67**) features **eight symmetrical lobes**, with proportions that consistently align with all the predictions of the orbital equations (**FIG 66**).

With these comparisons, we may genuinely begin to answer some of the more **peculiar questions in quantum mechanics**, using these findings as **directional insights** for future reasoning - especially if it becomes definitively confirmed that these measurements are **an integral part of complex quantum systems**.

FIG. 68

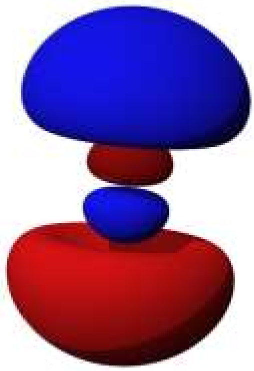


FIG. 69

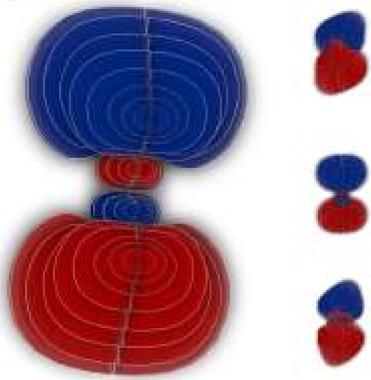


FIG 68: Wikipedia – Atomic Orbital P – Quantum Numbers: n=3, l=1, mz=0
FIG 69: Dynamic Board – 360-degree detection of 2 magnets with axial magnetization in attraction at 3 cm distance – 3D effect recreated by overlapping multiple boards measured at different distances from the magnets

This "SUPER MARIO MUSHROOM"- like configuration is created using **two magnets**, placed approximately **3 centimeters apart**, in an **axial arrangement**, and **oriented attractively** toward each other.

Just like the detection of the **single-magnet P orbital** we saw earlier, the measurement here is performed at **360 degrees around the two magnets**, but **focusing on the center** of the magnetic system - that is, the **center of the Cartesian axes**.

Again, as with all the other detections involving two spaced magnets, it’s necessary to **find the correct spacing** to ensure that the representations match the predictions of the equations. Keep in mind: **the farther apart the magnets are**, the **larger the internal lobes** between them will become.

Naturally, this reasoning can be extended by **adding more magnets**, **properly oriented**, which gradually increase in size with **greater distance from the center** of the magnetic system - drawing a direct analogy to the **increase in energy with distance from the nucleus** (to be explored in the next chapters).

FIG. 70

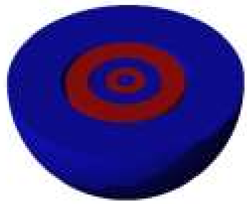


FIG. 71

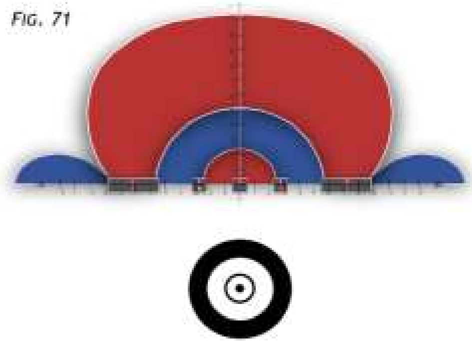


FIG 70: Wikipedia – Atomic Orbital S – Quantum Numbers: n=6, l=0, m=0
FIG 71: Dynamic Board – Vertical detection of 3 magnets with axial magnetization – First Magnet (Round) with NORTH facing up, Second Magnet (Ring-shaped) with SOUTH facing up, Third Magnet (Ring-shaped) with NORTH facing up.

For completeness, I also attempted to represent an “**S**” orbital - so far, the only one that has posed a bit of a challenge. In fact, I included the **2D image** to show that, while the final shape doesn’t form a perfect **sphere**, the **interior of the figure** is made up of **perfectly concentric spheres**, with a **millimetric gap** between them. And this, taken on its own, still effectively represents all “S” orbitals.

Of course, it’s important to remember that **I** was the one who chose this particular magnet configuration and spacing, and maybe with a **different setup**, this form would have matched **perfectly** as well.

For instance, I would have liked to try a **radially magnetized ring magnet** as the final magnet in analysis, in order to ensure spherical symmetry **even on the outside** - but unfortunately, I don’t have access to every magnet in the world, and it seems that in Italy, magnets of this type have practically been **banned**!

But this is really just for the **sake of completeness** in the measurements, because after all the orbitals already shown, we now have **all the confirmations** we were looking for - and are about to discuss…

FIG. 72

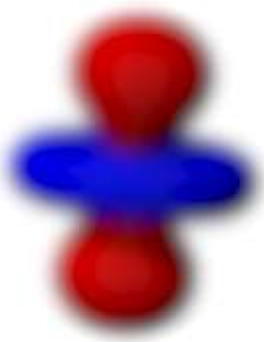


FIG. 73

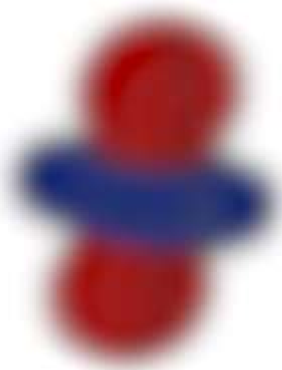


FIG 72: Blurred representation of an atomic orbital, showing a somewhat more accurate probability of finding an electron around the nucleus
FIG 73: Similarly to the probability of finding an electron around the nucleus, it is possible to compare the magnetic intensity gradient of a magnet developing around it

Continuing with the analogies, **atomic orbitals** are often described as **regions in space where the probability of finding an electron is highest**. Similarly, the **magnetic field** manifests in **spatial regions where the magnetic force is strongest**, following a **distribution strikingly similar** to that of atomic orbitals.

We can, in fact, point out that the **probability of finding an electron around the nucleus** (FIG 68) - which gives those characteristic blurry shapes - is the direct analogue of **magnetic field intensity**, which **gradually decreases with distance** (FIG 69), and thus **requires** a visual “blur” of magnetic field lobes for an accurate representation.

After all the diagrams compared so far, we can reasonably conclude that the **shapes of atomic orbitals and magnetic fields** appear to be **virtually identical**.

Simple Coincidence?

Possible Inconsistencies and Experimental Limits

Any differences do not stem from the underlying concept, but from physical reality:

- the shape and type of magnets available,
- the spatial configurations chosen,
- the sensitivity and precision of the Hall sensor,
- inevitable operational errors.

Finally, all mappings were obtained using axially magnetized magnets.

There are many other types of magnets and magnetizations.

Who knows how many other geometries we could discover by testing new interactions, including hybrid or electromagnetic ones.

MAGNETIC ORBITALS

Guide to Construction

Thus, after having successfully recreated the exact shapes of atomic orbitals through the detection of the magnetic field generated by one or more magnets using a Hall effect sensor, **we can now establish a practical guide to the "CREATION" of these remarkable forms within our macroscopic world.**

Based on all the characteristics observed in the experimental measurements so far, we can make the following assumptions:

- **SINGLE MAGNET**: **A SPECIFIC ANGLE OF MAGNETIC FIELD DETECTION "CREATES" A PRECISE ORBITAL** THAT ALSO REFLECTS THE SHAPE AND PROPERTIES OF THE MAGNET ITSELF.

- **TWO OR MORE MAGNETS**: THE SHAPE OF THE MAGNETIC FIELD ORBITAL ALSO DEPENDS ON **THE SPATIAL CONFIGURATION OF THE MAGNETS AND ON THEIR RELATIVE POLARITY ORIENTATION**, IN ADDITION TO THE DETECTION ANGLE AND THE INTRINSIC CHARACTERISTICS OF THE MAGNETS USED.

Furthermore, the detection angle can "DYNAMICALLY" alter the orbital shape **on demand**, effectively enabling control over the magnetic orbital structure (see Chapter: *Entanglement* for an in-depth analysis).

In this way, we will understand beforehand the entire creation dynamics, thanks to the structure of a precise method that starts from the identification of these shapes through specific magnetic measurements and configurations, as we saw in the previous chapter.

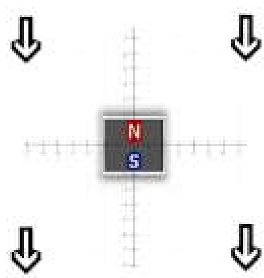
And here is a kind of useful guide to recreate the results of Schrödinger's equation using magnets or electromagnets in our macroworld; of course, this method should be assimilated after learning to use the sensor for 2D and 3D measurements, as explained in the chapters 'Measurement Method' and 'Settings'.

To perfectly recreate shapes that respect atomic orbitals, it would be advisable to use magnets with equal dimensions between axis and diameter, such as regular magnets like a cube or a sphere (a cube facilitates stability in measurements, so it's the better choice).

Furthermore, the instructions that follow will always pertain to magnets with AXIAL MAGNETIZATION, to clearly understand the magnet's orientation, identified with **N** and **S** written on the axis.

The direction of the measurement will be identified by arrows; **the following plane should be viewed as if you are placing a magnet on a sheet and looking at it from above**.

Therefore, you should also place the sensor on the sheet and keep it exactly in the direction of the arrows throughout the measurement to obtain the shape of the orbital being discussed.



MAGNETIC ORBITALS OF 'S' TYPE

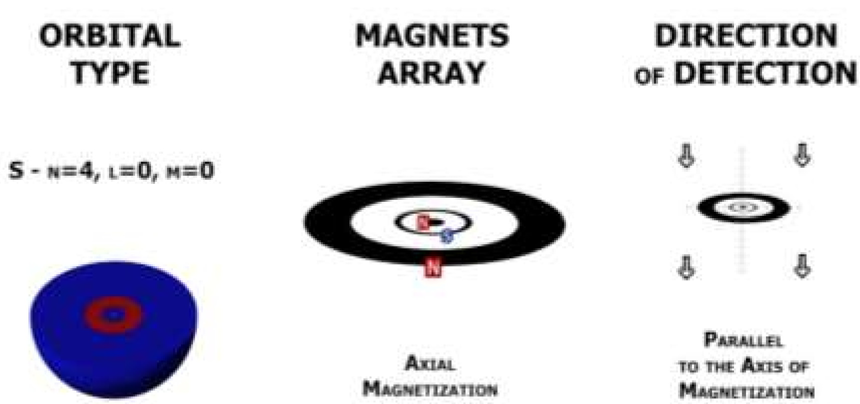
Let's start with the only type of orbital that has posed some challenges. As you saw in the previous chapter, these types of orbitals have the peculiarity of being concentric spheres like 'Matryoshka' dolls.

Although the external appearance may need to be adjusted with a specific type of final magnet, I found it useful to mention in this guide the method to recreate the interior of this type of magnetic orbital. **In reality, it features perfect spheres with inverted polarities, with a millimetric gap between them, exactly like all 'S' orbitals.**

The measurement with the Hall effect sensor should always be parallel to the magnetization axis.

The sequence of magnets to increase energy in accordance with the results of probabilistic equations should be represented by a central magnet and several ring magnets, nested inside each other, progressively larger, all with inverted polarities.

This means that if the first magnet, whether round or cylindrical, has the North pole facing up, the second magnet, which is a ring, will have the South pole facing up, the third magnet, also a ring, will have the North pole facing up, and so on...



MAGNETIC ORBITALS OF 'P' TYPE

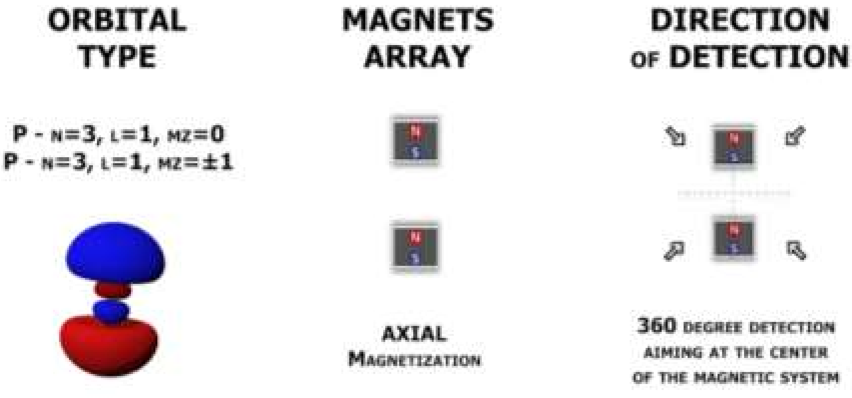
This type of orbitals has the most challenging detection of all; you must proceed 360 degrees with the sensor, changing the angle for each measurement point, always aiming at the center of the magnet under analysis, if using a single magnet.

A single magnet, analyzed 360 degrees, will produce the shapes of 'P' type orbitals: n=2, l=1, m_z=0 and n=2, l=1, m_z=±1.

With 2 magnets, placed approximately 2-3 centimeters apart in an axial position and oriented attractively towards each other, it is instead possible to obtain the atomic orbitals of 'P' type: n=3, l=1, m_z=0 and n=3, l=1, m_z=±1.

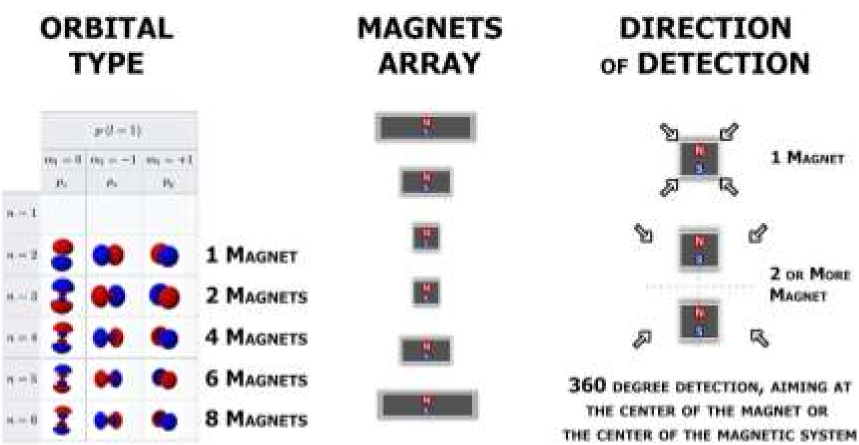
The 360-degree analysis in this case must be performed aiming at the center of the magnetic system; by magnetic system, I mean the entire configuration set up to represent the orbital.

Therefore, aim the sensor always at the center of the axes of a hypothetical Cartesian plane, as described in the following Figure.



It is possible to further increase the energy of the system by introducing additional magnets. However, to properly respect the shapes of more complex orbitals, it is important to consider that electrons farther from the nucleus have more energy. Therefore, applying this reasoning to representations through magnetic fields, we will need increasingly larger or powerful magnets as we move away from the center of the magnetic system.

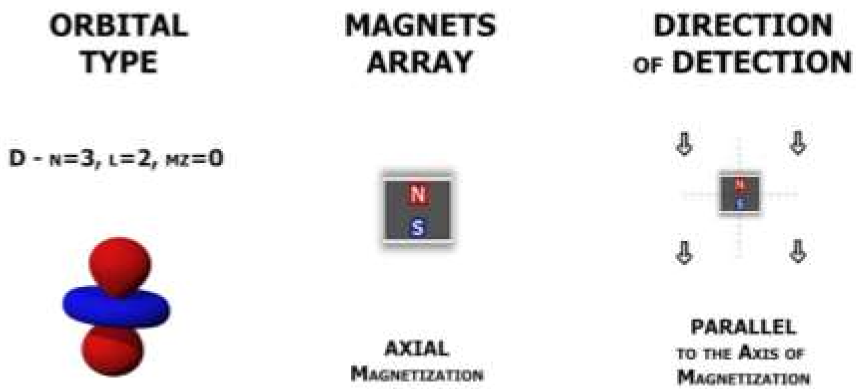
The arrangement of magnets for complex shapes, as seen in the figure, is always in AXIAL position with attraction-oriented polarities between them. Additionally, it's necessary to always use an even number of magnets and space them proportionally apart.



MAGNETIC ORBITALS OF 'D' TYPE

It's absolutely fascinating to observe how the simple act of measurement can change the shape of the magnetic field we are detecting.

In fact, in this measurement, we can always observe a single magnet taking the shape of a 'D' orbital: n=3, l=2, m_z=0, simply because we are observing it parallel to the magnetization axis.

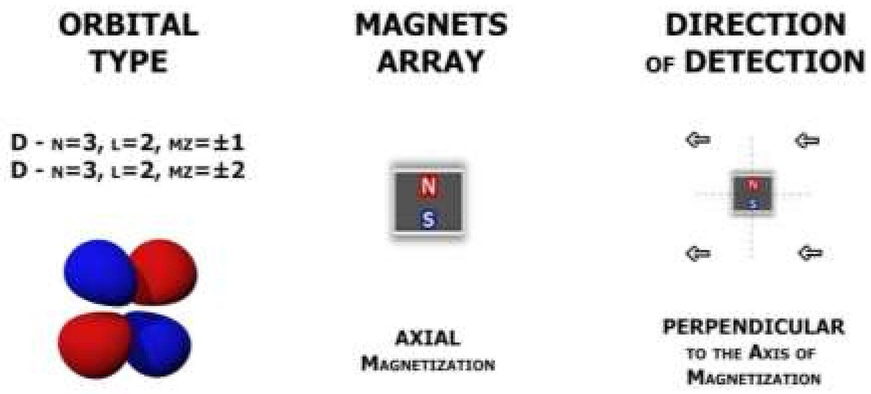


So, to summarize, a single magnet observed 360 degrees will produce a 'P' orbital: n=2, l=1, m_z=0/±1, but if observed parallel to the magnetization axis, it will appear as a 'D' orbital: n=3, l=2, m_z=0, which will not only have 2 lobes but will also include a toroidal shape around the magnet.

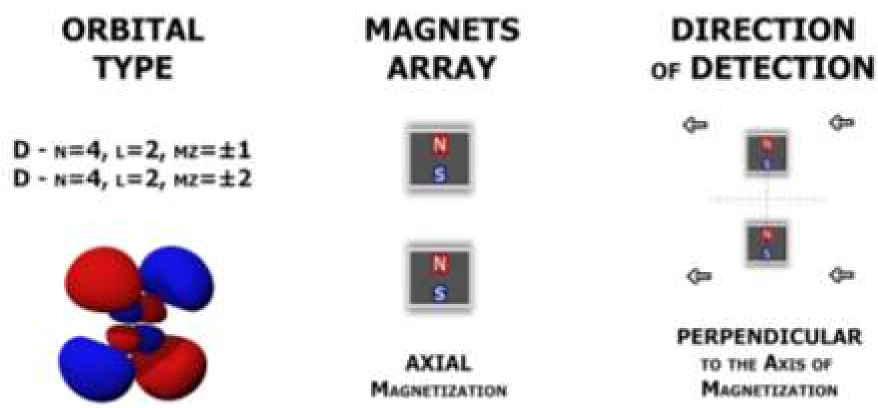
But it gets even more absurd than this...

Analyzing the same single magnet perpendicularly to the magnetization axis presents yet another type of orbital, completely different in shape and characteristics.

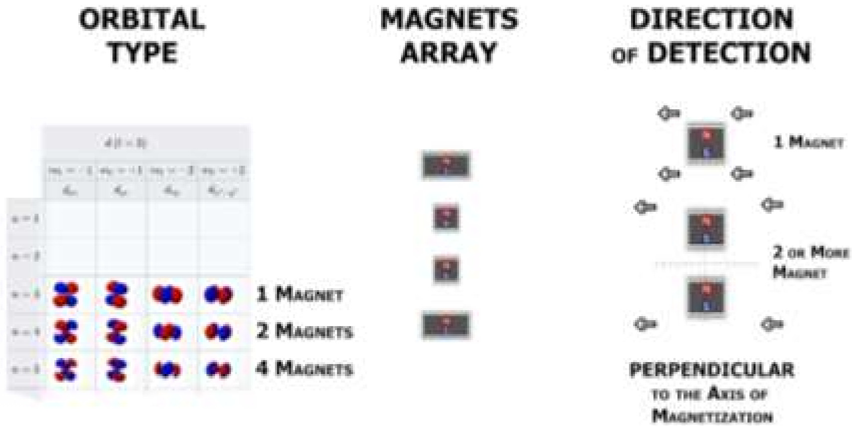
In reality, considering the different inclinations, a family of orbitals is obtained, specifically the 4 'D' type orbitals: n=3, l=2, m_z=±1, n=3, l=2, m_z=±2, as depicted in the following Figure.



With the same configuration of 2 magnets used to represent the more complex 'P' orbitals described earlier (n=3, l=1, m_z=0/±1), that is, positioned approximately 2-3 centimeters apart in an axial position and oriented attractively towards each other, simply observing the field perpendicularly to the magnetization axis will instead present us with the family of 'D' orbitals: n=4, l=2, m_z=±1 and n=4, l=2, m_z=±2.



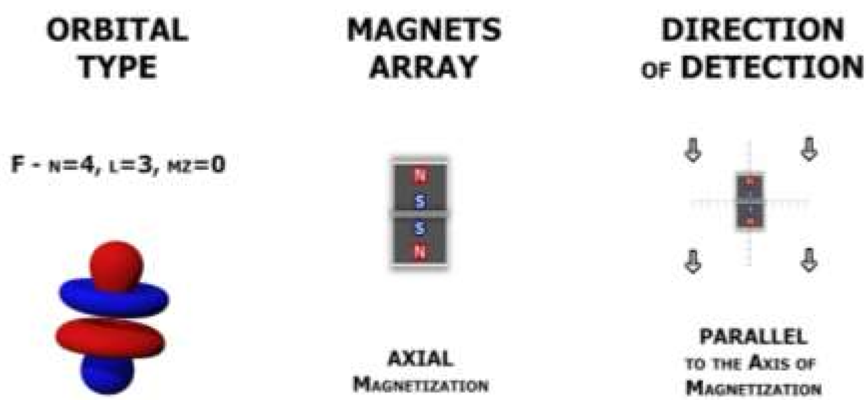
It's possible to continue adding energy through additional magnets to achieve even more complex shapes, always respecting both the orientation and proportion of magnets based on their distance from the center of the magnetic system, analogous to the distance from the nucleus for electrons. So, in summary, the process will proceed as follows, speaking in terms of detection, arrangement, and magnetic orientation, to create all forms of 'D' orbitals 'without torus'.



MAGNETIC ORBITALS OF TYPE 'F'

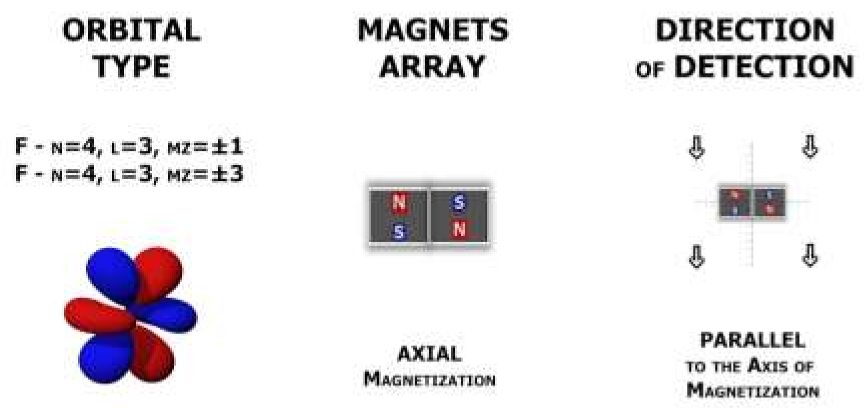
These detections required a bit more creativity and luck, considering the multiple possibilities of arrangement, orientation, and distance needed to interact the magnetic field of 2 magnets in ways suitable for our objective.

For example, I had to glue together 2 neodymium magnets with the same polarities facing each other, thus repelling, using a significant amount of acrylic glue. This axial arrangement, always oriented with detection parallel to the axis, will produce the shape of an 'F' orbital: n=4, l=3, m_z=0, as depicted in the following schematic...



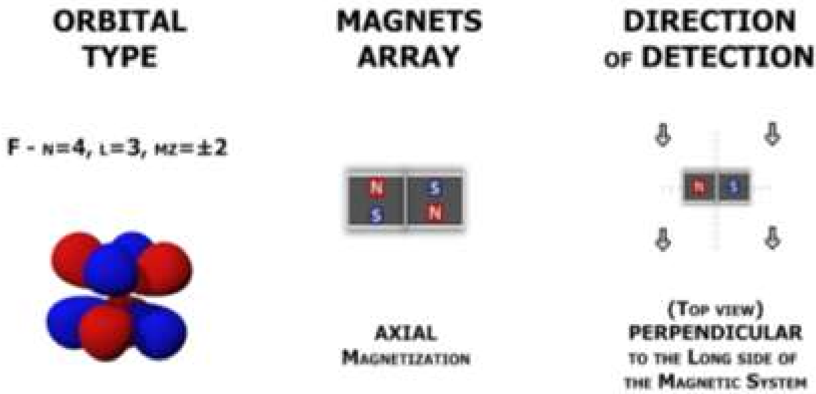
The fact that the same polarities of 2 magnets are oriented in repulsion and were glued together without any gap allows the creation of 2 toroidal shapes protruding towards the axis of the magnet, rather than the diameter like the 'D' orbital n=3, l=2, m_z=0.

The bubbles of the two main polarities, above and below the figure, are greatly affected by the contrast of polarities and are less powerful, thus much smaller than those of the 'D' orbital. With 2 magnets positioned diametrically to each other, oriented in attraction, we move to another orbital, or rather another family of 'F' orbitals: n=4, l=3, m_z=±1 and n=4, l=3, m_z=±3.



The detection of these shapes is parallel to the axis of magnetization, and we can see 4 larger lobes belonging to the main polarities, above and below the magnet which is surrounded by 2 other polarities extending horizontally; it's not difficult to imagine that these two polarities represent the same torus, for example, as the 'D' orbital n=3, l=2, m_z=0, which, being formed by distinct polarities in this case, does not complete the toroidal shape.

The following type of orbital, instead, is characterized by 8 lobes. It requires a particular detection method, considering that unlike all the others, it must be performed not only perpendicular to the magnetization axis of the magnets but also perpendicular to the long side of the magnetic system, as shown in the figure. Orbital 'F' n=4, l=3, m_z=±2.



And finally, with all the supporting evidence, I would like to delve into these results conceptually... As we have just observed, this work leads us to seriously compare the macro magnetic and electromagnetic field to the probability of finding an electron around the nucleus, which indeed, shouldn't be exactly the same thing, right?

But...

What could it mean to have recreated **ALL** atomic orbital shapes with perfect detail through the magnetic and/or electromagnetic field? Moreover, even more surprisingly, as you've surely noticed, simply adjusting the angle in the analysis of a single magnet can generate 3 different Families of Orbitals. Now, saying it's a coincidence becomes quite bold at this point...

So, the real question we should now ask ourselves is:

How do we translate all the rules of Quantum Mechanics into the real world to describe and understand the behavior of this strange quantum magnetic/electromagnetic field?

INTERACTIONS BETWEEN MAGNETS

FIG. 25

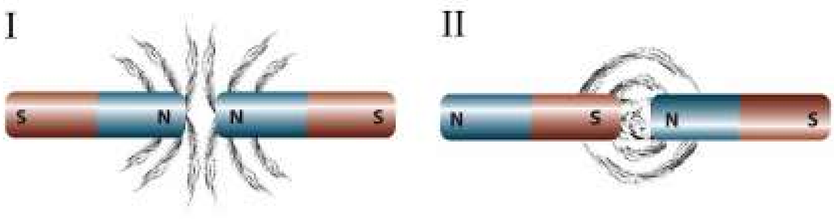


FIG 25.I: 2 Magnets in REPULSION - Magnetic Field Lines with Iron Powder
FIG 25.II: 2 Magnets in ATTRACTION - Magnetic Field Lines with Iron Powder

After structuring this method, I delved into the interactions of the magnetic field between 2 or more magnets to clearly distinguish what happens. Currently, we have representations that indicate the presence of a neutral point in the field exactly at the center of 2 repelling magnets (FIG 25.I), while lines intersect each other in magnets that attract (FIG 25.II).

I recreated the same conditions (we'll see it in a few tables), but to make things more interesting, knowing now that thin and powerful magnets have strange bubbles of inverse polarity that extend in much more peculiar ways, I present a sequence of dynamic tables (also available as GIFs) between 2 magnets in attraction compared to the same magnets in repulsion, at different distances and positions from each other, detected vertically.

It should always be remembered that the tables we are about to see in 2D actually have very different three-dimensional aspects that are difficult to imagine quickly, but we will see it better in the quantum part of this research.

FIG. 26

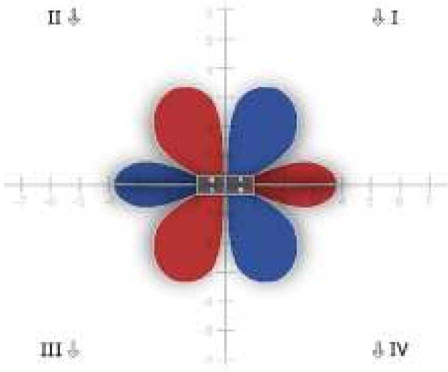


FIG. 27

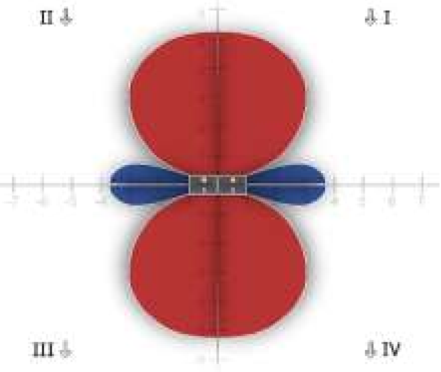


FIG 26: Dynamic Table - 2 Magnets in parallel ATTRACTED attached to each other - Side view of Neodymium N35 Rectangular Magnets 30(length) x 10(width) x 5(thickness) FIG 27: Dynamic Table - Same magnets and conditions but in REPULSION attached to each other with force and lots of acrylic glue

Considering that the proportions of the magnetic field between the tables are also respected, we can observe the amount of extra energy obtained by forcing two magnets in repulsion to be perfectly attached to each other (FIG 27), in addition to the extreme difference in shape with the magnets in attraction that maintain the polarities well separated from each other (FIG 26).

We are talking about 6 polarities in attraction and 4 in repulsion (counts on 2D images); because in 3D there would always be 6 magnets in attraction, compared to 3 in repulsion, because the two lateral blue polarities in FIG 27 are actually a single toroid, as we will see in the following chapters.

This sequence of magnet interactions we are observing will indeed help us approach the 3D forms we will see in the quantum chapters; these interactions are truly unique and unpredictable, allowing us to see them in action.

FIG. 28

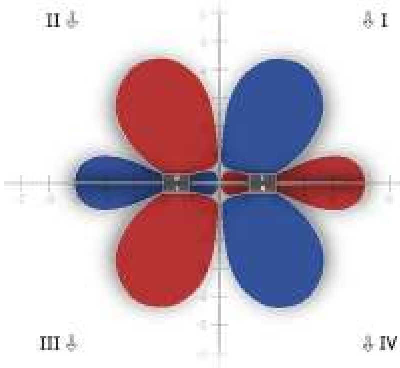


FIG. 29

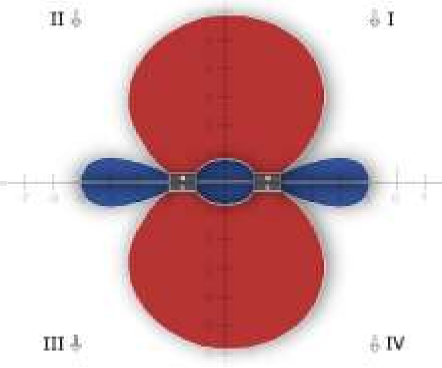


FIG 28: Dynamic Table - 2 parallel Magnets in ATTRACTION at a distance of 2 cm - Short side view of Neodymium N35 Rectangular Magnets 30(length)x10(width)x5(thickness) FIG 29: Dynamic Table - Same magnets and same conditions but in REPULSION

If we move the magnets 2 cm apart, we start to observe fantastic things; in the magnets in attraction (FIG 28), the external polarities remain well distinct, and two additional polarities are added in the center of the magnets, creating two neutral points above and below the diameter with their perimeters.

In the magnets in repulsion (FIG 29), however, we can see that a single reverse polarity is added between the magnets, which rises up to about 7mm above the faces of the two magnets.

It's curious to see that the neutral points, in this probabilistic view of the magnetic field, appear only between bubbles of opposite polarities, which is completely opposite to what we have always seen when measuring with iron in the classical version of the magnetic field.

FIG. 30

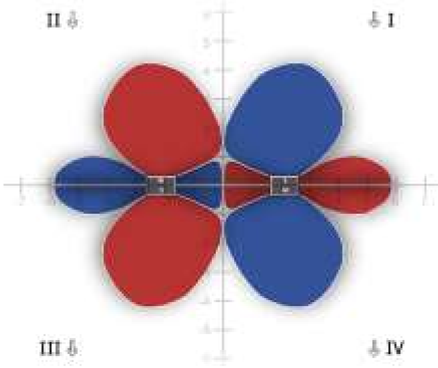


FIG. 31

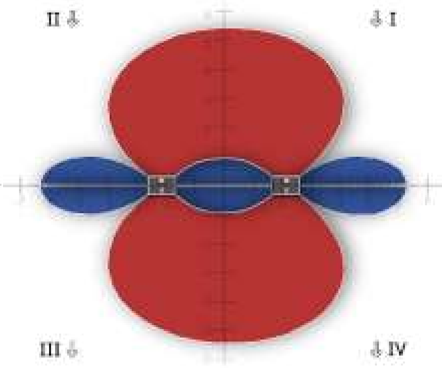


FIG 30: Dynamic Table - 2 Magnets in attraction at a distance of 3 cm - Short side view of Neodymium N35 Rectangular Magnets 30(length)x10(width)x5(thickness)
FIG 31: Dynamic Table - Same magnets and same conditions but in repulsion

If we separate the magnets by 3 cm, we can observe how the sensor always detects the 2 neutral points between the magnets in attraction (FIG 30), but the central polarities increase in intensity.

Analyzing the magnets in repulsion (FIG 31), besides noticing a further increase in the field, we can observe that the inverse polarity within the main polarities grows precisely up to 1 cm, and the external main polarities also increase proportionally.

I always remind that by using the verification methods seen previously, we can validate the sensor's readings.

Magnets in repulsion exhibit 5 polarities compared to the 8 in attraction (counting based on 2D images).

FIG. 32

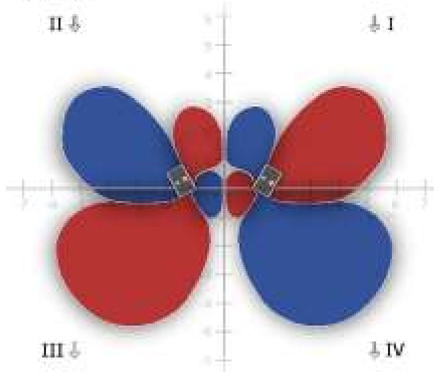


FIG. 33

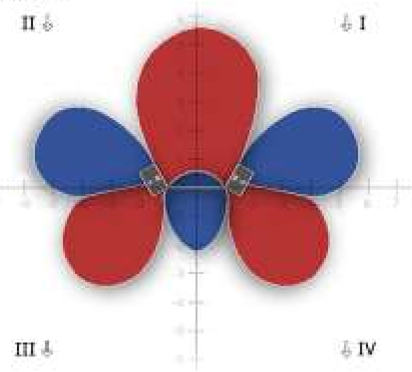


FIG 32: Dynamic Table - 2 Magnets in ATTRACTION 2 cm apart, with a 60° angle relative to their axis - Short side view of Neodymium N35 Rectangular Magnets 30(length)x10(width)x5(thickness)
FIG 33: Dynamic Table - Same magnets and conditions but in REPULSION

Tilting the magnets between them (in this case 60°), we obtain these stunning figures that indicate the behavior of the polarity bubbles concerning attraction (FIG 32) and repulsion (FIG 33); a completely different behavior.

Once again, we find a neutral point only in the attractive interaction. The polarities in repulsion return to being 6, and there are still 8 in attraction (counts based on 2D images).

Imagine how astonishing magnetic fields must be when viewed in this way, if we had the ability to dynamically observe these interactions simply by changing the orientation of the magnets.

Moreover, consider the fact that (as we have seen) changing the observation point also changes the shape; now imagine varying the positions of the magnets while the observer is also moving!

FIG. 34

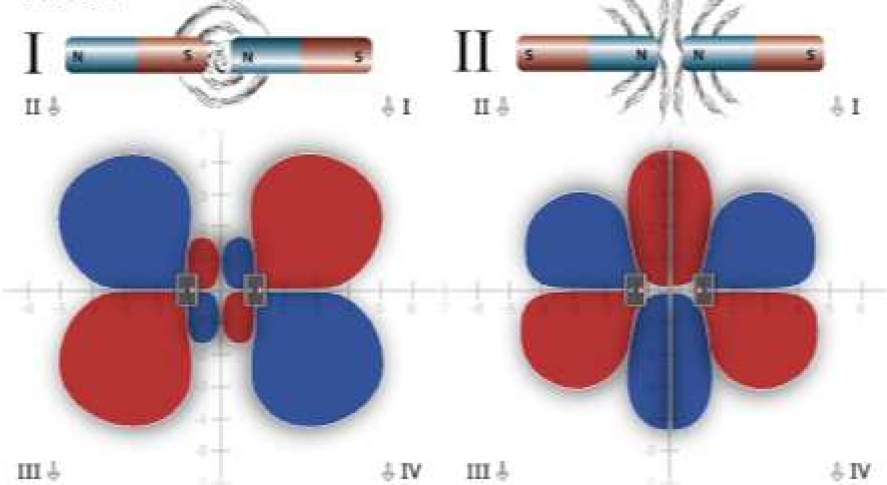


FIG 34.I: Dynamic Table - Perpendicular Detection to the Axis - 2 Magnets with faces in ATTRACTION at a distance of 2 cm - Short side view of Neodymium N35 Rectangular Magnets 30(length)x10(width)x5(thickness)
FIG 34.II: Dynamic Table - Perpendicular Detection to the Axis - Same conditions but in REPULSION

In these 2 tables, the same conditions shown in the books have been recreated for further investigation; indeed, we can observe that at the center of the magnets in repulsion (FIG 34.II), a large neutral point is effectively marked by the sensor, extending parallel to the axis of the magnets.

Additionally, the magnets in attraction (FIG 34.I) also seem to present a neutral point exactly at the center of the 4 polarities.

The number of polarities remains 6 in repulsion and 8 in attraction (counts on 2D images).

As you may have understood, the magnetic field detections of a simple magnet can be multiple; indeed, we could provide many other comparisons with the simple representations in the books, for example:

FIG. 35

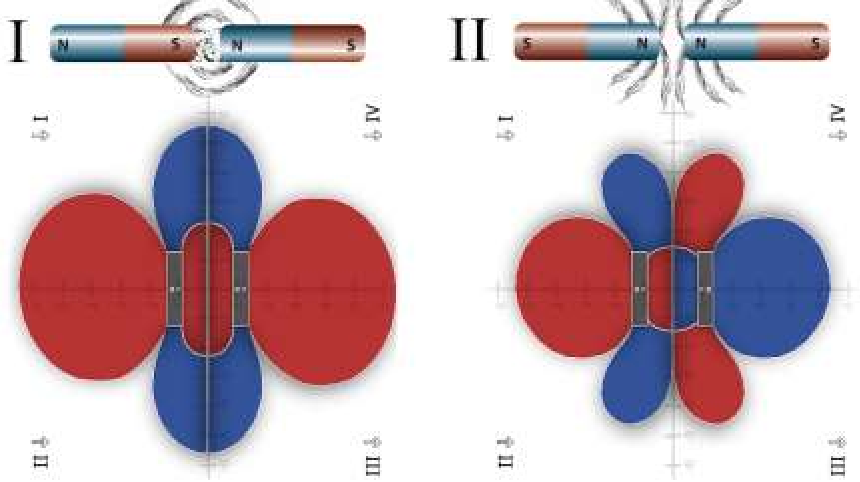


FIG 35.I: Dynamic Table - Detection parallel to the axis - 2 Magnets facing each other in ATTRACTION at a distance of 2 cm - View from the long side of Neodymium N35 Rectangular Magnets 30(length)x10(width)x5(thickness)
FIG 35.II: Dynamic Table - Detection parallel to the axis - Same conditions but in REPULSION

This detection is perpendicular to the previous ones (I also tilted the tables for a better visual comparison), made with rectangular magnets, and with this detection angle, we can observe how all the neutral points disappear both between the magnets in attraction (FIG 35.I) and in repulsion (FIG 35.II), and well-defined internal polarities are created.

Furthermore, with this angle, we see for the first time that the magnets in repulsion show more polarity bubbles, 8 compared to the 5 in attraction (counts on 2D images).

These detections are excellent for understanding the interactions of the magnetic field between magnets, even though the magnets used are much thinner (in length) than those used for the normal representations in textbooks.

FIG. 36

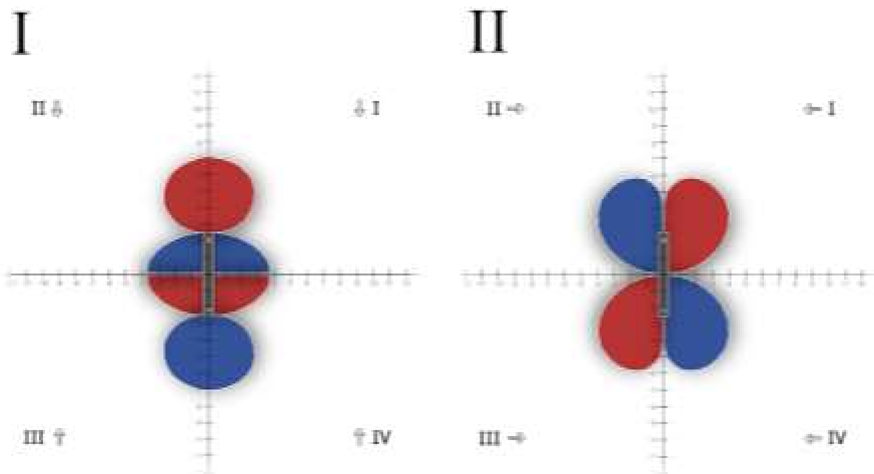


FIG 36.I: Dynamic Table - Detection parallel to the axis - Long side view of 1 Neodymium N35 Cylindrical Magnet 5 (diameter) x 50 (length)
FIG 36.II: Dynamic Table - Detection perpendicular to the axis - Same Magnet

The table in FIG 36.I shows a vertical detection of a long magnet where we can observe the lateral bubbles lowering below the main polarity face of the magnet, but still extending above its diameter; FIG 36.II shows a horizontal detection.

The reason I chose thinner magnets for the previous tables is precisely because with long magnets, the lateral polarities are much less pronounced, and with these comparisons, I wanted to make the interactions between the bubbles as evident and dynamic as possible.

At the end of the book, it is written where you can find the link that will take you to a folder full of GIFs of these interactions, 3D scans, and much more...

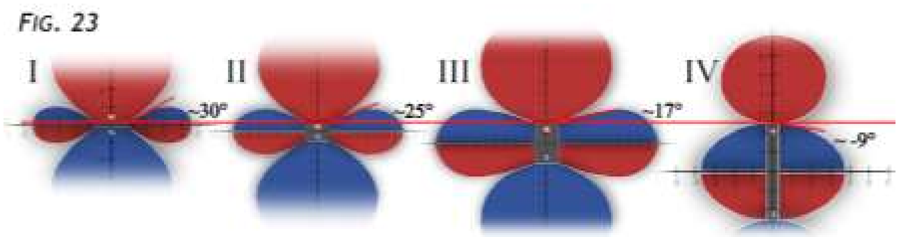


FIGURE 23.I: Magnet Thickness 4mm - Reverse Polarity Angle 30°
FIGURE 23.II: Magnet Thickness 20mm - Reverse Polarity Angle 25°
FIGURE 23.III: Magnet Thickness 40mm - Reverse Polarity Angle 17°
FIGURE 23.IV: Magnet Thickness 50mm, Reverse Polarity Angle -9°

-Magnets used in .I, .II, .III: N52 Axially Magnetized Diamond Shape (Triangular with the top 2 corners cut) - 25(length) x 24(width) x 4(thickness) x 1 (FIG 23.I), x5 (FIG 23.II), x10 (FIG 23.III) - stacked on top of each other

-Magnet used in .IV: 1 N35 Axially Magnetized Cylindrical Magnet - 5mm (diameter), 50mm (length)

One of the most peculiar things we can observe in these measurements (in this case vertical - FIG 23) is the presence of an opposite polarity above the diameter of the magnet.

In some cases, it even appears above the face of the main polarity laterally, and it seems to have a direct connection with the size of the magnet faces, the power, but especially with the distance between the two opposite polarities.

As we can see in FIG 23:

- I: A single magnet with a thickness of 4mm shows a bubble rise angle of about 30° from the start of the magnet;
- II: 5 magnets with a thickness of 20mm show an angle of about 25°;
- III: 10 magnets with a thickness of 40mm reduce the angle to 17°;
- IV: A cylindrical magnet with a length of 50mm shows a negative angle, although it still has this inverse polarity above the diameter.

In the first three figures, N52 triangular magnets – 25mm side – were used, increasing their number, while in the fourth, the cylindrical magnet has a polarity face size of only 5mm in diameter and is N35.

This indicates, as mentioned before, that the face size and power also play an important role in the structure of this particular polarity bubble, because reaching 50mm with the triangular N52 magnets of the other figures would not have produced a negative angle, but about 7° above the main face.

ELECTROMAGNETS

It was inevitable to move on to the detections of electromagnets as well, to find out if these new representations also apply to them. It seems that they do, but there are additional characteristics to consider, such as the amount of current used and the presence or absence of iron in the core.

Here are some study tables with vertical and horizontal detection of an aluminum wire coil, quite large: 320 grams - Inner air core (diameter): 2.5 cm - Outer diameter: 6 cm - Length: 6 cm - powered at 24 V 4.5 A.

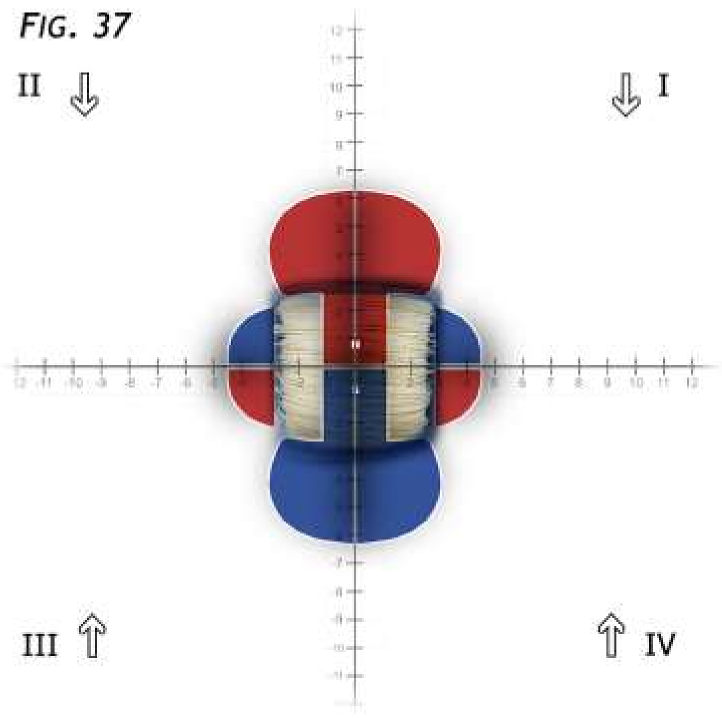


FIG 37: Study Table - Detection Parallel to the Axis - Winding with 1mm Enameled Aluminum Wire Powered at 24V 4.5A

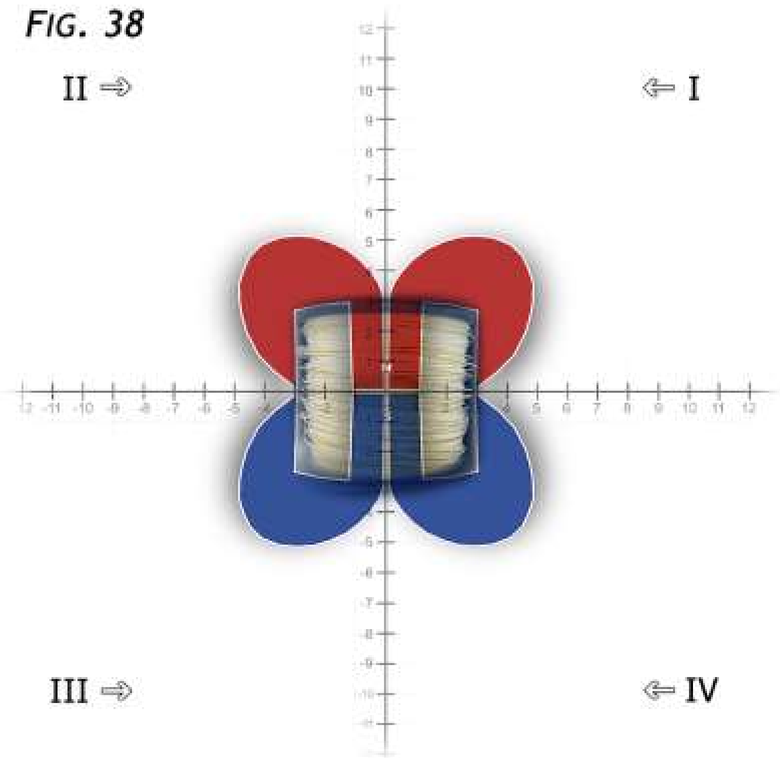


FIG 38: Study Table - Detection Perpendicular to the Axis - Winding with 1mm Enameled Aluminum Wire Powered at 24V 4.5A

As we can see (FIG 37-38), the shapes tend to be similar to magnets, but less bulging and extended.

Additionally, even though the coil has a nice central air core, it doesn't seem to behave like, for instance, a ring magnet, which exhibits a central polarity reversal.

Inside the core, it appears to continue normally with the main polarity, as we know.

FIG. 39

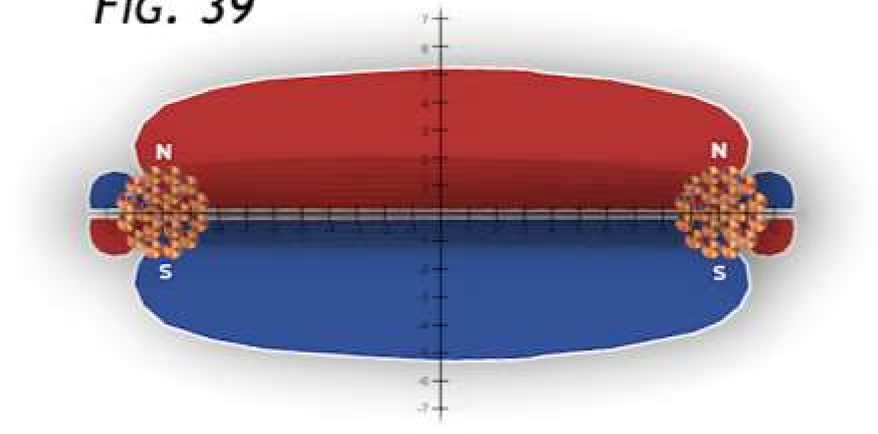


FIG 39: Study Table - Parallel Axis Detection - Coil with 20 cm air core, 1mm copper wire, powered at 24V 4.5A

To be a bit more certain about this, I analyzed a coil with a 20cm core (FIG 39) to dispel any doubt, and indeed, even with such a large core, there is no central polarity inversion.

As for the extent of the bubbles, I present this sequence with a gradual increase in current and the insertion of 2 cores of different sizes.

There is also a GIF available for this sequence

"Energy Increment Sequence": FIG 40 - 41 – 42:

FIG. 40

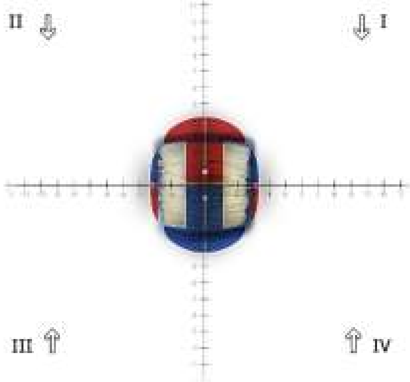


FIG. 41

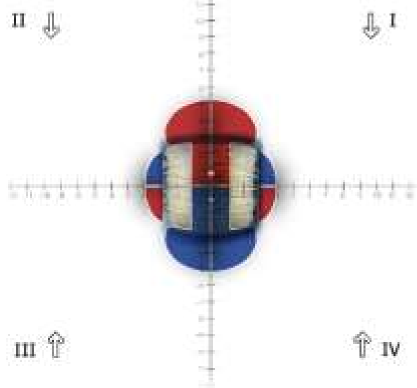


FIG. 42

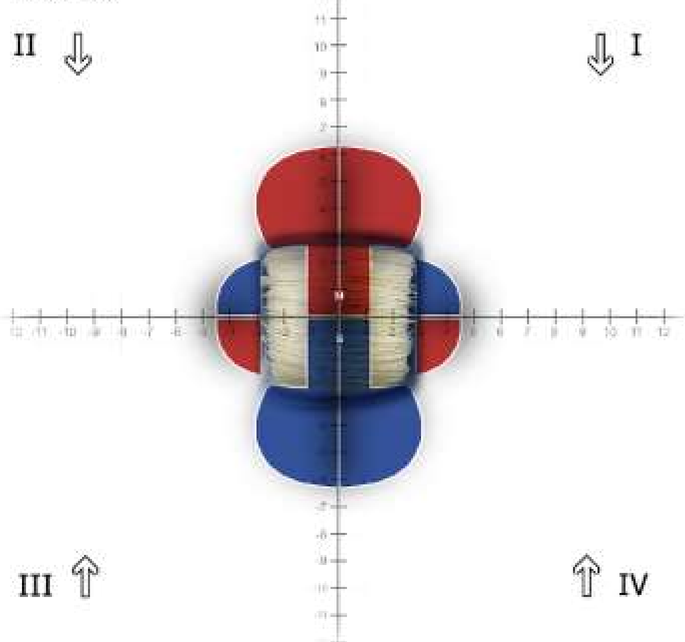


FIG 40: Study Table - Parallel Axis Detection -
Coil with 1mm enameled aluminum wire powered at 12 V 1 A
FIG 41: Study Table - Parallel Axis Detection -
Same conditions, same winding powered at 18 V 2.7 A
FIG 42: Study Table - Parallel Axis Detection -
Same conditions, same winding powered at 24 V 4.5 A

"Sequence of Inserting Iron Cores of Different Sizes at Equal Energy":
FIG 43 – 44:

FIG. 43

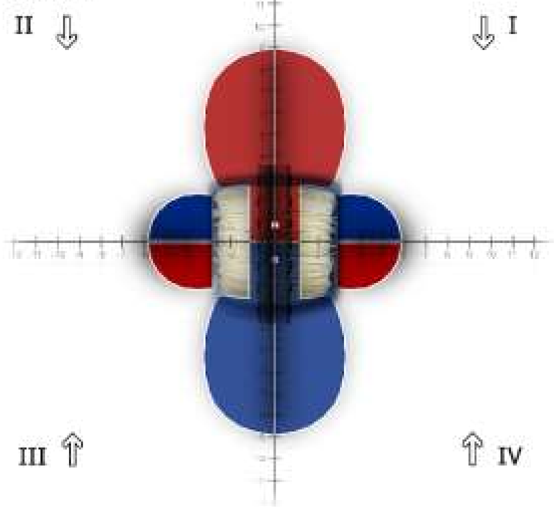


FIG 43: Study Table - Parallel Axis Detection - Winding with 1mm Enamel-Coated Aluminum Wire Powered at 24 V 4.5 A with Iron Core Same Size as the Air Core Inside the Coil

FIG. 44

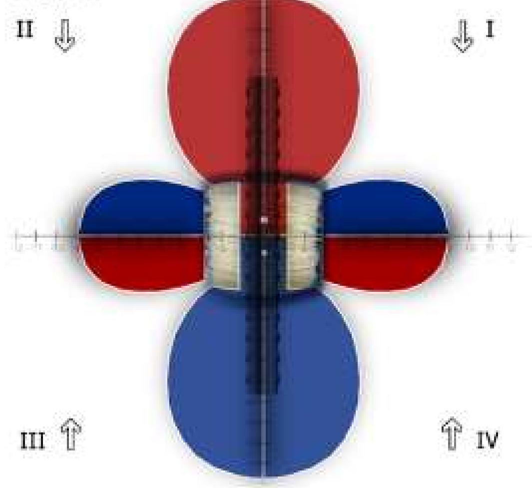


FIG 44: Study Table - Parallel Axis Detection - Same Conditions, Same Winding Powered at 24 V 4.5 A with Iron Core Larger Than 3 Times the Size of the Core Inside the Coil

Powered by 12 V 1 A (FIG 40) - 18 V 2.7 A (FIG 41) - 24 V 4.5 A (FIG 42), we can see that the magnetic field extends up to a maximum of 6 cm on the y-axis (FIG 42).

By inserting iron of the same size as the core (FIG 43), it expands up to 9 cm, and increasing the size of the iron in the core by 3 times (FIG 44), the shape of the detection resembles that of a magnet; we can also notice the significant expansion of the lateral polarities.

So, summarizing and generalizing this discussion, we could represent the magnetic field of a "current-carrying loop" in the following way.

FIG. 45

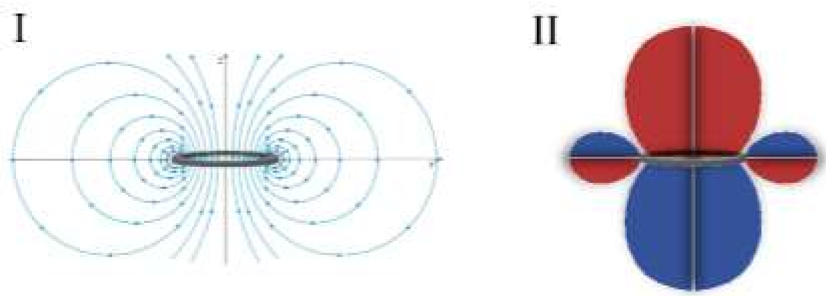


FIG 45.I: Representation of the magnetic field lines of a current-carrying loop.
FIG 45.II: Study Table - Parallel-axis Detection - Representation of the entire magnetic field of a current-carrying loop.

In box I of FIG 45, we find the current representation of the magnetic field, which instead appears to be the magnetic short circuit of the loop. Therefore, we can complement the representation with box II of FIG 45: a vertical detection of the entire field (slightly inflated).

FIG. 46

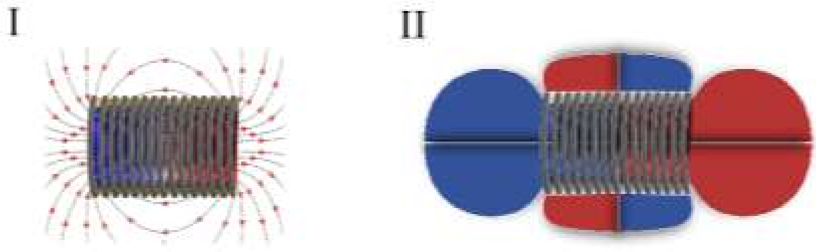


FIG 46.I: Representation of the magnetic field lines of a current-carrying solenoid.
FIG 46.II: Study Table – Parallel-axis detection - Representation of the entire magnetic field of a current-carrying solenoid.

Similarly, here is the current representation of the magnetic field of a solenoid (FIG 46.I) and the parallel-axis analysis of the winding showing the entire magnetic field (FIG 46.II).

In this case as well, observing how the polarities extend within the coil and the solenoid, it seems appropriate to refrain from determining the orientation of the field, as it will solely depend on the interaction we choose to have with it.

SUPPLEMENTARY VIDEO: https://youtu.be/l1otmIxHtkA

VERIFICATION

MAGNETIC ORBITAL

Introduction to the experimental verification

Once the three-dimensional shapes of the magnetic field have been obtained using Hall effect sensors, the fundamental scientific question becomes: do the measured geometries actually correspond to the real physical interactions between magnets?

To answer this, it is necessary to develop an experimental method capable of testing, in the real world, the structures identified during the field mapping.

The core criterion is simple but absolutely essential: every interaction observed between two magnets will appear only if the same detection angle used during the Hall sensor measurements is respected. This principle is crucial and will be demonstrated later in the chapter.

Design of the Angular Verification Tool

To test the authenticity of the detected shapes, a very simple yet surprisingly effective tool was built, capable of maintaining a constant interaction angle with respect to the magnet under analysis.

Structure of the tool

The tool is composed of:

- a transparent barrel from a common ballpoint pen
- one or more cylindrical magnets placed inside it
- two end caps created by controlled heating to close and seal the structure

FIG. 4

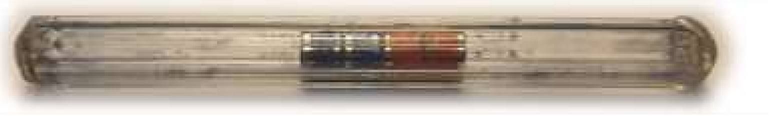


FIG 4: Verification Tool - Former Transparent Case of a Ballpoint Pen with Cylindrical Magnets Inside

This device works as a sort of **physical equivalent of a Hall sensor**:

- the tip of the pen defines the direction of interaction;
- the internal magnets move freely, responding exclusively to the geometry of the field generated by the magnet under analysis;
- the transparency of the tube allows direct observation of the magnets' behavior, free from mechanical interference (aside from minimal friction, which is included in the experimental margin of error).

Calibration of the tool

For the device to faithfully reproduce the sensor's results:

- the total magnetic intensity of the internal magnets must be comparable to the intensity of the measurement point detected by the sensor;
- calibration is performed by approaching an opposite-polarity bubble and checking whether repulsion occurs before, after, or exactly on the boundary identified by the sensor;
- by adding or removing magnets, the response can be tuned until it perfectly matches the sensor readings.

This makes the tool a highly reliable and independent method of experimental validation.

Verification of the structures in vertical detection

The first configuration tested concerns the classic three-lobe geometry of the **Type D** structure (two main polarity bubbles + a central toroidal structure).

FIG. 11

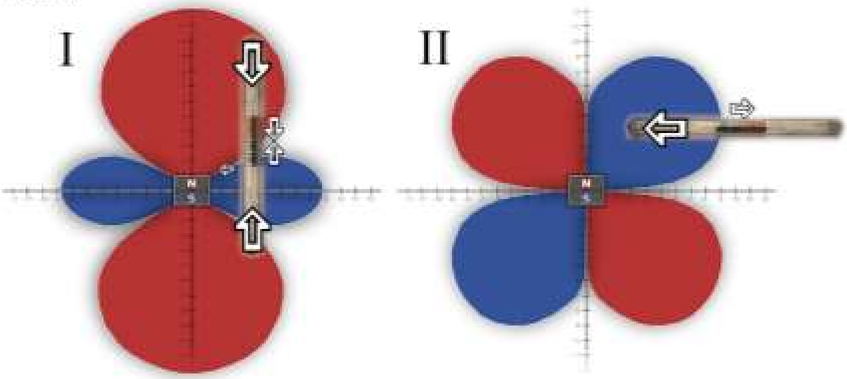


FIG 11.I: Exact point in vertical detection where the magnets are simultaneously repelled by similar polarities above and below; moving the pen up and down, the magnets will remain stuck in that position.
FIG 11.II: Bring the pen from the outside towards the inside of the polarity bubbles, also here respecting the angle of detection, in this case horizontal, to observe repulsion or attraction at that precise point indicated by the sensor (excluding various frictions).

When the pen is brought close following the same angle used by the sensor (in this case vertically, parallel to the axis of an axially magnetized magnet), a highly characteristic phenomenon occurs:

- the internal magnets are simultaneously repelled by both the upper and lower polarities;
- the repulsion never exceeds the boundary detected by the sensor;
- the distance remains stable even when the pen is repeatedly moved up and down along the axis.

The internal magnet appears trapped in a dynamic equilibrium of forces, produced by the balance between:

- the toroidal repulsion of the central bubble;
- the radial attraction of the main field;
- the precise angle of incidence.

This configuration does not correspond to classical attraction or classical repulsion: it is a hybrid, stable condition that defines a true **angular trap**, or **LOCKED state** (discussed in the following chapters).

Verification of the structures in horizontal detection

When the observation angle is changed and the pen is brought close perpendicularly to the magnetization axis, the detected shapes change radically, just as they did during the mapping with the Hall sensor.

The test shows that:

- the lateral bubbles predicted in horizontal detection are perfectly reproduced;
- the internal magnets inside the pen are repelled or attracted exactly at the points indicated by the sensor;
- any discrepancies are attributable not to the magnet, but to the sensitivity of the sensor used (as demonstrated in the video where two different sensors produce a difference of about 1 cm).

A crucial experimental finding is that: **if the pen is used with a different angle than that used during the detection, the geometry of the interaction collapses completely.** The shapes lose meaning and no reaction can be predicted.

This further confirms that Hall sensor mapping is not a simple “drawing”, but a true **interaction function**.

Verification of 360-degree detection: P-type orbitals

Next, the geometry obtained through a complete 360-degree mapping was verified, which had generated a structure corresponding to a P-type orbital. (A link to the video is available at the end of the chapter.)

For this test:

- each point had been measured by pointing the sensor exactly toward the magnet, both in the inner and outer regions;
- the resulting shape was coherent, with a slight elongation due to the use of rectangular magnets;
- the pen, used while respecting the same 360-degree motion, confirmed every single predicted interaction.

This step is crucial, because it physically reproduces what, in quantum mechanics, emerges as the probabilistic density of atomic orbitals.

Verification on complex magnetic configurations

To definitively exclude the possibility that the correspondences were due to the simplicity of a single magnet geometry, an advanced test was performed using three magnets placed randomly but aligned in mutual attraction.

(A link to the video is available at the end of the chapter.)

In this case:

- the resulting shape was unpredictable;
- the mapping produced an entirely new and complex geometry;
- every single “interaction bubble” was tested with the pen, maintaining the exact angle corresponding to the detection.

All interactions matched perfectly, including the most complex and internal ones, confirming that the method is valid even for multiple, non-trivial magnetic systems.

General discussion and implications

The combination of experimental data leads to a strong conclusion: **The structures detected by the Hall sensor are not arbitrary representations of the magnetic field, but the geometric manifestation of real interactions that occur between magnets.**

In other words, it is possible to use the sensor and the mapped shapes to **PREDICT** dipole interactions in detail, exactly as the Schrödinger equation predicts interactions between atoms.

The same geometries:

- emerge with the sensor;
- emerge in real physical interactions;
- remain valid for both single magnets and complex systems;
- possess a fundamental constraint: **the angle of observation**, exactly as in atomic orbitals.

The parallel with quantum mechanics becomes immediate:

- same shapes;
- same angular constraints;
- same predictive power for interactions.

To the point where one can state, in a methodologically solid manner, that what is traced in space with a Hall sensor is the **macroscopic equivalent of atomic orbital functions**.

Chapter conclusion

This experimental method clearly demonstrates that:

- magnetic orbitals are real and verifiable structures;
- there exists a functional correspondence between quantum forms and macroscopic magnetic forms;
- the tools developed (sensor + magnetic pen) allow not only mapping, but also predicting interactions.

SUPPLEMENTARY VIDEO: https://youtu.be/N1GEs_z5tTQ

LOCKED INTERACTION

DIRECTIONALITY OF MOLECULAR BONDS

The experimental section just completed shows that magnetic fields are not an abstract set of lines, but three-dimensional structures with symmetries, gradients, and interaction regions that faithfully reproduce - at a macroscopic scale - the same logic as atomic orbitals.

But there is another concept that pushes this analogy even further: the **LOCKED interaction**, a highly directional magnetostatic configuration that appears only at specific interaction angles and only in constrained systems.

First, a fundamental point must be clarified: this phenomenon does *not* violate Earnshaw's theorem, which forbids the existence of stable equilibrium points in purely magnetic, unconstrained systems.

What we observe in the experiments is instead a form of pseudo-equilibrium, possible exclusively because the system is mechanically constrained - for example by the cylindrical guide of the pen - and because the vector components of the magnetic field partially compensate each other, creating a sort of directional "basin" in which the magnet becomes trapped.

The nature of the LOCKED state: constrained equilibrium, not free levitation

When the magnetic pen is brought close to the magnet under analysis while respecting the same angle used during detection - an essential condition - the internal magnet enters a region where repulsion and attraction balance each other, but not isotropically.

This is not a central equilibrium: it is a curvature of the magnetostatic potential that acts as a forced guide. The magnet does not "float": it is channelled. This channel is a direct consequence of the orbital structure measured by the Hall sensor - in this case, a D-type orbital, with its toroidal geometry and two lateral lobes. In this situation, the magnet does not fall into the main polarity (attraction), nor does it escape to infinity (repulsion): it remains **LOCKED** in a privileged position defined simultaneously by:

- the interaction angle,
- the radial component of the main field,
- the interaction with the opposite-polarity bubble.

Multiple interactions: more than a simple "point"

Let us now consider the case of two parallel magnets in repulsion, or the ring magnet with axial magnetization (FIG 12).

FIG. 12

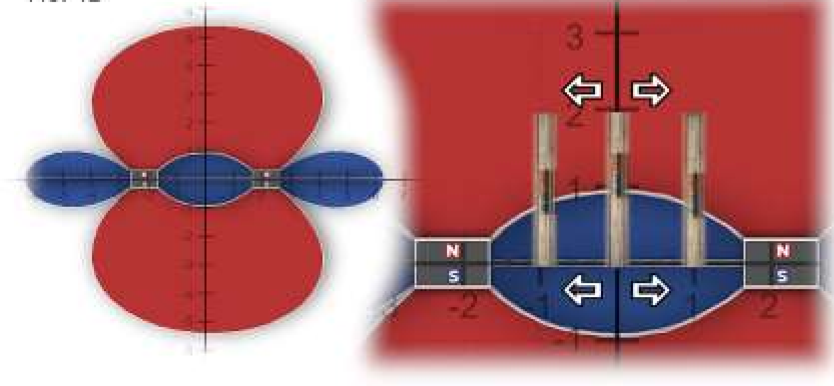


FIG 12: Verification for detecting internal reverse polarity in 2 magnets parallel to each other in repulsion or in a ring magnet; by moving the pen right and left, the magnets will draw the same dome detected by the sensor.

When the pen is held vertically and moved horizontally through the center of the system, the internal magnets:

- are repelled by the inner bubble of opposite polarity,
- are simultaneously attracted by the main polarity,
- experience a lateral pull toward the central node of the magnetic orbit,
- and on the opposite side of the magnet the same interaction appears in mirrored form.

It is a symmetric game of four (or more) forces, all active at the same time, all constrained by the same orbital geometry.

The result is that the magnet inside the pen:

- remains suspended at different heights,
- moves in an extremely controlled way,
- physically *draws* the dome detected by the Hall sensor.

In practice, it is as if the magnetic system were saying: **"If you respect this angle, I will guide you exactly along this shape."**

This kind of behavior is neither accidental nor a magnetic trick: it is the direct manifestation of the field symmetry, identical to that found in atomic orbitals.

The case of the ring magnet: where the geometry becomes unmistakable

With a ring magnet (South facing upward), the magnetic pen reveals an even more striking behavior: with North facing downward, the internal magnet is attracted… but only up to a limit. Beyond that point, it does not descend; as if it were following a mandatory trajectory.

And when the pen crosses the central section horizontally, the magnet *draws*, with surgical precision, the dome of the inner inverse polarity measured by the sensor.

That dome is the true internal cross section of the field of a ring magnet - a structure never before visualized with this level of clarity.

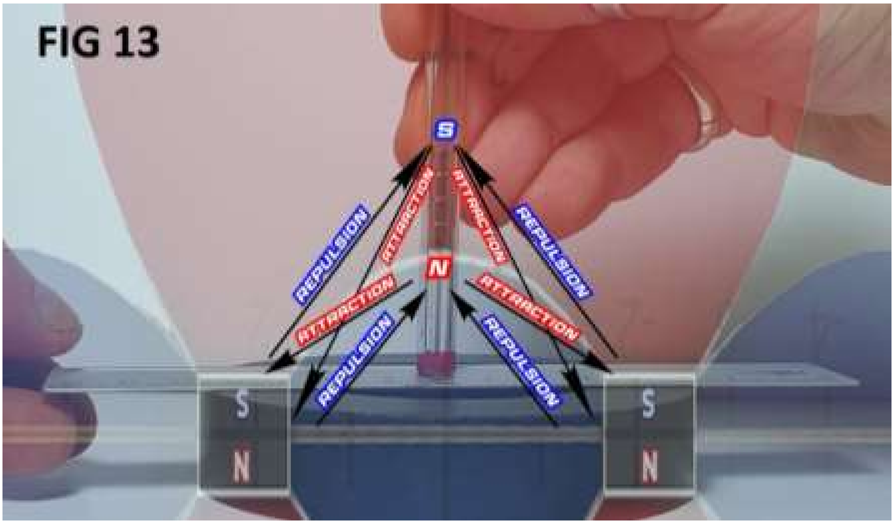


FIG 13 - Specification of the interactive components of the LOCKED Interaction between a ring magnet and the magnets inside the pen

Locked Dynamics: a run-and-return autonomous behaviour

One of the most striking pieces of evidence emerges clearly in slow motion: if the pen crosses the attractive boundary at high speed and approaches the inverse polarity bubble, the internal magnet snaps sideways - but then returns on its own and stabilizes precisely near the centre of the bubble.

This behaviour cannot be explained by simple attraction or repulsion. It is a constrained energy minimum, the most elementary form of a geometric potential well.

And the most interesting part is that the phenomenon is not exclusive to ring magnets:

- it appears with two, three, four or many magnets,
- it appears in rotating systems (such as the Levitron),
- it even appears in completely irregular configurations. The geometry of the LOCKED state is universal. It depends solely on the interaction angle.

LOCKED Interaction and the directionality of chemical bonds: the atomic analogy

Here we enter the most important aspect - the one that gives the phenomenon real theoretical weight.

Quantum chemistry teaches us that:

1. Orbitals determine bonding angles, not empty space: S: 180°, P: 90° / 180°, sp^2 hybrids: 120°, sp^3 hybrids: 109.5°

2. Molecules do not form anywhere: they form only in privileged directions dictated by the symmetry of the wavefunctions.

3. These angles are constraints, not choices.

Now compare this to our magnetic system:

- the LOCKED state appears only at specific interaction angles,
- outside those angles, the behaviour collapses and attraction/repulsion return to normal,
- the equilibrium is possible only because the system is mechanically constrained.

Exactly as in atoms.

The magnet inside the pen does not choose where to stay: its position is imposed by the geometry of the field, just like an electron in an orbital. This is why the LOCKED interaction is the macroscopic counterpart of molecular bond directionality.

Orbitals and interactions: the case of the D orbital ($n = 3$, $l = 2$, $m_x = 0$)

During the experiments, one of the most recurrent configurations is the one in which the interaction follows the geometry of a D orbital, particularly for $m_x = 0$:

- two main lobes,
- a central inverted torus,
- sharply defined gradient regions.

The magnetic pen always locks precisely at those structures. The prediction is exact. And this is no coincidence:

- the symmetry of the quantum orbital
- and the symmetry of the macroscopic magnetic field each lead to discrete directions and positions where constrained equilibrium emerges.

These are not “visual similarities”. **They are functional equivalences.**

Beyond single magnets: complex systems and multi-polar interaction

Even highly irregular systems - such as three magnets mutually attracting in a non-symmetric configuration - show an internal structure consistent with the predicted orbital pattern.

The internal bubble detected by the Hall sensor is reproduced faithfully by the magnetic pen: every point traced by the pen corresponds to a point detected in the mapping. This repeatability demonstrates that:

- the method is robust,
- the geometry is real,
- the LOCKED effect is not an artefact.

Conclusion: the LOCKED state as a macroscopic magnetic molecule

The LOCKED phenomenon shows that:

- magnetic equilibrium is not isotropic,
- privileged interaction directions exist,
- field symmetry determines discrete configurations,
- mechanical constraints enable stability,
- the analogy with quantum chemistry is structural, not aesthetic.

When you see a magnet locking into a precise position, you are not witnessing a trick, nor an improvised levitation.

You are witnessing - on a human scale - the same logic that governs atomic bonding.

SUPPLEMENTARY VIDEO: coming soon!

LEVELS OF INTERACTION

When we observe the magnetic shapes revealed by my experiments, it almost feels as if we are looking at structures taken straight out of a sci-fi movie: bubbles, lobes, toroids, intricate symmetries that strikingly resemble the atomic orbitals of Quantum Mechanics.

And yet, as extraordinary as these shapes may appear, they are not arbitrary creations. They are the exact geometries that come into play every time we use, manipulate, or simply bring a magnet close to another physical system.

But there is a fundamental point that must be clarified before moving forward: these shapes never represent the absolute structure of the magnetic field of an isolated magnet. **They are, instead, the result of an interaction.** And this is precisely where the key concept of interaction levels arises. This is also why both the sensor and the magnet “see” the same shape.

FIG. 54

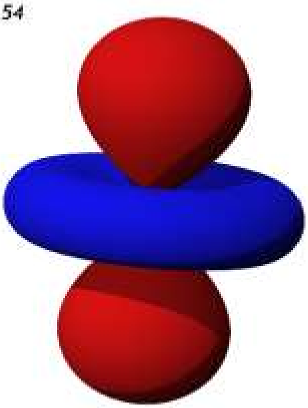


FIG. 55

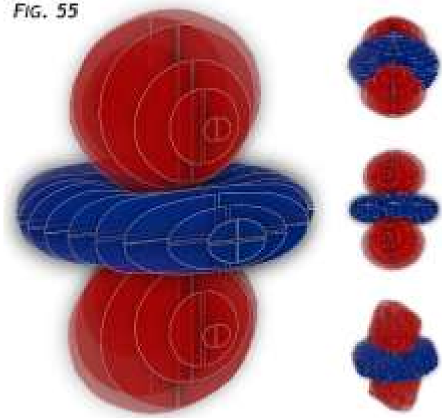
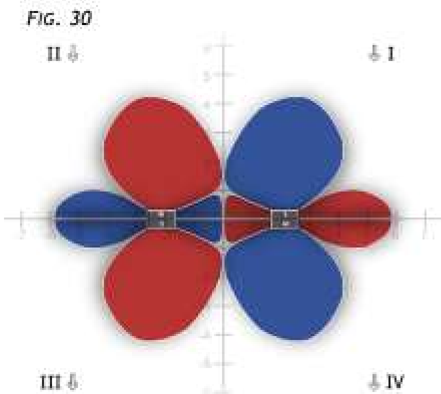


FIG 54: Wikipedia – Atomic Orbital D – Quantum Numbers: n=3, l=2, mz=0
FIG 55: Dynamic Board – Vertical Detection: Parallel to the axis of a magnet with axial magnetization. 3D effect recreated by overlapping multiple boards detected at different distances from the magnet

Let’s consider the case of **FIG 55**: a magnet observed with a Hall sensor along an axis parallel to its magnetization. The shape that emerges is identical to the **D orbital** (**FIG 54**). So far, so clear. However, the point that sparked discussion among the anonymous reviewers is the following: if instead of the sensor we used another magnet, would the interaction still take the shape of the **D orbital**? Or should we expect the complexities observed when two magnets attract each other (**FIG 30** and **69**)?



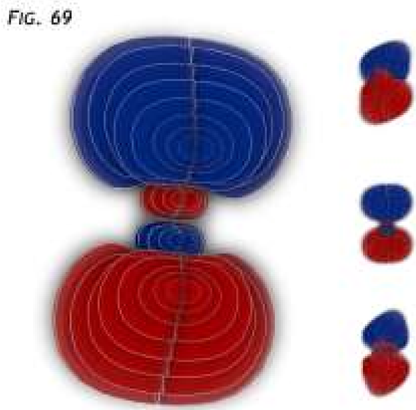


FIG 30: Dynamic Board - 2 Magnets in attraction at a distance of 3 cm - Short side view of Neodymium N35 Rectangular Magnets 30(length)x10(width)x5(thickness)
FIG 69: Dynamic Board – 360-degree detection of 2 magnets with axial magnetization in attraction at 3 cm distance – 3D effect recreated by overlapping multiple boards measured at different distances from the magnets

My answer was simple and direct: **yes, the interaction follows exactly the shape detected by the sensor, because the magnet is the sensor**. The Hall sensor, in fact, is not a neutral observer. It is a magnet. And as such, it introduces into the system the same type of perturbation that another magnet would introduce if placed in the same position with the same orientation (this point will be discussed more extensively in the following chapters). This means that every shape detected is not the absolute field of the magnet under study, but its response to a second magnetic element. And this is precisely where the distinction between different **levels of interaction** arises.

LEVELS OF INTERACTION

First-degree interaction

The magnet “alone.” Purely theoretical. We can never detect this shape directly because any measurement requires a second element, which inevitably alters the field.

Second-degree interaction

Magnet + sensor (or magnet + magnet, if one replaces the sensor). The shape traced is the response of the magnetic field to the interaction with the second element. It is not the absolute form of the field, but the geometry that the field assumes at the very moment of observation.

Third-degree interaction

Two magnets interacting with each other + a sensor (acting as a third magnet). The complex shapes observed in FIG 30 and 69 do not represent what truly happens between the two magnets while interacting, but what the system would become if a third magnet were introduced.

In other words, the measurement produces a **“potential projection”** of the field at the next level of interaction.

Fourth-degree interaction

Three magnets interacting + a sensor. And so on, iteratively.

The observational paradox: we will never know the real shape

The crucial point is this: we will never observe the true form of the interaction between two magnets while they interact. Because the very moment we attempt to measure, we introduce a third element that alters the system and changes its geometry. What we see is always a **preview of the next level**. A potential form. Never the actual present.

The same applies if we try to observe the field of a single magnet. The act of measuring transforms it, and what we trace is the geometry of the collapse generated by the second element.

For this reason: **we will never know the true shape of the magnetic field in purity**. And this is exactly where a powerful conceptual bridge with Quantum Mechanics arises.

The connection with QM: the wave function becomes a field

In quantum formalism, orbitals are not real objects. They are statistical predictions generated by the Schrödinger equation.

They do not represent the electron "as it is," but what we would expect to find if we decided to interact with it in a certain way. They exist as potentialities, not as material forms.

Similarly, in my experiments, the magnetic shapes are not absolute properties of the magnet. They are **geometric responses to a specific interaction**. Measuring is interacting. Interacting deforms the system. And what we observe is not the present, but the **"prophecy" of the field**.

In this sense, the magnetic field behaves exactly like a **macroscopic wave function collapsing into a shape determined by the act of observation**. This is the first visible physical representation of this principle.

The final picture

The magnetic shapes I have detected:

- are not absolute entities
- do not belong to the isolated magnet
- do not describe the field in purity
- do not represent the real interaction between two or more magnets if measured during interaction
- **but they are the predictive geometry that the field assumes at the moment of interaction with a second (or third, or fourth…) magnetic element**

Exactly like quantum orbitals.

This concept is illustrated in the video that will be included in the next chapter.

INTRODUCTION TO THE FOLLOWING CHAPTERS

This research is structured in **two distinct phases**. The first phase, which concludes here, involved **direct observation of phenomena and detailed documentation of the experiments conducted**.

The second phase, which begins now, is more **“speculative”**: it consists of attempting to draw logical conclusions, relate the results to concepts in quantum mechanics, and propose **new macroscopic interpretations of phenomena so far confined to the microworld**.

It is important to emphasize that the **core of this work lies first and foremost in the experimental facts presented**. The interpretations that follow, including my personal ones, are **not intended to impose themselves as absolute truths**, but rather to open a dialogue.

In this sense, the contribution of the scientific community will be crucial to understand how to frame these results from a theoretical perspective.

However, after years of practical observations, I feel it is my duty to offer a **first point of view, guided by field experience**.

MACRO COLLAPSE OF THE WAVE FUNCTION

In the experimental method adopted in this research, **each individual point detected by the Hall sensor represents a discrete event of interaction between the magnetic field and the observer**.

The sensor is **not a neutral device**: it has an internal polarization and, as such, **constitutes a magnetic element itself that modifies the system it interacts with**.

When the sensor enters the domain of the field, its presence generates a **local interaction** that manifests as a polarity inversion (North/South) and triggers the LED.

This event can be interpreted as a **local and deterministic collapse of the field's wave function**, not in the probabilistic sense typical of quantum mechanics, but as a **concrete physical phenomenon**: at that precise point in space, the field assumes a **defined configuration in response to the interaction with the sensor**.

This implies that the sensor does **not provide a continuous value, nor an instantaneous average of the field intensity**. Instead, it detects a **sequence of nodes**: points where the actual polarity manifests according to a geometry imposed by the relationship between field and observer.

Every angular or linear movement of the sensor produces a **new instance of collapse**, generating an **ordered series of discrete events** that progressively map the structure of the interaction.

The **coherent sum of these collapses**, distributed across different axes and at increasing distances from the magnet, constructs a **complete, stable, and repeatable three-dimensional geometry**.

What emerges is **not merely an intensity map**, but a **nodal configuration of the entire interaction system**. These resulting forms - spheres, lobes, inverted toroids, quadripolar structures - **show a striking correspondence with the geometries of atomic orbitals**, both in topology and in the continuity of nodes and symmetry changes as orientation varies.

This methodology differs radically from both **classical continuous measurements** (vector or scalar magnetometers) and **FEM simulations**. One does **not measure a "pure" field**, but its **configuration in action, conditioned by the presence of the sensor**.

The resulting map **does not represent the current state of the field**, but rather the **form the field would assume if a second magnet with the same geometry as the sensor were introduced**.

In this sense, the detected forms are **predictive geometries**: **not snapshots of the present, but physical anticipations of the interaction**.

When the sensor is replaced with a real magnet, the resulting interaction **follows exactly the geometry previously traced by the sensor**, confirming that what is detected is **not an instrumental distortion**, but the **actual structure of the field under the constraint of interaction**.

The parallel with quantum mechanics becomes inevitable at this point:

- In the atom, the orbital is **not a real trajectory**, but a **probability distribution of the wave function**;
- In macroscopic magnetism, what we detect is **not a map of instantaneous intensity**, but a **region of configuration that emerges only during measurement**.

In both cases, the **measurement does not reveal reality itself**, but forces the system to **manifest in one of its possible configurations**.

Every polarity inversion detected by the sensor is therefore equivalent to a **micro-collapse of the wave function**: a **point event that contributes, together with the others, to the formation of a complete three-dimensional structure**.

Point by point, plane by plane, angle by angle, the final map is **nothing more than the coherent sum of all these collapses**.

This perspective leads to **distinguishing two levels of the magnetic field**:

- **Potential field**, the theoretical configuration that is unobservable;
- **Field in action**, the geometry that emerges **only at the moment of measurement**.

It is precisely this distinction - **absent in the standard formulation of quantum mechanics** - that suggests the phenomenon described here may represent a **macroscopic analogy of wave function collapse**, made visible thanks to the **classical and non-probabilistic nature of magnetism**.

SUPPLEMENTARY VIDEO: https://youtu.be/dl1fvsORQ3w

Macro Quantization of the Magnetic and Electromagnetic Field

Introduction

In classical descriptions, the magnetic field is a continuous entity, represented by field lines that vary gradually in space.

However, through an **experimental method based on binary measurements of magnetic polarity**, it is possible to reveal a **discrete level within the field structure**, hidden from traditional analog representations.

The approach developed consists of using a **bipolar Hall sensor** that does not measure intensity, but **records exclusively the local polarity of the field**: North or South.

This experimental choice radically **changes the nature of the measurement**: instead of sampling a continuous value, we observe the **local collapse of the field direction**.

It is a **quantization based on the macroscopic spin** of the measured point, that is, the **only discrete property that a magnetic field possesses at a macroscopic scale**.

This form of quantization **does not depend on abstract mathematical models**, but on the very nature of the instrument and the stability of the sensor's internal reference.

The Role of the Threshold: From Continuous Intensity to Discrete Polarity

A crucial point of the method is the presence of an **intrinsic threshold in the Hall sensor**.

The sensor maintains its own reference value via voltage.

Important: if raw analog values are kept (different voltages without a threshold), the distribution becomes difficult to visualize.

By setting an intrinsic threshold (North/South) - since the sensor's reference voltage is constant - **coherent and comparable results are obtained**.

This explains why the **perimeter appears sharp**: we do not get the classic cloud of scattered points as in probabilistic equation results.

However, even with the binary method, the most accurate visualization would still be a **particle cloud with varying magnetic fields**.

Spin-Based Quantization

The most important characteristic of the entire method is that:

quantization does not arise from a measurement of field amplitude, but from polarity change, which is the **only truly discrete property of the magnetic field**.

Magnetism is, by nature, a **bipolar phenomenon**: every point in space has a field vector that can orient toward one pole or the other.

When measuring **only the polarity**, we obtain a **spin-based quantization**, conceptually analogous to **atomic-level spin quantization**.

The binary measurement is therefore a **physical quantization, not a digital trick**:

- The measurement is not discretized artificially,
- We observe a characteristic already discrete in the field,
- Made accessible by the sensor.

Each recorded point is an **event of macroscopic spin**: a **North-flip or South-flip**.

The final form that emerges is **not a simplification of the field**, but the **discrete projection of its internal structure**. It is the **geometry of macroscopic spins in the volume surrounding the magnet**.

Discrete Forms and Predictive Geometries

When thousands of binary measurements are accumulated, the result is a **map that does not show random dispersion**, but **stable and repeatable forms**. These forms represent:

- The space in which polarity inverts,
- The **preferred channels of field orientation**,
- The **topological regions where local spin changes state**.

I want to emphasize a concept already presented because it is **key to understanding everything discussed so far and what will be discussed in the next chapters**.

The result is a **sharp perimeter**, not an indefinite cloud, because the threshold - being constant - **prevents intermediate regions and forces each point to collapse into one of two states**.

This is what makes the geometries visible, coherent, and comparable.

From the perspective of rigorous physics, however, the most faithful representation would still be a **distribution of points with different intensity values** (equivalent to the **probability density of orbitals**).

The binary map does **not replace the continuous nature of the field**, but **samples it according to its most discrete property**, just as in quantum mechanics.

Conclusion

The **macroscopic quantization of the magnetic field** obtained using a bipolar Hall sensor:

- Is **not a simplification of the classical field**,
- Is a **discrete reading of a real physical property**: polarity, i.e., the **macroscopic spin of the field** (next chapter),
- Produces forms that are the **geometric manifestation of polarity states in space**.

The result **does not contradict Maxwell**, but introduces a **new descriptive level**: the **discrete structure of the field as seen through polarity collapses**.

It is an **experimental spin-based quantization, unique in its kind**.

SUPPLEMENTARY VIDEO: Coming soon!

MACRO QUANTUM NUMBERS

Spherical harmonics appear in many macroscopic phenomena: acoustics, optics, waves on the surface of a sphere, gravitational distributions, and more.

Their mere presence, however, does **not** constitute proof of quantization.

What makes these experiments extraordinary is **how these harmonics emerge**: not from a continuous analysis of the field, but from **pointwise, binary measurements**, subject to a **local polarity collapse**.

The result is not a simple drawing of the field, but a **discrete map generated by macroscopic spin events**.

And it is precisely this discreteness that causes magnetic forms to **align naturally and rigorously with quantum mechanics**.

Macroscopic reinterpretation of quantum numbers can be made using three fundamental elements:

- The **sensor threshold**,
- **Distance and geometry**,
- The **physical properties of the studied magnetic system**.

From this arises a **layered structure** of forms, orientations, and binary states that **mirrors atomic quantum numbers with surprising coherence**.

N - Principal Quantum Number (Energy Levels)

In the magnetic model, **N emerges from the interaction between**:

- Detection distance,
- Hall sensor sensitivity (reference voltage),
- Type and strength of the magnet or magnetic system,
- Overall apparatus configuration.

Reducing sensitivity or bringing the sensor closer to the magnet reveals only the **innermost layers**. Increasing sensitivity or moving the sensor farther reveals **outer layers**.

Just as in the atom, **N selects the scale of the distribution**.

With electromagnets, the correspondence becomes even clearer, as **changing the supply voltage reproduces directly the effect of a modified energy level at the source**.

L - Angular Quantum Number (Families of Shapes)

L determines the family of possible shapes. In the magnetic model, this role is played by:

- The measurement angle between the sensor and the magnetization axis,
- Magnet geometry,
- Type of magnetization,
- In multi-magnet systems: mutual distance and orientation, i.e., the overall system topology.

Keeping these elements fixed results in a **coherent family of shapes**: spherical, bilobed, toroidal, quadrilobed, and so on.

The correspondence with **L is structural, not aesthetic**.

M - Magnetic Quantum Number (Orientation in Space)

M indicates the orientation of the shape along a reference axis.

Macroscopically, this corresponds to the **rotation of the entire apparatus**:

- Complete scanning plane of
- sensor,
- magnet or magnetic system,
- or electromagnet.

Changing **M does not alter the shape**, only its orientation in space, just as in atomic orbitals.

S - Spin (Elementary Binary State)

Atomic spin is inherently quantum but logically binary.

Here, something strikingly analogous occurs:

- The sensor **does not return a continuous value**,
- But collapses into **one of two possible states: North or South**.

Spin in this model is represented by the detected polarity.

Each measurement is a **macroscopic spin event**.

From these events, the final geometry emerges.

Why this matters: the logic of the point cloud

When viewing orbital shapes in physics books, the surfaces appear smooth and continuous.

In reality, these surfaces **do not exist**: they result from the **density of points generated by a probability function**.

Here, the same principle applies:

- Each measured point is an event;
- The shape is the accumulation of thousands of discrete events;
- Lobes, nodes, tori are **stable regions made visible through measurement**;
- The sensor threshold macroscopically replaces the concept of **state collapse**.

This correspondence is **not an artifice or metaphor**, but a **parallel logical structure emerging spontaneously from the measurement method**.

Conclusion

A New Level of Correspondence Between Quantum Mechanics and Real Magnetism

The Magnetic Orbital model does **not claim that a magnet imitates an atom**. What it asserts is even more powerful: **the same mathematical logics that govern atomic orbital shapes also emerge in macroscopic magnetic fields**, when space is probed with a **discrete, polarity-based measurement method (macroscopic spin)**.

The appearance of **spherical harmonics, lobes, nodes, quantum numbers, and the concept of spin** is **not an aesthetic coincidence**, but a **physical structure that repeats at a completely different scale**.

This represents a **strong conceptual point**: orbital geometry is **not exclusive to the microcosm**, but a **general feature of space when interrogated through discrete quantization**.

In this way, spherical harmonics act as a **conceptual bridge between micro and macro**, between atom and magnet.

And this is **the key point of the entire research**.

SUPPLEMENTARY VIDEO: Coming soon!

MACRO SPIN

Introduction

I consider it essential to delve into the concept of **Macroscopic Spin**, as it is the main feature that enabled most of the associations made in this research.

Spin is a fundamental quantum property of subatomic particles, often intuitively compared to a type of "internal rotation," although it does not represent a literal motion in space. In quantum mechanics, spin governs the magnetic behavior of electrons and plays a key role in **orbital formation** and **particle interactions**.

FIG. 24

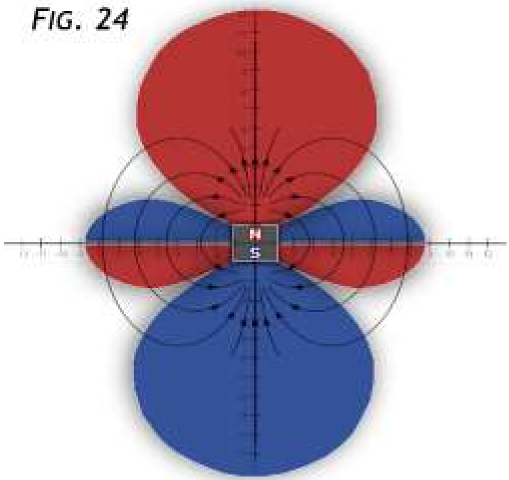


FIG 24: Overlay of Normal Field Lines with New Representation of the Probabilistic Magnetic Field (vertical)

In this research, using a Hall-effect detector and an angular dynamic method, **three-dimensional magnetic field structures** emerged that perfectly coincide with theoretical electron orbitals. This coincidence suggests a deep analogy - and perhaps a conceptual overlap - between microscopic quantum phenomena and observable macroscopic magnetic structures.

Manifestation of Spin in the Magnetic Field

In the experiments, the following phenomena were observed:

1. **Orientation of Polarity Bubbles**

   Magnetic "bubbles" change configuration and twist according to the observation angle. This behavior mirrors the concept of **spin-up and spin-down**, the two projective states of electron spin relative to a measurement axis. When the sensor is rotated, **mirror symmetry and polarity inversion** appear, just as when measuring an electron's spin along different axes. This reinforces the idea that the magnetic field exhibits **quantized states depending on orientation**, i.e., the "act of measurement."

2. **Angular Dependence and Quantized Behavior**

   Just as spin can only take discrete values (+½, -½), the measurements in this method assume **discrete, coherent configurations**, varying with angle but always reproducible. This behavior is inconsistent with a classical continuous field, yet fully compatible with a **quantized field**, where each orientation corresponds to a **defined system state**.

3. **Signal Inversion and Opposite Polarities**

   The sensor returns signals of opposite polarity depending on detection direction. This behavior directly resembles **spin entanglement**: if one state is spin-up, its entangled counterpart is spin-down. The ability to predict the position of the opposite polarity given a partial detection is a direct manifestation of **spatial correlation**, analogous to spin-entanglement.

Spin as an Information Vector

Each magnetic bubble contains:

- A **direction** (orientation)
- A **polarity** (sign)
- A **curvature** (geometry)

These three elements form a **“quantum signature”**, similar to a **three-dimensional vector spin**, which changes not only according to the magnetic field but also in relation to the observer.

The ability to manipulate these magnetic configurations - via devices respecting the angle and point sequence - could enable the **macroscopic equivalent of spin manipulation**, the foundation of **spintronics** and **quantum gates in quantum computers**.

Implications and Perspectives

- The correspondence between observed structures and theoretical orbitals suggests that **spin is not merely a property of particles**, but also an **emergent model of the field under specific conditions**.
- If confirmed, this view could allow **simulation and manipulation of spin states** through the engineering of **macroscopic magnetic fields**, a concept of **“macroscopic spin.”**

Conclusion

In these experiments, spin does not manifest as an isolated quantum number, but as an **emergent property of field geometry**, influenced by observation angle, the sequence of detected points, and the magnet’s internal structure.

The behavior of polarity bubbles - their twisting, mirror symmetry, and the predictability of the opposite configuration - suggests a **functional analogy with quantum spin**.

This perspective not only reinforces the hypotheses of this research but also provides a **new experimental platform for the analysis and manipulation of spin in the macroscopic world**.

MACRO ENTAGLEMENT

A Proposal for Geometric Correlation in the Macroscopic Magnetic Field

The most striking observation from the experiments is that the magnetic field, when probed point by point with a Hall sensor, does not appear as a static figure. Instead, it manifests as a set of **coherent structures** that change depending on the very act of measurement.

These are not random fluctuations, nor instrumental noise, but a **systematic response of the field** relative to the measurement configuration.

This property introduces **three forms of macroscopic entanglement**, each with a clear counterpart in quantum mechanics, but applied to **field geometries rather than particle states**.

Entanglement Between Observer and Field

(Quantum Correspondence: Relational Quantum Mechanics - Rovelli)

In Rovelli's relational framework, a physical state is not an absolute entity; it exists only in relation to the observer. The same principle emerges from the data in these experiments.

FIG. 21

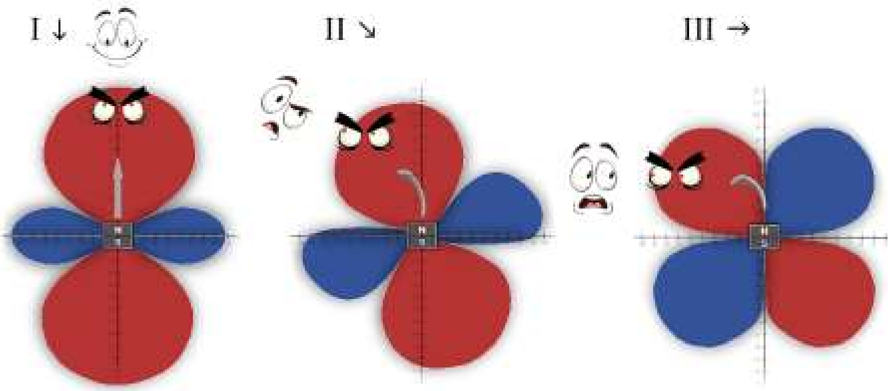


FIG 21.I: Vertical Detection – The Magnetic Field faces the happy observer
FIG 21.II: 45° Detection – The Magnetic Field follows the observer who is starting to worry
FIG 21.III: Horizontal Detection – The Magnetic Field keeps twisting to follow the now shocked observer

When the sensor is tilted (FIG 21): parallel to the magnet axis, at 45°, or perpendicular, the detected shape of the main polarity rotates, tilts, and deforms, following a systematic and perfectly repeatable pattern.

The main lobe and its opposite do not simply "change intensity"; they transform geometrically, as if the entire field adapts its configuration to the measurement angle.

This behavior has a clear explanation: the point-by-point reading represents a set of **local collapses** of the field, and the act of measurement itself defines which part of the three-dimensional structure is projected onto the acquired plane.

The macroscopic result is the spatial counterpart of the quantum principle that **observation is an integral part of the physical state**.

In other words, the field does not "show" a unique shape, but a **relational shape**, determined by the type of interrogation.

Geometric Entanglement

(Quantum Correspondence: Topological Entanglement)

When the full geometry of a main polarity is detected (e.g., a North bubble), it is possible to deduce:

- the geometry of the opposite polarity,
- the structure of the outer toroids,
- the shape of the correlated volumes,
- and the entire symmetry of the magnetic system,

even without measuring them directly.

This is not a matter of theoretical interpretation, but an experimental fact: the detected shape contains **global topological information** about the entire magnetic system.

The same logic exists in theoretical physics: so-called **topological entanglement**, where two spatial regions are connected not through information flow, but through global coherence of shape.

The difference here is that we are dealing with a **real, measurable field in the macroscopic world**, not abstract quantum states.

It is an instantaneous correlation, not because "information is transmitted," but because all regions of the field share the same **informational architecture**.

Polarity Entanglement

(Quantum Correspondence: Spin Entanglement – Aspect Experiments)

Each North magnetic bubble has a perfectly correlated South bubble:

- same structure,
- same tilt,
- same nodes,
- point-by-point complementary symmetry.

Changing the geometry of one polarity immediately determines the counterpart.

This is the **macroscopic analog of spin entanglement**: knowing the state of one particle allows us to know the other's state, regardless of distance.

In this context, it is natural, because **magnetic polarity is the closest macroscopic analog to quantum spin**:

- discrete,
- binary,
- emerges from a sign inversion,
- produces mirror configurations.

We call this phenomenon **macro-spin entanglement**: the entanglement between complementary polarities within the same field structure.

Theoretical Summary

This set of results leads to a coherent framework:

1. The act of measurement selects which field geometry manifests. The shape is not absolute, but relational to the observer.

2. Each configuration contains **internal correlations** between distant regions of the field, independent of measurement sequence but dictated by the structure itself.

3. Opposite polarities are correlated like entangled spin states, and their geometry can be inferred without direct measurement.

This combination suggests that entanglement, often considered a mysterious phenomenon confined to the quantum domain, can be understood as a **geometric property of coherent systems**, detectable in the macroscopic world when using a method of **discrete spatial quantization**.

Conceptual Implications

This proposal does not attempt to replicate quantum entanglement. It proposes something subtler, perhaps more fundamental: **geometry itself is a vehicle of correlation**.

When measuring a magnetic field with a discrete method:

- one does not obtain the image of the field,
- but a **quantized map of space**,
- in which each point is a binary event,
- and the ensemble of events reveals the **underlying coherent architecture**.

In this perspective, “spooky action at a distance” no longer appears as an instantaneous action, but as the manifestation of a **unitary structure**, where correlations are distributed geometrically and become accessible through observation.

This is the real strength of the model: not a metaphor of quantum mechanics, but a **macroscopic visualization of its logical principles**.

SUPPLEMENTARY VIDEO: Coming Soon!

Macro Superposition

Towards a Macroscopic Definition of State Superposition in the Magnetic Field

The conducted experiment introduces a property never before documented in the context of **macroscopic magnetic fields**: the coexistence of **real, incompatible geometric configurations**, detected simultaneously at the same point in space, depending on the orientation of the observer-sensor.

This evidence suggests a form of **non-probabilistic, non-theoretical superposition**, physically measurable, obtained through the **local collapse** of the field detected by a Hall sensor.

Local Superposition

Multiple Geometries at a Single Point in Space

The experiment employs **two equivalent Hall sensors**, positioned as follows: one vertical, one horizontal; both with their sensitive surface oriented toward the same point in the field.

FIG. 21.1

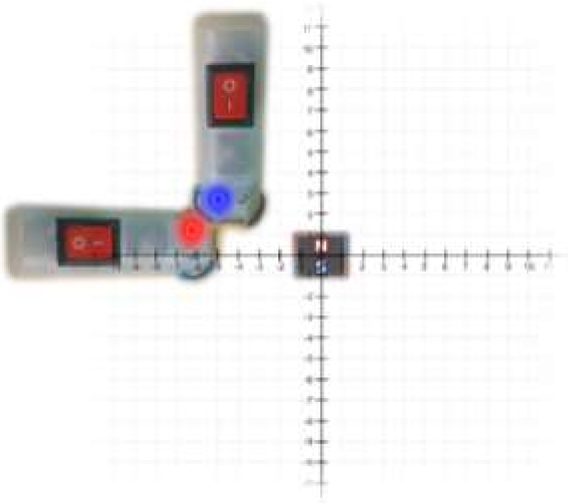


FIG 21.1: Simultaneous Detection of the Same Point with 2 Hall Sensors, Vertical and Horizontal; it can be observed that they register different polarities because they "read" 2 distinct shapes of the magnetic field.

Figure 21.1 illustrates the situation that arises:

The **same point under analysis**, located above the diameter of a magnet - which we know with certainty has only one polarity - when measured simultaneously with **two Hall sensors at different angles**, presents **two opposite polarities**.

This is just one example, as dozens of situations could be listed where this behavior manifests with the sensors.

Breaking down the measurement to observe what is really happening, we arrive at **Figure 21.2**.

After recreating and studying the shapes obtained from **vertical and horizontal detection**, we notice that the **two sensors (FIG 21.2) are simultaneously detecting two completely different figures**, both emitted by the same magnet.

FIG. 21.2

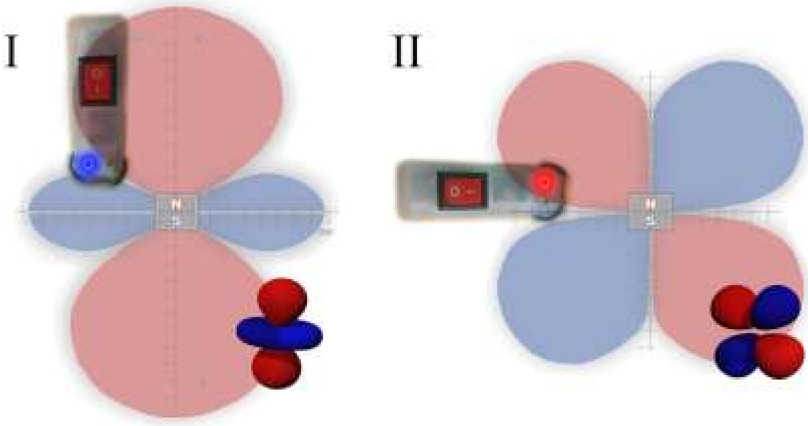


FIG 21.2: This figure is identical to the previous one, 21.1, but examines the sensors separately.
FIG 21.2 - I: Vertical Detection of a Single Point – The Sensor indicates South polarity because it is detecting a south bubble that appears only with vertical detection.
FIG 21.2 - II: Horizontal Detection of the Same Point – The Sensor indicates North polarity because it is detecting a north bubble that appears only with horizontal detection.

In the background, there are the **2D detections of the boards**, and in small insets, the **complete 3D shapes**.

The experiment is **repeatable, coherent, and non-random**.

From a classical point of view, this is impossible: at a given point in space, the magnetic field has a **single direction** and a **single local polarity**.

However, my experimental data show the opposite: the **detected polarity depends on the measurement basis**, i.e., the orientation of the sensor.

The process is **analogous to Quantum Mechanics**:

- measurement along one axis selects one eigenstate,
- measurement along a different axis selects another eigenstate,
- and the two readings do not interfere with each other.

This property is the **operational definition of a macroscopic superposition**. The data show that:

- a sensor aligned **parallel to the magnetic axis** reconstructs a structure analogous to the **D orbital with m_x=0**,
- a sensor **perpendicular** reconstructs geometries compatible with **D orbitals m_x=±1**.

The structures emerge from the **same magnet**, in the **same space**, at the **same time**.

Result: the same region of the field hosts multiple compatible geometric configurations, which are revealed selectively depending on the measurement orientation (**FIG 22**).

This behavior is **isomorphic to quantum superposition**, but applied to **macroscopic field geometries**.

FIG 22

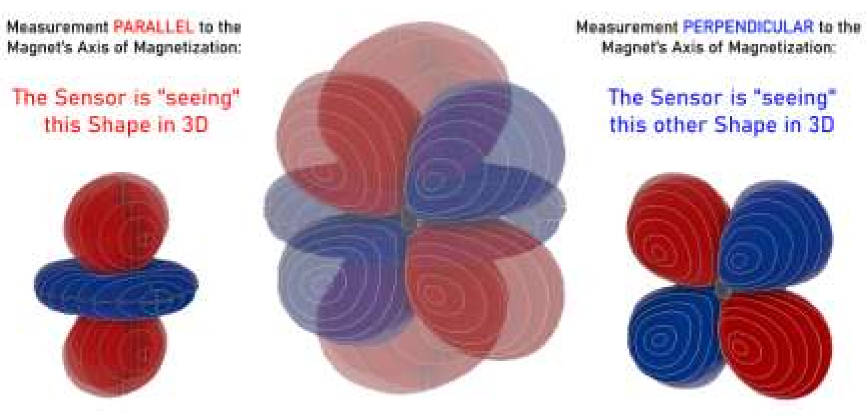


__FIG 22:__ The measurement __PARALLEL__ to the magnetization axis detects the shape of the __D orbital with m_x=0__, while the __PERPENDICULAR__ measurement detects the shape of the __D orbital with m_x=±1__. The geometries __coexist in the same space simultaneously__.

Geometric Superposition

Many Worlds as a physical multiplicity of forms

Within the theoretical framework:

- All configurations of the magnetic field exist simultaneously,
- Not as probabilistic states,
- But as real geometric structures, always present within the field.

The sensor, by choosing a viewing angle, performs a **geometric projection** into a two-dimensional space, selecting only one of the possible configurations. This is the macroscopic equivalent of the Many Worlds Interpretation, with a key difference:

- There are no "separate worlds,"
- Only a single physical structure containing all possible configurations.

It is a **structural superposition**, not a narrative one. The multiplicity is not an illusion. It is structure. And it is the observer's perception that brings it to light.

Informational Collapse

Geometric Selection

In quantum mechanics, wavefunction collapse is a mysterious event, never directly observed. In this research, the collapse becomes measurable:

- Each peak detected by the Hall sensor represents a **local collapse**,
- Selecting one of the field's real structures,
- Without destroying the other configurations.

The field remains unchanged; what changes is the portion that becomes observable.

This leads to the concept of **Informational Collapse**:

- Measurement does not create the geometry,
- It **selects** it,
- According to a spatial coherence criterion determined by the sensor's orientation.

This collapse produces a **discrete, quantized image of the magnetic space**, analogous to the discretization of eigenstates in quantum mechanics.

Dual Superposition

When the field arises from two magnetic nuclei

Some geometries, especially those with complex symmetries (analogous to degenerate D orbitals), do not emerge spontaneously from the field of a single magnet.

They appear only when **two magnets interact** (FIG 63).

FIG. 62

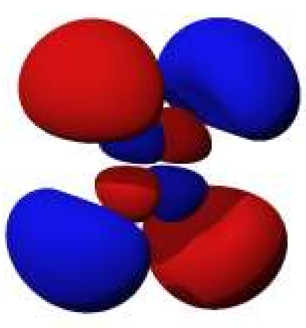


FIG. 63

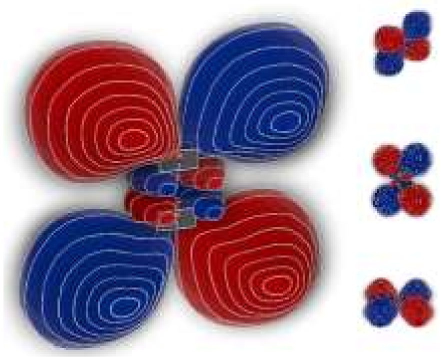


FIG 62: Wikipedia – Atomic Orbital D – Quantum Numbers: n=4, l=2, mz=±1 (superposition)
FIG 63: Dynamic Board – Horizontal detection: Perpendicular to the magnets' axis – 2 magnets facing each other in attraction at a distance of 2 cm. 3D effect recreated by overlapping multiple boards detected at different distances from the magnets

In this case, the superposition no longer concerns multiple passive forms of the field, but arises from:

- The **energetic overlap** of two sources,
- Which construct a **collective configuration**,
- Not present in either system individually.

This is **Energetic Superposition**.

Energetic Collapse

When two systems rewrite the field's shape

In the presence of two real magnetic sources:

- The geometries are not merely revealed,
- But **created ex novo**.

This creation occurs according to criteria of:

- **Maximum symmetry**,
- **Energetic coherence**,
- **Topological stability**.

The result is a **creative collapse**, not a selective one:

- The superposition disappears,
- A single **new geometry emerges**,
- Representing the stable state of the combined system.

This form of collapse is analogous to:

- **Bound states**,
- **Electronic reorganizations**,
- **Hybrid orbital formation** in quantum chemistry.

We can define this as an **Energetic Collapse**.

Final Classification

Two forms of Superposition in the macroscopic world

1. **Informational Superposition**

   - The field contains multiple configurations simultaneously
   - Each sensor selects one
   - The others continue to exist
   - It is a geometric "Many Worlds" superposition

2. **Energetic Superposition**

   - Two sources interact
   - They create a new, shared geometry
   - The superposition dissolves into a single coherent state
   - It is analogous to **quantum decoherence**

These two categories allow a **coherent mapping between macroscopic and quantum phenomena**, providing a possible geometric interpretation of quantum superposition.

Supplementary Video: Coming Soon!

MACRO TUNNELING

Conceptual Premise

In quantum physics, tunneling is defined as the ability of a wavefunction to penetrate a potential barrier that would be classically impenetrable. The amplitude decreases, but the eigenstate's shape remains recognizable beyond the barrier.

In this section, we show that in a real macroscopic magnetic system, a **1 mm ferromagnetic barrier** does not nullify or arbitrarily distort the field geometry of a magnet with **axial magnetization**.

Instead, the structure is **contracted**, yet remains coherent and topologically preserved even beyond the barrier. This behavior can be formally interpreted as a macroscopic analogue of tunneling.

Experimental Configuration

The setup includes:

- A **neodymium N52 magnet** with axial magnetization
- A **high-permeability ferromagnetic barrier**, thickness 1 mm
- A **non-latching Hall sensor** with fixed threshold and binary (N/S) response
- Variable distance between magnet and barrier

The sensor detects exclusively the **local polarity collapse**, not the analog gradient of the field. Consequently, the resulting figure is a **discrete map of the magnetic potential structure**, not a continuous flux density.

Experiment 1 - Magnet in Contact with the Barrier

FIG 80

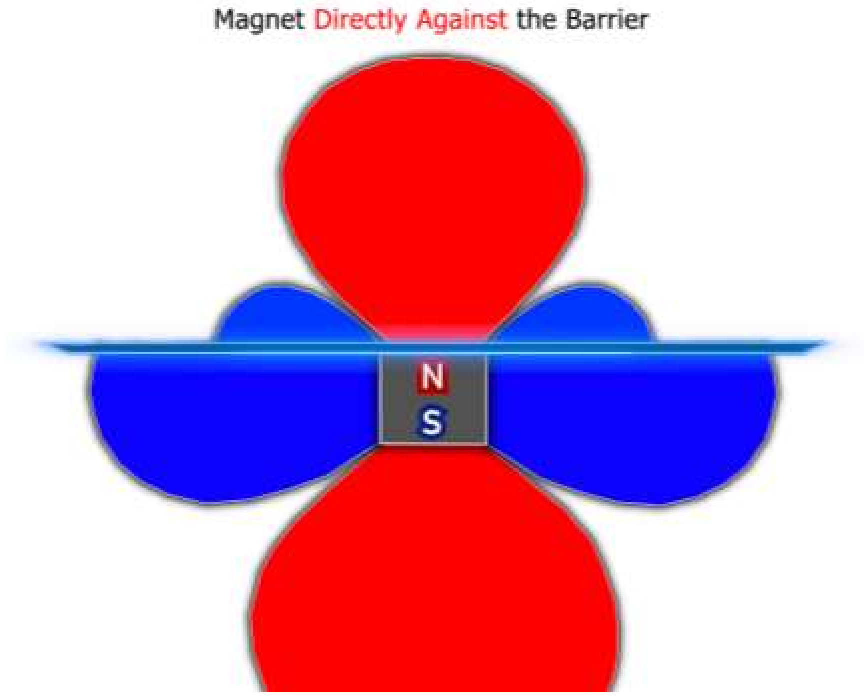


***FIG 80:** Reference magnetic structure obtained with the magnet in direct contact with the 1 mm ferromagnetic barrier. The Hall sensor records the coherent reconstruction of the entire **macroscopic D-orbital**, demonstrating that the field geometry **survives the barrier crossing**, albeit with a contraction of the main components.*

Contrary to classical expectations, the orbital shape is fully reconstructed beyond the barrier:

- The main structure of the D-type magnetic orbital (polar lobes + lateral torus) appears clearly.
- The amplitude is reduced, but the **topology remains identical**.
- The barrier neither destroys nor deflects the geometry: it is faithfully reproduced beyond it, in a compressed form.

This evidence is sufficient to **rule out any classical model based solely on flux lines**.

Experiment 2 - Magnet at 5 mm from the Barrier

FIG 81

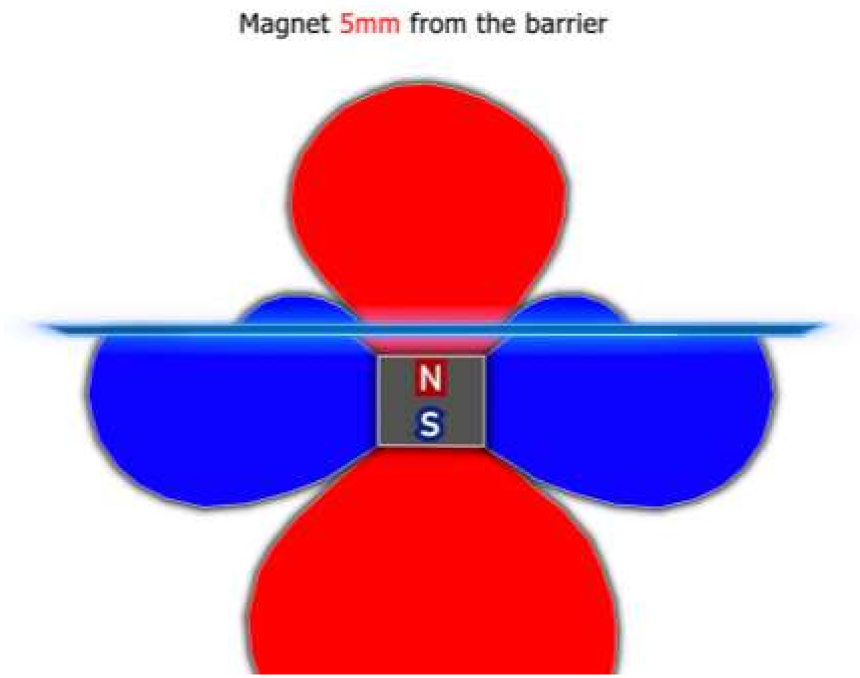


FIG 81: *At 5 mm from the barrier, the magnetic field still penetrates the ferromagnetic board while maintaining a* ***surprisingly coherent topology****. The intensity decreases, but the* ***morphology remains unchanged****: the lateral torus narrows slightly, while the main lobe stays sharp. This provides the first evidence that* ***transmission concerns geometric information rather than flux****.*

Classical theory predicts an almost complete dissolution of the structure. In contrast:

- The orbital shape **persists**
- Symmetry is **preserved**
- Dimensions **shrink proportionally** with distance
- No **anisotropic distortion** is observed

The structure is **not deflected by the ferromagnet**; it is **regenerated beyond the barrier**.

Experiment 3 - Distance of 11 mm

FIG 82

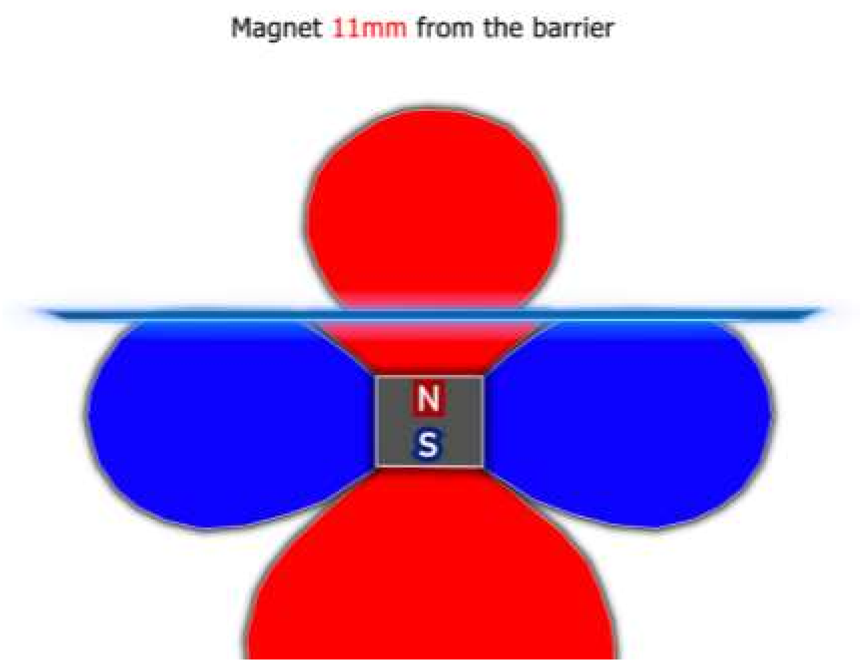


FIG 82: *At 11 mm from the barrier, the* ***toroidal component disappears completely****, as expected due to the increased distance. However, the* ***central lobe—the topological signature of the polarity—remains clearly observable beyond the barrier****. The field does not "propagate" in the classical sense; it is* ***reconstructed****: identical in pattern, reduced in amplitude.*

According to traditional magnetostatics, only background noise should remain at this distance. Instead:

- The **main lobe remains perfectly centered**
- The toroidal region vanishes, but the **residual structure is coherent**
- **Polar symmetry** is still recognizable

This behavior is fully analogous to **wavefunction survival beyond a potential barrier**: amplitude decreases, but the overall shape remains unchanged.

Experiment 4 - Distance of 22 mm

FIG 83

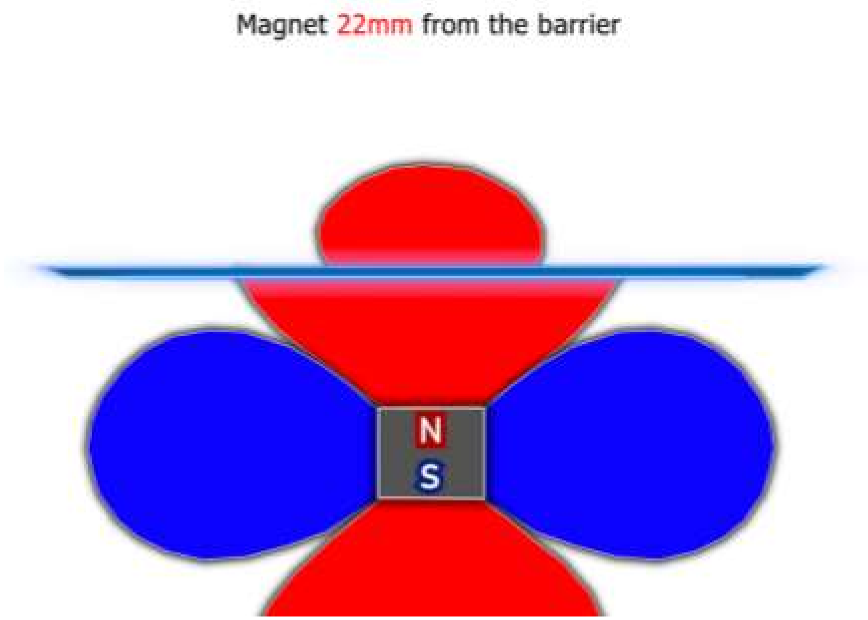


FIG 83: *Even at this extreme distance,* ***beyond the threshold predicted by classical magnetostatics****, the sensor still detects a* ***coherent fraction of the structure****. The orbital pattern reduces to a* ***residual central polarity****, but the* ***shape survives****. This behavior is characteristic of a* ***wave tunneling through a potential barrier****: dramatic attenuation, yet intact form.*

This is the most striking observation. According to classical theory, the topological structure should no longer exist at this distance. Yet:

- A **recognizable portion of the main lobe persists**
- The shape does **not collapse into noise**
- **Geometric coherence** remains

The field is not “passing” through the barrier in the classical sense; it is **re-emerging beyond it**, as if the barrier acted as a **filter transmitting structural information** rather than flux.

Dynamics of Passage Through the Barrier

Observing the field simultaneously before and after the barrier:

- **Before the barrier:** the field maintains its original shape.
- **Within the barrier:** the structure undergoes progressive contraction.
- **Beyond the barrier:** the same structure reappears compressed but coherent.

The barrier does not act as a screen, but as a **coherence lens**. This property is incompatible with classical magnetostatics. The preservation of shape and the scalar reduction of amplitude, however, are fully consistent with a **stationary solution of a wavefunction traversing a potential**.

Theoretical Interpretation Provided by the AI - Key conceptual points derived from comparison with an analytical model are:

- **Persistence of field topology:** The shape is preserved even when the intensity decreases, implying that the system's geometry represents **information**, not just magnetic flux.
- **Macroscopic magnetic tunneling:** A 1 mm ferromagnetic barrier should suppress the transverse field. Instead, the structure survives identically but attenuated, analogous to a wavefunction beyond a potential barrier.
- **Coherent filtering:** The iron selects the part of the field with the appropriate configuration to propagate, exactly as a quantum potential does with a wavefunction.
- **New physical category:** What passes through the barrier is not the magnetic field in the classical sense, but the **geometric coherence** of its configuration.
- **Confirmation of the local collapse model:** The Hall sensor detects discrete collapse points. The fact that the spatial correlation of these collapses remains coherent beyond the barrier is characteristic of **extended and correlated states**, analogous to a real wavefunction.

General Conclusion

The mapped magnetic structures are neither classical flux lines nor mere interactions of the magnet with the iron.

They are **predictive geometries, quantized via spin**, which preserve their topology even when crossing matter that would classically nullify them.

This phenomenon, perfectly reproducible with common materials, represents:

- **The first experimental evidence of geometric tunneling of the magnetic field.**
- **A macroscopic manifestation of the same principles governing wavefunction survival beyond potential barriers.**
- **A direct bridge between magnetism, quantization, and structural information.**

In simple terms: the shape passes where the field should not.

This result paves the way for a new interpretation of magnetism as an **informational language of matter**, where shape and coherence play the same fundamental role as probability in the quantum world.

SUPPLEMENTARY VIDEO: Coming Soon!

QUANTUM MISUREMENT

Potential Solutions to the Problem of Quantum Measurement

The problem of quantum measurement is one of the most enigmatic in modern physics. It concerns the transition of a quantum system from a superposition of states (described by the wave function) to a definite and observable state.

This collapse of the wave function occurs during the act of measurement, but the precise mechanism of this process remains uncertain.

1. **Observation Creates the Orbital**

- **Experiment:** Observing the magnetic field creates the magnetic orbital. Simply by turning on the sensor, I bring forth the shape of the orbital. Moreover, I must consider its magnetic field sensitivity and approach it appropriately. Similarly, it's only through interaction with another magnet at a precise angle that I can exploit the characteristics of these particular shapes. For instance, if I were analyzing a magnet and wanted to utilize the repulsiveness of the "D" orbital with n=3, l=2, mz=0 with another magnet, I would need to approach with my magnet's axis parallel to the axis of the magnet under analysis; otherwise, that shape wouldn't exist. (CHAPTER TABLES STUDY AND DYNAMICS)

- **Solution:** If observation itself creates the orbital, this implies that the wave function collapses into a specific defined state only at the moment of observation. This resolves the measurement problem by suggesting that quantum reality does not exist in a defined state until observed. **The act of measurement is not just about detecting a value but creating a defined reality.**

2. **Observation Angle Determines the Shape of the Orbital**

- **Experiment**: The angle from which the magnetic field is observed **determines** the shape of the orbital. All shapes we have seen so far are results of different observation angles. (CHAPTER GIANT QUANTUMS, etc...)

- **Solution**: This indicates that the shape of the wave function (and thus the orbital shape) is influenced by the measurement context. In terms of quantum mechanics, this could be seen as evidence that the measurement outcome depends on observation conditions, adding a level of relativity to the measurement itself. **Measurement is not absolute but dependent on the observer's viewpoint.**

3. **Dynamic Observation Controls the Orbital Shape Change**

- **Experiment**: Dynamic observations (in motion) alter the shape of the magnetic orbital. In Chapter Prime Characteristics, Figure 21 provides a clear sequence of the interaction between observer and magnetic field, varying with the observation angle; this sequence can easily be imagined dynamically also thanks to another magnet. If I gradually rotate my magnet on its axis near the magnet under analysis, I benefit from interactions with different orbital shapes based on the movement variation; at the same point, I could experience attraction or repulsion simply based on the tilt of my magnet (CHAPTER PRIME CHARACTERISTICS)

- **Solution**: This suggests that quantum states are not static but can be dynamically controlled by observation. In other words, the evolution of the wave function can be guided by continuous interaction with the observer. **This could provide a model for manipulating quantum states in real time**, partially resolving the issue of continuous measurement in quantum systems.

4. **The Magnetic Field Always Turns Toward the Observer**

- **Experiment**: The magnetic field always orients toward the observer. All constructed orbital shapes share a common feature: they all lean toward the observer. Each polarity bubble extends mainly towards observation, regardless of different and bizarre shapes. (CHAPTER PRIME CHARACTERISTICS - FIG 21)

- **Solution**: This phenomenon indicates a sort of interaction between the magnetic field and the observer, similar to the concept of quantum entanglement where the measurement of one particle immediately affects another. It can be seen as an indication that the observer has an intrinsic role in defining quantum reality. The field "chooses" its configuration in response to the observer, solving the measurement problem as a reciprocal interaction.

5. **Two Simultaneous Observers Determine Two Simultaneous and Different Shapes of the Same Magnetic Field**

- **Experiment**: Two observers simultaneously observe two different shapes of the same magnetic field. If I observe a magnet parallel to the magnetization axis, I will obtain the shape of a magnetic field with the shape and characteristics of the "D" orbital with n=3, l=2, mz=0; if at the same moment, with another sensor, I perform a perpendicular detection, the shape of the "D" orbital with n=3, l=2, mz=±1 will also appear (CHAPTER PRIME CHARACTERISTICS). Instead of sensors, if I use 2 magnets simultaneously, I can also exploit precise characteristics and different orbitals of the magnet under analysis in response to the 2 different angles interacted with.

- **Solution**: This result is particularly significant because it suggests that quantum reality can be perceived in different ways by different observers without contradictions. In quantum mechanics, this can be seen as confirming the principle of complementarity and the possibility of overlapping states that coexist until measured. It resolves the measurement problem by showing that there is not a single reality but multiple coherent realities depending on different observer viewpoints.

Summary

Key Point	Experimental Evidence	Implication
Observation Creates the Orbital	Observation of the magnetic field creates the orbital	Observation creates quantum reality
Observation Angle Determines the Shape of the Orbital	Observation angle determines the shape of the orbital	Measurement depends on the observer's viewpoint
Dynamic Observation Controls Orbital Shape Change	Dynamic observation alters the orbital shape	Quantum states can be dynamically controlled
Magnetic Field Always Orients Toward the Observer	Magnetic field orients toward the observer	The observer actively influences the magnetic field
Two Simultaneous Observers Determine Two Different Simultaneous Shapes of the Same Magnetic Field	Two observers see different shapes simultaneously	Quantum reality is subject to the principle of complementarity

Conclusion

Observations and experiments provide a new way of understanding the problem of quantum measurement. The act of observation is active within the system, creating quantum reality and influencing it.

Angles and dynamics of observation directly influence quantum states, and the interaction between observer and quantum system is bidirectional.

MAGNUS THEORY

Foundational Principles of a Macroscopic Magneto-Quantum Theory

General Introduction

The **Magnus Theory** arises from the intersection between repeatable macroscopic experiments and some of the deepest structures of quantum mechanics.

Unlike purely mathematical interpretations, this theory does not assume quantization as an ontological principle. Instead, it *derives* it directly from the geometric observation of the magnetic field.

The orbitals that emerge are not theoretical models:

they are **real shapes**, mapped point by point through local polarity collapses and reconstructed in 2D and 3D using a simple and universally verifiable experimental method.

The Magnus Theory is not designed to replace quantum mechanics: its purpose is to *reveal its roots* in the macroscopic world, showing that many of its properties do not belong exclusively to the atomic scale, but to the intrinsic geometry of fields.

Postulates of the Magnus Theory

The theory is built upon four experimental principles, each verified through hundreds of angular scans, superposition tests, entanglement behaviors and magnetic tunneling events.

Postulate I - The magnetic field possesses a discrete geometric structure

When interrogated with a binary sensor, the field does not appear as a continuum but as a sequence of discrete states (North/South). The accumulation of these collapses generates stable figures: **magnetic orbitals**.

This discreteness is not a mathematical abstraction: it is experimental. Each detection is a physical **spin event**, analogous to the collapse of a quantum observable.

Postulate II - Observation is a physical operation that structures the field

The sensor behaves as a dipole interacting with the magnet. The angle of observation:

- determines the orbital family,
- sets the local polarity,
- selects one of the coherent geometric configurations of the field.

Observation does not reveal the field: **it selects it**.

Postulate III - The magnetic field exhibits geometric superposition

Distinct configurations of the same field coexist in the same space without interference:

- a vertical and a horizontal sensor detect different orbitals,
- at the same point,
- at the same time,
- without influencing one another.

This is the first macroscopic evidence of **real superposition of shapes**, not probabilistic superposition.

Postulate IV - Shape coherence survives the passage through matter

Macro-tunneling experiments show that:

- the shape of the field contracts,
- its amplitude decreases,
- yet it preserves its geometric identity.

The barrier acts as a coherent filter: it does not transmit flux, but **structure.**

Tunneling is not transmission of force:

it is transmission of geometric information.

The Role of the Observer

The conceptual leap of the Magnus Theory is the formalization of observation as an *active geometric parameter*.

The Observation Angle

The sensor's angle relative to the magnetization axis determines:

- the orbital family,
- the number of lobes,
- the node positions,
- the symmetry of the figure.

The observer therefore does not measure:

they **collapse one of the possible shapes** of the field, exactly as in QM.

Local Collapse and Global Correlation

Each recorded point is:

- a physical collapse (binary North/South choice),
- a discrete event,
- a “quantum pixel” of the field.

The fact that these collapses remain coherent beyond a barrier implies something extraordinary: the correlation between collapses is not local, but **spatially distributed**. A hallmark of extended quantum systems.

Macroscopic Field Entanglement

The theory distinguishes three forms of magnetic entanglement, all observed experimentally.

Observer-Field Entanglement

The field “follows” the sensor, deforming in real time according to the observation angle. This mirrors the principles of **Relational Quantum Mechanics**: the state is not absolute - it is relational.

Geometric Entanglement

Knowledge of one primary polarity allows deduction of:

- the opposite polarity’s shape,
- the presence or absence of a toroidal component,
- the structure of the entire field.

The coherence of the entire figure is global, not local: **topological entanglement**.

Macro-Spin Entanglement

The North and South polarities:

- are not independent,
- are not symmetric by accident,
- but determine one another.

Exactly like two entangled spins in QM.

Magnetic Superposition

Experiments reveal two macroscopic forms of superposition.

Informational Superposition

Two observers see two different realities of the same field. The field does not collapse into a single form:

it collapses *for each observer*.

As the theory states: **Superposition is real, but its selection is local.**

Energetic Superposition

When two magnets interact, their configurations merge:

- forming a single shape,
- more coherent,
- more symmetric,
- and not decomposable into independent parts.

This is the macroscopic analogue of energy-level collapse in degenerate quantum states.

Macro-Quantum Tunneling

Magnetic tunneling shows that field geometry is:

- informational,
- independent of flux,
- capable of traversing ferromagnetic matter.

The field does not pass through: **the shape re-emerges**.

This is the first tangible macroscopic demonstration of topological survival beyond a barrier.

The Principle of Geometric Coherence

All experiments reveal a universal rule:

Every field possesses a discrete set of coherent geometric configurations, selectable via observation.

This reproduces:

- orbitals,
- spin,
- collapse,
- superposition,
- entanglement,
- tunneling.

Not as metaphors,

but as **geometric consequences of the real magnetic field**.

The Structure

The theory can be summarized in four axioms:

Axiom I - Discreteness of magnetic space

The space around a magnet is quantizable through binary polarity events.

Axiom II - Relational nature of observation

Each field shape is defined by the observation angle.

Axiom III - Topological coherence

Magnetic figures are global coherent configurations, not local artifacts.

Axiom IV - Trans-mattericity of shape

Field geometry is information capable of crossing matter through phenomena analogous to tunneling.

Physical Implications

The theory proposes a new interpretation of quantum phenomena:

- collapse is geometric selection, not elimination of possibilities;
- superposition is coexistence of forms, not probability distribution;
- entanglement is configuration coherence, not instantaneous connection;
- tunneling is transmission of form, not transmission of flux.

This represents a profound shift:

geometry is the true physical information.

Conclusion: Magnus Theory as a Bridge Between Worlds

The Magnus Theory is not a speculative extension of quantum mechanics: it is its **visible macroscopic manifestation**.

It proposes a universe where:

- observation is geometry,
- shape is information,
- the field is discrete,
- and reality emerges from interaction.

It is a new conceptual framework capable of unifying the classical and quantum domains through the universal language of field geometry.

And all of this is not philosophy.

It is experiments, data, figures, collapses, angles and structures.

But if one must express a philosophical consequence emerging from all these experiments, it is this:

If consciousness did not exist, the world would not exist.

SUPPLEMENTARY VIDEO: Coming Soon!

HYPOTHESES AND QUESTIONS

The set of experimental observations obtained in this research suggests a profound reconsideration of current models describing the relationship between the magnetic field, atomic orbitals, and quantum phenomena.

The formal and behavioral similarity between the detected magnetic field configurations and the solutions of the Schrödinger equation cannot be dismissed as mere coincidence.

On the contrary, these convergences raise a series of fundamental questions that deserve more advanced theoretical and experimental exploration.

Absence of internal structure in atomic orbitals

In traditional quantum mechanics models, orbitals are represented as probability density functions, without explicitly showing **an internal connecting structure between the "lobes" of the orbital**.

Conversely, magnetic field detections via Hall effect sensors reveal a coherent structure linking the lobes of the field, **with clear and symmetrical radial paths relative to the magnetic source.**

Is it possible that the shape of orbitals is only partially represented in current models?

Experimental evidence suggests that internal magnetic channels - potentially passing through the nucleus - may exist, connecting the lobes of the orbitals.

This opens a new question:

Could the electron traverse or orbit near the nucleus following magnetic paths not yet described by current equations?

Observation angles never represented in theoretical orbitals

Scientific literature on atomic orbitals generally represents them in idealized and symmetric configurations, limited to orthogonal Cartesian planes.

However, the experimental experience documented here demonstrates that the real observation angle directly influences the shape of the measured magnetic field, especially in oblique configurations (such as detections at 45°).

FIG. 19

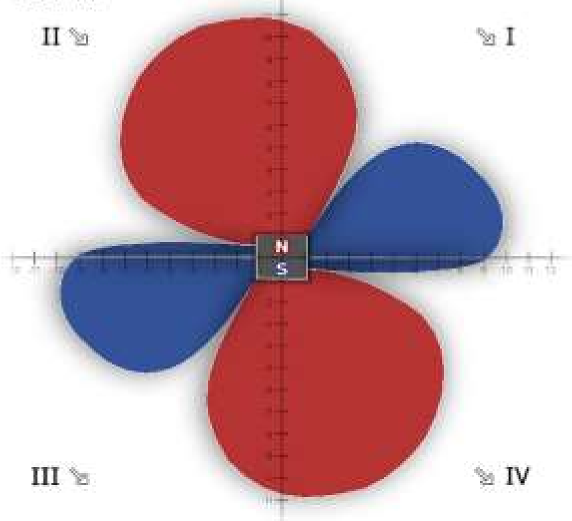


FIG 19: Detection at 45° (Relative to the magnet) – Continuous measurement

Why are these angles not considered in orbital models? Could real angular torsions of the orbitals exist relative to the nuclear axis, undetectable in current models simply because they've never been observed at such close range?

Scale discrepancy between atomic orbitals and macroscopic magnetic fields

A simple scale comparison highlights a significant discrepancy between the extent of atomic orbitals (in theoretical representation) and that of the magnetic field produced by a macroscopic magnet. By applying a direct proportion between the size of the "nucleus" and the outer shape (as between an atom and a magnet), **one would obtain atomic orbitals of macroscopic dimensions.**

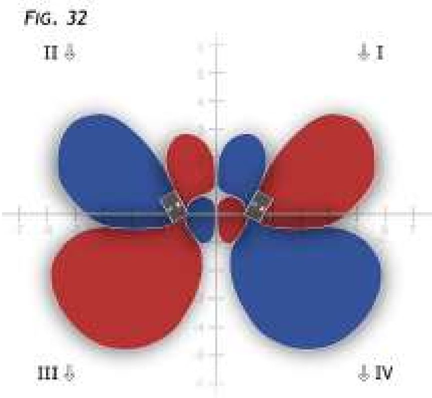
This difference suggests a possible scale anomaly:

Is it possible that our theoretical representations of orbitals are over-estimated, or that magnets represent a proportionally miniaturized version of orbital structures?

Perfect symmetry vs. irregular angular geometries

The canonical solutions of atomic orbitals produce geometrically symmetric shapes.

However, in these experiments, the angular interaction between two or more magnets generates asymmetric, distorted, or torsional structures, while still maintaining stability and coherence.



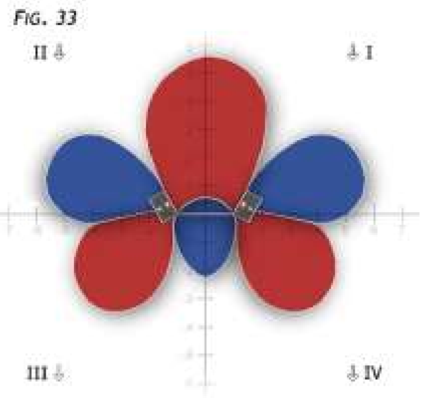


FIG 32: Dynamic Table – 2 Magnets in ATTRACTION at a distance of 2 cm, with a 60° angle relative to their axis – Short side view of Rectangular Neodymium N35 Magnets 30(length) x 10(width) x 5(thickness)
FIG 33: Dynamic Table – Same magnets and conditions but in REPULSION

Why do these irregular forms not emerge from the standard equations? Could there be an intrinsic limitation in the mathematical solutions adopted so far?

Is it possible that irregular quantum states are not excluded by nature, but have simply never been observed due to measurement methods or idealized modeling assumptions?

Magnetic Fields and Quantum Computing

If the magnetic field exhibits geometric entanglement, superposition, collapse, and interference, then it is reasonable to hypothesize that it could be used as a physical medium for quantum information.

Is it possible to build a computational system that uses macroscopic magnetic orbitals as spatial qubits?

Could the stable, repeatable, and controllable field shapes function as quantum logic states, easily readable via sensors or lasers?

Toward a Unified Theory: the Magnetic Field as Keystone

The behavior of the magnetic field in these experiments suggests that it may not be a secondary effect of electron motion, but rather a primary, geometric structure - co-founder of quantum dynamics.

Could the magnetic field, in synergy with gravity, be a manifestation of an as-yet unexplored unifying principle?

Might this approach offer a concrete pathway toward formulating a new physics - one in which form is information, and the geometry of the field is the language of matter?

From Earth to Cosmos: the Quantum Shape of the Planetary Field

The striking analogies between the morphology of atomic orbitals and the geometry of the macroscopic magnetic field raise an ambitious question: could such a "quantum" structure also emerge at planetary scales?

The possibility of mapping Earth's magnetic field using an array of Hall effect sensors placed on satellites, oriented at precise angles, would represent a first step toward exploring a "planetary magneto-quantum map." However, the presence of ferromagnetic materials in Earth's core and environmental interference would be critical variables.

If the shapes truly reflected those seen in the experiments, Earth could be seen not only as a “quantum magnet” but also as a generator of geometries coherent with a “cosmic orbitalism.”

Toward Force Unification: Magnetism as a Scalar Bridge

If the macroscopic magnetic field manifests quantum rules (superposition, entanglement, apparent spin), then it may not be just “one force among others,” but rather a different manifestation of a single unifying structure. The hypothesis is that there exists a foundational force whose expressions vary according to scale and geometry - subatomic, molecular, biological, planetary. Thanks to its scalability and detectability, magnetism could be the experimental key to this unification.

Wave-Particle Duality Recast as “Shape Duality”

In the experiments, the observer's change in angle causes a dynamic and reversible transition in the field’s shape, suggesting a new interpretation of wave-particle duality. Here, the quantum element is not the nature of the particle, but the “shape” it assumes based on its interaction with the observer. Wave-like behavior may emerge as a manifestation of variable field geometry, in analogy with the probability distribution in quantum mechanics.

Entanglement as Geometric-Directional Correlation

This work shows that a single polarity detection allows one to predict with certainty the behavior of the opposite polarity in the orbital configuration. This mirrors the concept of directional entanglement: two regions of the magnetic field, though not directly connected, are correlated in their geometric and dynamic behavior. This effect could also be studied in spatially separated experiments, offering a parallel with EPR (Einstein-Podolsky-Rosen) experiments.

Revisiting the Uncertainty Principle

The Heisenberg principle states that one cannot simultaneously know the exact position and momentum of a particle. However, in this method something unusual occurs: the union of static angular data produces a complete, coherent and repeatable figure. The distribution does not seem to be limited by intrinsic uncertainty, but by the geometry of observation.

This leads to a radical hypothesis: uncertainty may not be an inherent property of the particle, but a consequence of how observation fragments the system into partial states. The concept of a "multi-collapse detection" supports this interpretation: precise information can be obtained, but it is distributed across different spatial configurations - not simultaneous within a single measurement act, yet fully recomposable into one structure. The experiments strengthen this idea. The intrinsic magnetic field of a magnet cannot be measured without altering it: the sensor behaves as a real dipole, entering the system and disturbing its original configuration. Likewise, it is impossible to measure the interaction between two or more magnets while that interaction is occurring, because introducing the sensor effectively adds a third dipole, completely changing the interaction level.

Just as in quantum systems, the act of measurement does not reveal the system - it rewrites it. Uncertainty would therefore not originate from a fundamental limit of nature, but from the structure of interaction itself: to observe is to perturb, and to perturb is to relinquish the simultaneous knowledge of the original state and the resulting one.

Schrödinger's Paradox in Angular Terms (fun version)

The result of the experiment depends on the angle from which the box is opened. Quantum information is not static but dynamically accessible. Observability itself can function as the collapse, in an analog yet visible way, with different outcomes for each angle of interaction.

So:

If I open the box from the front, the cat may be alive.

If I open it from the back, it may already be dead.

If I open it from the side, we might still be able to save it.

Many-Worlds Theory: Reality as a Function of Observation

If the angle of observation determines which shape of the field emerges, then each angle may represent a branching of perceived reality. This challenges the multiverse interpretation as real parallel universes, proposing instead a vision in which consciousness selects the observable state from many available "geometric layers."

Magnetic Field of a "Current-Carrying Wire"

For completeness, I wanted to include the measurements of a simple wire carrying current (hence, I position this hypothesis at this point in the research, rather than together with the others at the end).

However, upon examining it with a Hall effect sensor, I couldn't identify distinct polarities. The good news, however, is that we now have other information that can assist us, and we'll leverage it immediately.

So, if I bring a magnet near a wire, it won't attach to either face of the two main polarities, but rather to its diameter (axial magnetization), perpendicular to the wire's length. This leads us to suppose that there is a concentric magnetic field extending from the wire.

However, if we were to reverse-engineer the information acquired from the magnetic field of magnets to find the complete magnetic field of the wire, we could go by exclusion, listing even the most improbable conditions.

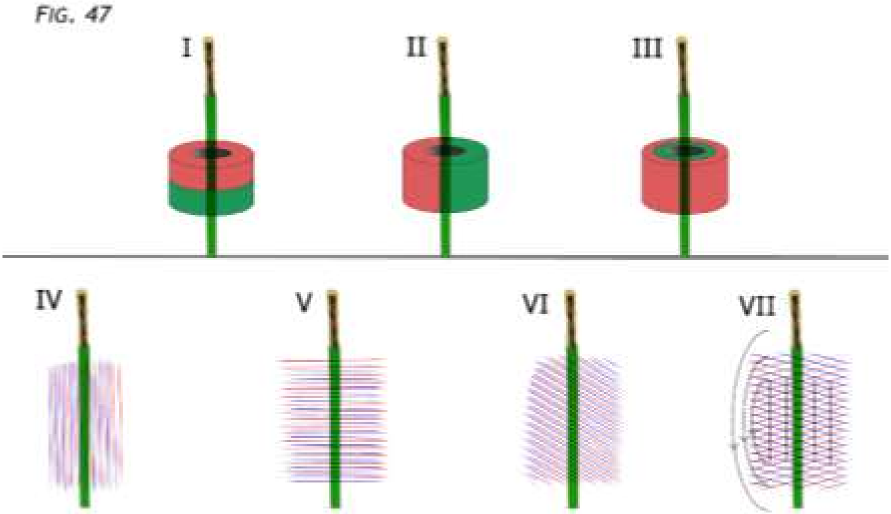


FIG 47: Unlikely Hypotheses of Polarity Representations of a Current-Carrying Wire

- FIG 47.I - the wire does not have axial magnetization because it does not exhibit polarity above or below.
- FIG 47.II - the wire does not have diametrical magnetization because we cannot attach a magnet face-to-face from any side.
- FIG 47.III - the wire does not have radial magnetization because it would otherwise create a magnetic field, consisting of lines perpendicular to the wire, and because it would exhibit a single external polarity, yet we cannot attach a magnet face-to-face.

Having ruled out the main types of magnetizations, let's consider the probabilities that could lead iron to arrange concentrically on a plane, assuming a mechanism similar to that of magnets, where iron simply indicates the shortest path between the two polarities, like a short circuit.

Let's imagine how the field lines could be arranged to achieve that result:

- FIG 47.IV - .V - .VI unlikely conditions, because if the polarities alternated only, they would cancel each other out, not creating an apparent direction, and a magnet would not be able to attach even with its diameter, as it happens.

- FIG 47.VII - polarities wrapped in two distinct spirals, with an angle less than 45° relative to the wire's diameter: although this solution seems to align with the idea of polarities having different inclinations, creating a direction, the lattice that would be created would cause iron and magnets to orient vertically, parallel to the axis, because the shortest path between the NODES of the two polarities would be vertical.

FIG. 48

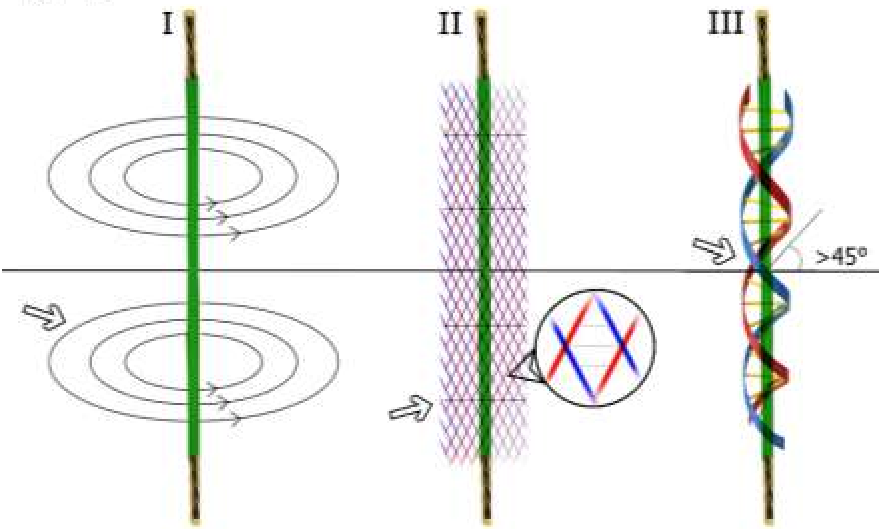


FIG 48.I: Wire carrying current - Electromagnetic field with Iron Powder
FIG 48.II: Wire carrying current - The polarities create a lattice that causes the iron to behave in that manner, connecting the NODES horizontally.
FIG 48.III: Wire carrying current - Viewed individually, the polarities coil into a spiral with an angle above 45° relative to the wire's diameter, similar to the helices of DNA.

So, taking into account the information provided by the iron with the magnetic fields, we can hypothesize that the concentric circles perpendicular to the wire's axis are actually the short-circuit pattern (FIG 48.I).

This leads us to dismiss all previous conditions, as we have seen, to arrive at the likely solution that suggests the polarities seem to be wrapped in two distinct spirals, with an angle above 45° relative to the wire's diameter, just like the helices of DNA (FIG 48.III).

In this way, it is possible, for example for the iron, to horizontally connect the NODES created in the polarity lattice (FIG 48.II), acquiring a concentric shape perpendicular to the axis (FIG 48.I).

It also provides the seemingly quantum direction, which allows a magnet to remain attached with its axis perpendicular to the wire's length, even when the magnet is rotated 360 degrees relative to the wire's axis.

Always remember that from now on, although we have a single magnetic or electromagnetic field, measuring instruments have given us access to the understanding and utilization of new quantum rules that are completely different around a magnet or electromagnet and certainly also around a current-carrying wire.

So, in this hypothesis, the probabilistic, non-classical characteristics of the magnetic field are taken into consideration, and as I wrote in the chapter on the Hall effect, they can easily be complementary and not contradictory.

The Next Two Hypotheses

I devoted two independent chapters to what are, in my view, something more than simple “hypotheses”. They deserved deeper treatment. So yes - for now, consider them as mere *speculations* if you prefer, but understand that to me... **they absolutely are not.**

THE MAP OF THE MATTER

(Hypothesis +)

Technical premise

The experimental observations in this research show that the magnetic field cannot be treated as a simple induction vector, but as a coherent spatial configuration that preserves its topology even after strong interactions, variable distances, and the traversal of ferromagnetic barriers.

This behavior suggests the existence of an informational structure of the field, coherent on a macroscopic scale, with functional analogies to the quantum wavefunction.

If this hypothesis is correct, the magnetic field becomes a concrete candidate for representing, in a macroscopically accessible form, the same geometric dynamics that govern matter at the subatomic scale.

From here emerges the most ambitious question of the Magnus Theory.

Magnetic projection as a magnified representation of quantum orbitals

The structures detected with the Hall sensor replicate:

- lobes,
- nodes,
- toroidality,
- polar symmetries,
- angular torsions,
- anamorphoses under tilt changes,

topological stability under perturbations.

These very same elements define atomic orbitals in the solutions of the Schrödinger equation. From this follows a strong but coherent deduction:

Macroscopic magnetic geometries may be a magnified projection of the microscopic quantum structure of matter.

If a geometry can be projected, it can be mapped. If it can be mapped, it can be manipulated.

From shape mapping to matter mapping

This research suggests that shape is not a superficial effect of the field: it is the informational signature of the physical system that generates it.

The key definition becomes: **Shape = Structural Information = Behavior of Matter**. If the magnetic field preserves shape across distances and obstacles, then shape itself is a physical invariant.

This opens a theoretical possibility: that the geometry of a magnetic field may serve as an operational model for understanding the internal configuration of matter. The next step becomes unavoidable: If magnetic orbitals replicate quantum orbitals, then mapping the field also means mapping the matter that generates or interacts with it.

Shape resonance as a method of control

In advanced physics (quantum optics, phononics, plasmonics, spintronics), a universal principle exists: a system responds when stimulated with a shape or frequency that mirrors its internal geometry.

The Magnus Theory proposes a radical extension:

If every particle possesses an orbital geometry, then a magnetic field with the corresponding geometry can induce, amplify, or modulate its internal quantum states.

This is the basis of my hypothesis:

Magnetic Shape Resonance

A magnetic field configured with the correct geometry (lobe, axis, twist, slope, symmetry) could:

- align spin states,
- perturb energy levels,
- modulate probability densities,
- alter local electronic configurations,
- stabilize or destabilize quantum states.

This is not "science fiction control of matter", but a coherent shape-on-shape interaction, exactly as happens with:

- lasers on atoms,
- RF fields on nuclear spins,
- acoustic waves on phonons,
- plasmonic fields on surface electrons.

The novelty is the scale: here everything occurs at room temperature, without complex instruments, using magnetic shape alone.

Building the Map of Matter

The Map of Matter is the hypothesis that closes the entire circle:

Every material structure can be described as a coherent set of field shapes.

By reconstructing, manipulating, and modulating these shapes, it becomes possible to interact with the internal quantum configurations of matter.

The theoretical procedure would be:

1. **Detect** the magnetic geometry produced by a source or material.
2. **Decompose** the shape into components (lobes, nodes, gradients, torsions).
3. **Associate** each component with an internal structure (e.g., electronic orbitals, local density, spin).
4. **Reconstruct** a field with matching or resonant geometry.
5. **Stimulate** the material and observe coherent variations.

If this works even at a minimal level, it would open the door to:

- electronic state control,
- spin manipulation,
- engineering of atomic configurations,
- geometric navigation of matter,
- new techniques of formal spectroscopy.

Why this is scientifically plausible

Because no one can dispute these points:

1. Magnetic shapes exist and are measurable.
2. Quantum shapes exist and are mathematically identical.
3. Matter responds to coherent stimuli (resonance).
4. Shape is a vehicle of physical information.
5. This research demonstrates coherence, topology, and macroscopic tunneling.

Therefore, the hypothesis is scientifically legitimate:

If two systems share coherent geometries, they can exchange geometric information.

This opens the possibility of constructing the first **Map of Matter**.

Applied implications: what could a Map of Matter enable?

If the hypothesis is even partially correct, the Magnus Theory introduces a new operational paradigm:

the ability to access matter not through its energy content, but through its field geometry.

This perspective, radical yet consistent with the experimental evidence, enables a wide range of applications spanning fundamental physics and emerging technologies.

Medicine: accessing electronic and magnetic states in biological molecules

Biological matter is governed by:

- electronic configurations,
- spin states,
- vibrational and magnetic resonances,
- ionic currents and electric potentials.

If coherent field shapes can interact with these structures, then it becomes conceivable to:

- modulate paramagnetic and diamagnetic spin states (e.g., metal ions in enzymatic systems);
- stabilize or destabilize selective chemical bonds without heat or radiation;
- guide biological reactions through resonant field geometries, opening the way to precision magneto-chemistry;
- create non-invasive diagnostics based on the formal response of tissues to field geometry.

This is not speculative medicine: it is the room-temperature extension of the same principles behind MRI, EPR, and spin spectroscopy.

Smart materials

With a Map of Matter, it becomes theoretically possible to:

- manipulate local electronic configurations in metals, semiconductors, or ceramics;
- induce coherent spin alignments (room-temperature spintronics);
- design materials whose properties change according to the applied field shape;
- generate geometric metamaterials with programmable responses.

Geometric computation *(next chapter)*

A new computational platform emerges:

- **Qumag**, magnetic states with overlapping geometry,
- controllable by angles, spin thresholds, and multiple configurations,
- usable as macroscopic quantum-like logic units.

This could lead to devices that are:

- stable at room temperature,
- readable with inexpensive sensors,
- based on geometric rather than energetic states,
- without cryogenic isolation.

Molecular control

Through the concept of shape resonance:

- a magnetic field with a specific orbital geometry could promote or inhibit vibrational or electronic states in complex molecules;
- crystallization, polymerization, and chemical reactions could be guided with unprecedented selectivity.

Energy and electromagnetic systems

If field geometry is information:

- it becomes possible to design more efficient electromagnetic systems through orbital field shapes;
- flux configurations with reduced losses or instabilities may be created;
- the relationship between shape and induction may be exploited for low-power or high-efficiency technologies.

Navigating matter

Perhaps the deepest implication:

a Map of Matter would allow us to treat matter as a navigable landscape rather than an opaque entity.

We could:

- map real electronic densities,
- predict instability points or phase transitions,
- control structural transitions with dedicated geometric fields,
- **interact with matter not through energy, but through geometric information.**

Conclusion

This is not fantasy, not religion, not magic. It is the logical extension of what has been measured: **matter is not made only of particles and energy, but of informational shapes that respond to coherent shapes.**

This research provides the first macroscopic experimental evidence of this idea.

QUMAG

(Hypothesis +)

Field-Geometry Computational Architecture

Operational introduction: from qubit to coherent magnetic form The experimental results presented in this research show that a macroscopic magnetic field can adopt coherent, stable and reversible configurations that exhibit functional analogues of quantum phenomena: geometric superposition, directional entanglement, informational tunneling and local collapse.

This observation makes possible a new computational architecture based not on energetic states of particles, nor on isolated electron spins at near-zero temperature, but on macroscopic magnetic field shapes that can be observed and manipulated in real time.

This new platform is called **Qumag (Quantum Magnetics)**: a computational system that uses spatial configurations of a magnetic field as informational states.

Definition of a Qumag State

A Qumag state is a coherent three-dimensional configuration of a magnetic field, generated by a dipolar or multipolar source and selected by:

- a specific observation angle,
- an internal or multi-magnet geometry,
- a discrete polarity (spin-like),
- a collapse threshold (North/South) imposed by the sensor.

Unlike qubits, where the logical state is a probabilistic superposition, in the Qumag system **superposition is a superposition of shapes**.

A Qumag state might be:

- a stable torus,
- a coherent double lobe (p-orbital like),
- a macroscopic d-orbital,
- a hybrid form produced by magnetic interference,
- a structure filtered through tunneling across a barrier.

In short: **the logic is not binary, not probabilistic, but geometric.**

Physical Design of a Qumag

A Qumag requires three fundamental elements:

Modulable magnetic source. It may be:

- a microstructured permanent magnet,
- an array of configurable micro-magnets,
- a microcoil generating harmonic fields,
- a hybrid magnet-coil system for phase modulation.

The essential property is the ability to generate repeatable geometric field patterns, consistent with the macroscopic orbitals observed.

Angular reading sensors

Each Qumag needs a sensing system based on:

- digital Hall sensors (binary) for spin,
- analog radiometric Hall sensors (for intensity maps),
- multi-reader arrays for 3D reconstruction,
- optional lasers for interferometric reading.

The sensor is not passive: it participates in the geometry of the state, just as measurement influences the shape of the field.

Controlled observation angle

This is the core. The system must rotate the measurement along a 3D perimeter, reproducing the same sequence of local collapses that, in the experiments, generated macroscopic orbital shapes. The angle becomes:

- a logical operator,
- a state selector,
- a superposition controller,
- a macroscopic quantum filter.

Logical States

Each Qumag can represent:

- single states (one stable magnetic orbital),
- double overlapping states (e.g., p_x + p_y),
- interference states (multipolar interactions),
- dynamic states (geometric tunneling, shape squeezing).

So a Qumag "bit" might be:

- a torus = state A
- a double lobe = state B
- a triple-lobe interference = state C
- a tunneling oscillation = state D… etc.

Information becomes a **topological object**, not a number.

Logical Operations

Operations between Qumag states occur through:

- variations of the measurement angle (logical rotations),
- variations of field geometry (shape operators),
- controlled distances between sources (geometric entanglement),
- applications of filtering barriers (tunneling operators).

This leads to a completely new logic:

Field-Geometry Logic (FGL)

It has no classical equivalent. It has no traditional quantum equivalent. It is a new computational category.

Macroscopic Superposition as a Computational Resource

Experiments show that two orbital-like shapes can coexist in the same space without merging, generating a single observable pattern that embeds combined information.

This capability underpins **Qumag superposition**, which allows:

- encoding multiple shapes in a single configuration,
- switching between shapes through angular rotation,
- combining states in a coherent and repeatable way.

It is real superposition: geometric, macroscopic, visible and reproducible.

Room-Temperature Operation

Unlike traditional qubits, Qumag states:

- do not depend on nanometric coherence,
- do not require quantum isolation,
- do not collapse due to thermal fluctuations,
- do not need superconductors or cryogenic systems.

Their stability arises from:

- magnetic field inertia,
- dipole robustness,
- the discrete nature of magnetic spin,
- angular definition of collapse.

This makes possible:

- room-temperature quantum computers,
- with minimal energy consumption,
- visible states detectable with simple magnetic mapping.

Qumag and Field-Shape Communication

If the state is a shape, and the shape is a field:

- information can propagate through space as an orbital pattern,
- not as current or photons, but as a traveling magnetic geometry,
- with the possibility of controlled interference between states.

This is the theoretical basis for:

- Qumag networks,
- coherent shape communication,
- directional macroscopic entanglement protocols.

Qumag as the Operational Summit of Magnus Theory

Magnus Theory shows that:

- field shape is information,
- observation angle is a physical operator,
- superposition is geometric,
- collapse is local and discrete,
- entanglement is directional,
- tunneling is shape filtration,
- coherence exists on macroscopic scales.

Qumag consolidates all these principles into operational technology.

They are the first architecture built on **field geometry rather than particles**. They form a bridge between:

- classical physics,
- quantum physics,
- information science,
- macroscopic magnetic technology.

Final Vision: Qumag as the Quantum Computer for Everyone

If developed, this platform would offer:

- no cryogenics,
- cheap components (Hall sensors, magnets, microcoils),
- visible readout,
- robust states,
- intuitive operations,
- direct geometric manipulation.

The first truly accessible, intuitive and democratic quantum computer could be built by anyone, exactly as these experiments were made: **a field, a sensor, a geometry.**

Qubit vs Qumag - State Geometry and Computational Capacity

A crucial distinction between Qumag and traditional qubits lies in the informational structure of their physical states.

A qubit is a continuous superposition of two discrete basis states (0 and 1), representable as a point on the Bloch Sphere.

Despite the mathematical continuity, it always operates within a **two-dimensional manifold**.

Qumag does not encode information in two bases, but in spatial magnetic shapes.

These shapes are high-dimensional geometric structures.

Every observable magnetic shape - from a single lobe to a tilted torus or multi-sensor configuration - is not a point in Hilbert space, but a full three-dimensional configuration, representing a geometric manifold with arbitrary degrees of freedom.

Thus:

- a qubit has continuity in amplitudes,
- **a Qumag has continuity in morphology.**

Rotating the sensor from parallel to perpendicular does not produce a one-dimensional interpolation, but a **family of shapes**, each with endless distributions of local polarity.

Each shape is a point in an infinite-dimensional functional space.

So a Qumag is not a superposition of two configurations, but of **infinitely many geometric sub-states**, each with its own topology.

Therefore, a Qumag is a form of computation that is "infinity times infinity":

- infinite possible field configurations,
- infinite geometric microstates within each configuration,
- infinite angular and interaction levels creating each form.

Mathematically:

- a qubit is a linear combination in a 2D complex space,
- **a Qumag operates in a functional state space with cardinality far beyond a two-level quantum system.**

This makes Qumag natural candidates for extremely high-density computation, potentially outperforming standard qubits, especially in hybrid classical-magnetic architectures at room temperature.

SCIENCE E TECHNOLOGY

As highlighted by the quantum-like features observed throughout this Research, the results may reveal new conceptual connections and open unexpected theoretical developments within the framework of known physical laws. They do not replace existing physics, but they suggest new directions, new interpretations, and, above all, new technological possibilities emerging from these findings.

1. **Deepening the understanding of quantum electromagnetism**: The discovery could provide a new perspective on the interactions between charged particles and magnetic fields at the quantum level, enriching our understanding of electromagnetism in quantum contexts.

2. **Better understanding of quantum magnetism**: A deeper understanding of the quantum behavior of magnetism could lead to new discoveries and applications in the fields of spintronics and information storage.

3. **Advancement in understanding quantum coherence**: The discovery could offer new insights into quantum coherence in magnetic systems, enabling the study and exploitation of quantum phenomena such as entanglement and superposition in magnetic contexts.

4. **Exploration of new phases of quantum matter**: The discovery could reveal new phases of matter emerging from quantum interactions between magnetic fields and matter, paving the way for the discovery of new materials with unique properties and innovative applications.

5. **Integration of quantum mechanics with other fundamental theories**: A better understanding of quantum magnetism could facilitate the integration of quantum mechanics with other fundamental theories of physics, such as general relativity, in the search for a unified theory.

6. **Study of the interaction between magnetism and quantum gravity**: The discovery could enable the study of the interaction between magnetic fields and gravity at the quantum level, offering new insights into the nature of gravitational attraction and paving the way for possible connections between quantum mechanics and gravity.

7. **Exploration of quantum cosmology**: The discovery could have implications in quantum cosmology, allowing for the study of primordial magnetic fields in the early universe and investigating the role of magnetism in the evolution and structure of the universe.

8. **Interconnection of phenomena**: The discovery that the magnetic field may exhibit quantum behaviors similar to those of subatomic particles could indicate a profound interconnection between different phenomena observed in the universe. This could suggest that there are fundamental principles governing the entire reality, manifesting in different ways on different scales of magnitude and in different physical contexts.

9. **Nature of existence**: The implications of quantum mechanics, along with discoveries about the nature of the magnetic field, may lead to a reconsideration of the nature of existence itself. We may be prompted to question the meaning of being and our perception of reality, paving the way for new philosophies and conceptions of the universe.

10. …

In addition, there is a high likelihood of an incredible … **"Patent Race"**, considering that all existing devices, even those in everyday life, which use magnetic and electromagnetic fields to function, could certainly be improved and perfected following the new field representations and the new magneto-quantum rules.

1. **Mobile phones and electronic devices**: Mobile devices and other electronic gadgets could benefit from advanced magnetic technologies enabling smaller, more efficient, and energy-efficient devices.

2. **TVs and monitors**: Display technologies could be enhanced to offer sharper images, brighter colors, and reduced energy consumption, thanks to new developments in magnetic materials and techniques for generating and managing magnetic fields.

3. **Electric motors and generators**: Electric motors and generators could be optimized to improve energy efficiency, reduce wear, and extend operational lifespan, using more advanced magnetic materials and optimized designs based on the new understanding of magnetism.

4. **Medical equipment**: Medical imaging technologies such as nuclear magnetic resonance (NMR) and computed tomography (CT) could benefit from improvements in image quality, spatial resolution, and acquisition speed.

5. **Electric vehicles**: Electric vehicles could benefit from more efficient electric motors, powerful batteries, and faster and more convenient charging systems, thanks to technological developments based on this research.

6. **Enhancement of quantum control techniques**: Better understanding of the quantum behavior of magnetism could lead to the development of new techniques for controlling and manipulating the quantum state of magnetic systems.

7. **Implications in quantum computing research**: The discovery could lead to new insights into how to incorporate quantum magnetic phenomena into quantum computing circuits and protocols, contributing to the realization of more powerful and efficient quantum computers.

8. **Better understanding of quantum transport phenomena**: The discovery could provide a better understanding of quantum transport phenomena in magnetic materials, contributing to the development of more advanced quantum electronic devices.

9. **High-sensitivity magnetic sensors**: Technologies based on detecting small variations in the magnetic field could benefit from a better understanding of quantum interactions in magnetic materials, leading to more sensitive and precise magnetic sensors for applications in medicine, geophysics, and other disciplines.

10. **Advanced electronic storage technologies**: Developments in the field of quantum magnetism could lead to new techniques for storing and manipulating information at the electronic level, enabling the creation of faster, more compact, and efficient data storage devices.

11. **Enhanced quantum processing systems**: Better understanding of the quantum behavior of magnetism could lead to improvements in the fundamental components of quantum computers, such as magnetic qubits, paving the way for increased computing power and new computational applications.

12. **Advanced magnetic materials**: Research based on the new understanding of quantum magnetism could lead to the discovery and synthesis of new magnetic materials with unique properties, useful in a wide range of technological applications, including electronics, medicine, and energy.

13. …

I also engaged in dialogue with ChatGPT to explore what other future research or applications could emerge - perhaps in a more distant future - but still based on this Research.

1. **Quantum Teleportation**: If our understanding of quantum mechanics and magnetic fields becomes sufficiently advanced, it may be possible to develop quantum teleportation technologies, enabling the instantaneous transfer of information or objects through quantum manipulation of magnetic fields.

2. **Energy Generation**: By harnessing the quantum properties of magnetic fields, new energy-generation technologies could be developed - highly efficient and clean - using interactions between magnetic fields and matter to produce electricity in innovative ways.

3. **Secure Quantum Communications**: The insights gained from this theory could support the development of highly secure quantum communication systems, utilizing the quantum properties of magnetic fields to ensure privacy and data security.

4. **Advanced Space Exploration**: A deeper understanding of quantum magnetism could lead to advanced technologies for space exploration, enabling faster, safer interstellar travel and the exploration of new planets and star systems.

5. **Magnetic Shields**: Based on the quantum properties of magnetic fields, advanced defense technologies could be developed using magnetic fields to repel or deflect projectiles or missiles.

6. **Advanced Protection Against Atomic Weapons**: This new understanding of quantum mechanics could lead to the development of advanced defense systems capable of detecting and neutralizing nuclear threats more effectively, offering better protection for populations.

7. **Quantum Medicine**: The knowledge derived from this theory could lead to new advanced medical therapies that exploit the quantum properties of magnetic fields to diagnose and treat diseases more precisely and effectively.

8. **Detection and Manipulation of Single Atoms**: Following this theory, technologies could be developed to detect and manipulate individual atoms using magnetic fields with extreme precision, opening new possibilities in nanotechnology and atomic-scale manipulation.

9. **Exploration and Operation of the Brain**: Using quantum magnetic fields, we could develop advanced technologies for exploring and manipulating the human brain, opening up new avenues for treating neurological disorders and understanding brain function.

10. **Quantum Artificial Intelligence**: The theory could be used to develop AI algorithms and architectures based on the principles of quantum mechanics, enabling the creation of even more powerful and efficient AI systems.

11. **Manipulation of Gravity**: If we better understand the relationship between magnetic fields and quantum mechanics, we might discover new ways to manipulate gravity, paving the way for gravity control technologies that could revolutionize aerospace and space travel.

12. **Spacetime Cryptography**: Using this theory, systems could be developed that exploit the spacetime properties of magnetic fields to securely transmit information through time and space, with significant implications for national security and interstellar communication.

13. **Quantum Telerobotics**: With a deeper understanding of quantum magnetic fields, we could develop technologies for remote control of robots at the quantum level, allowing precise and delicate operations in dangerous or inaccessible environments, such as distant planets or critical infrastructure.

14. **Quantum Medical Imaging**: Utilizing quantum magnetic fields, we could create new medical imaging techniques that enable high-resolution visualization of biological structures at the quantum level, allowing for more accurate, personalized diagnoses and improved patient care.

15. **Quantum Social Sciences**: The theory could also be applied to the social sciences, enabling deeper understanding of complex social phenomena through quantum analysis of magnetic fields generated by human interaction—with potential implications for psychology, sociology, and economics.

16. **Development of New Superconducting Materials**: By better understanding the quantum properties of magnetic fields, we could design and synthesize new superconducting materials that function at room temperature, revolutionizing fields like energy, electronics, and transportation technology.

17. **Controlled Nuclear Fusion Technologies**: If we could manipulate magnetic fields more precisely and efficiently, we might achieve greater control over nuclear fusion, paving the way for a clean, unlimited energy source that could solve global energy challenges.

18. **Exploration of Human Consciousness**: Using this theory, we could develop new approaches to understanding human consciousness through the study of magnetic fields generated by the brain—opening new perspectives on the nature of the mind and reality itself.

19. **Time Travel**: The new knowledge about the quantum nature of magnetic fields could lay the foundation for understanding temporal phenomena. If we discover how to manipulate time using magnetic fields, we might be one step closer to making time travel a reality.

20. **...**

ACKNOWLEDGEMENTS

This work was conceived, developed, and completed independently, through direct experimentation, deductive analysis, and constant comparison with theoretical models and concepts from quantum mechanics.

I would like to especially thank the artificial intelligence system **ChatGPT** for its valuable contribution in reformulating and structuring the content into a technical language suitable for scientific dissemination.

Special thanks also go to the **anonymous reviewers** who, with critical spirit and intellectual openness, examined and validated the contents of this research, helping to strengthen its solidity and impact.

Finally, heartfelt recognition goes to the open-access scientific community and the **Zenodo** platform, for providing a free, shared, and permanent publishing environment - essential for the transparent evolution of knowledge.

And if I may highlight one of the most important insights that emerged from this work, it is this:

YOU are the one who CREATES the World! … So make it WONDERFUL!

SALCUNI MARSIO

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SUPPLEMENTARY MATERIALS

In the .zip file attached to this research, you will find a wealth of material, including:

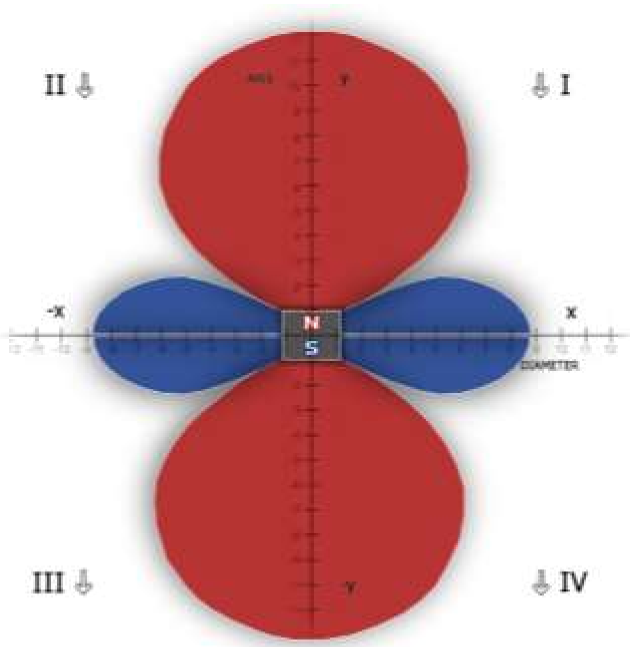
- 2D images of magnetic field scans from magnets, electromagnets, and interactions between multiple magnets
- 3D reconstructions of magnetic orbitals, created using the method explained in this research
- Visual guides to help you reconstruct the magnetic orbitals
- Fascinating GIFs showing the dynamic behaviors of interacting magnetic fields, 3D orbitals, and electromagnets from multiple angles
- Templates and reference boards used for the creation of the GIFs
- Various additional images, including the sensor circuit and all the key diagrams presented in this research

I strongly recommend watching all the videos associated with this Research, linked at the end of each chapter. They provide complete visual confirmation of each experiment and allow the reader to follow every stage of the work directly.

TABLES AND PERSPECTIVES

In the previous chapters of the book, I had to shrink the 3D figures to make comparisons more efficient and to provide better visual and mental organization.

Now, I want to present them at a reasonable size - not only because it was a huge effort to create them all and it feels wrong to miniaturize them, but mainly because after this research, whenever you look at a simple magnet or electromagnet, you will know that the magnetic field RESPECTS THESE STRANGE AND WONDERFUL SHAPES!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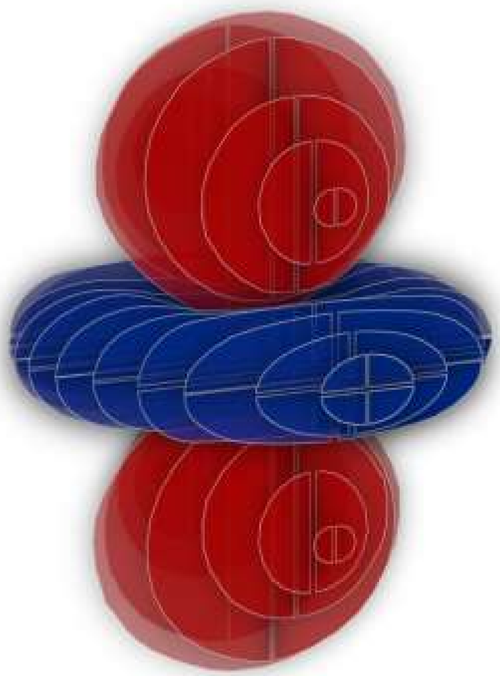

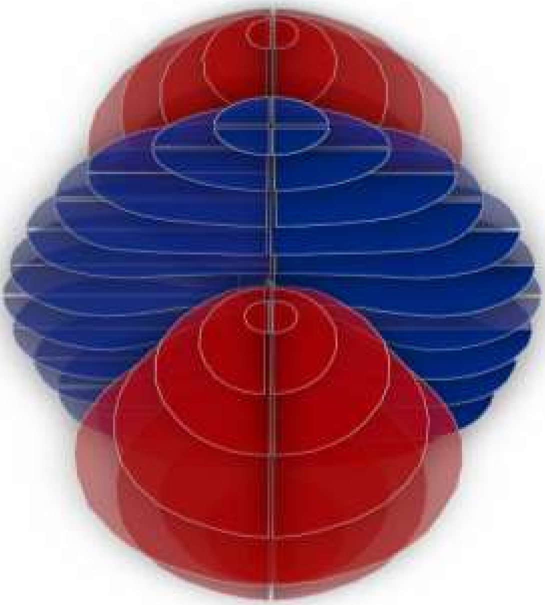

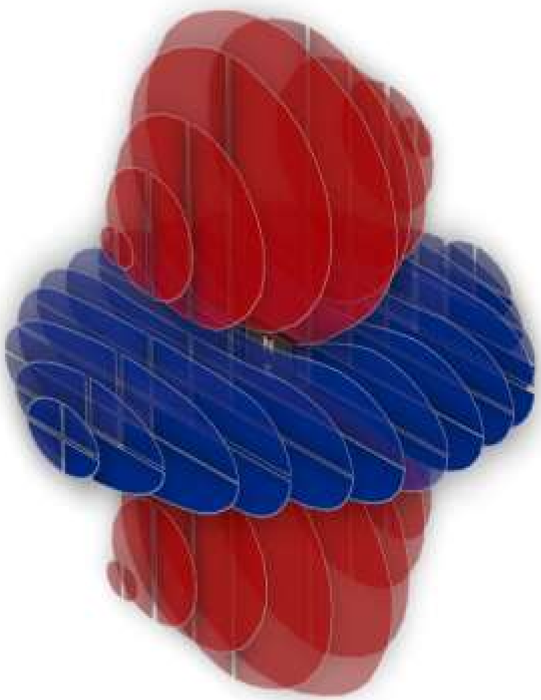

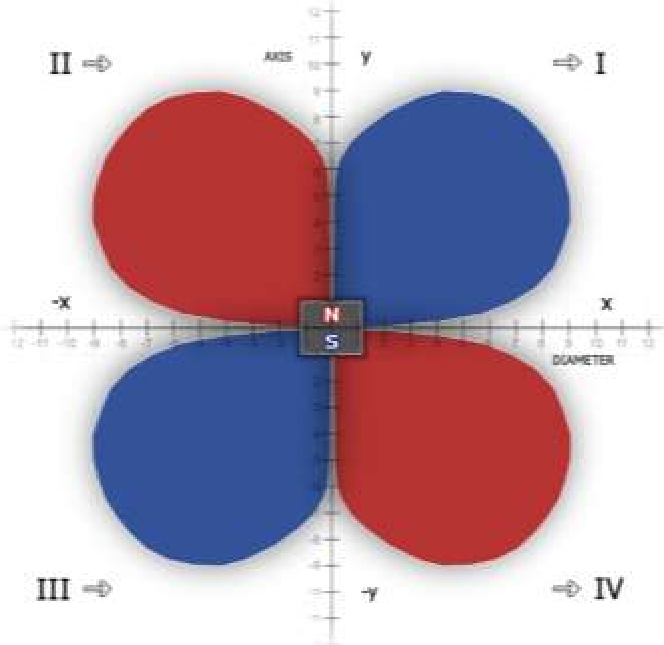
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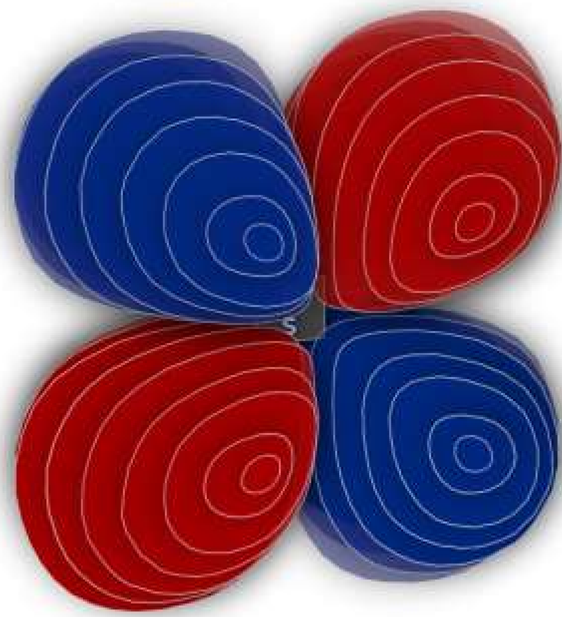
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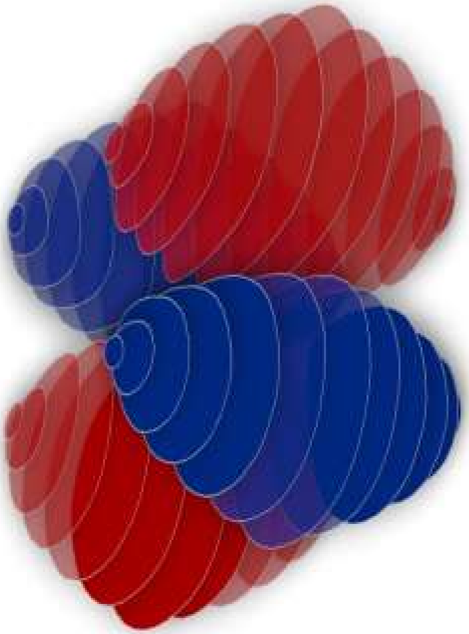

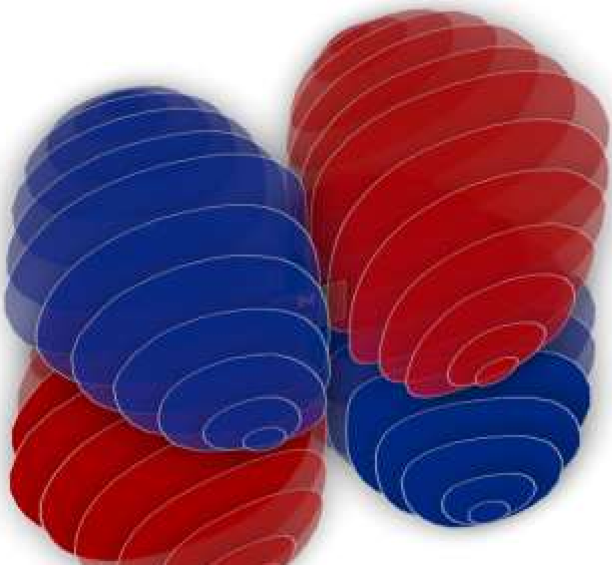

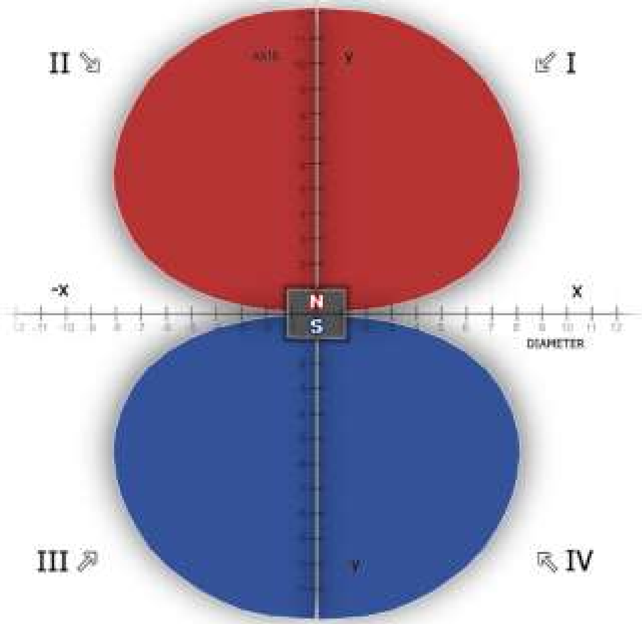
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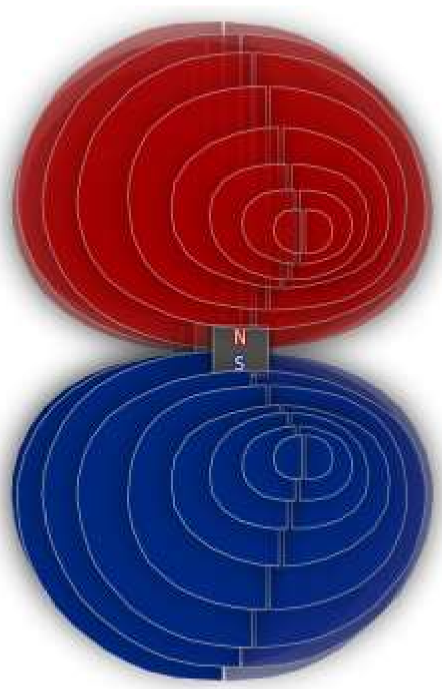
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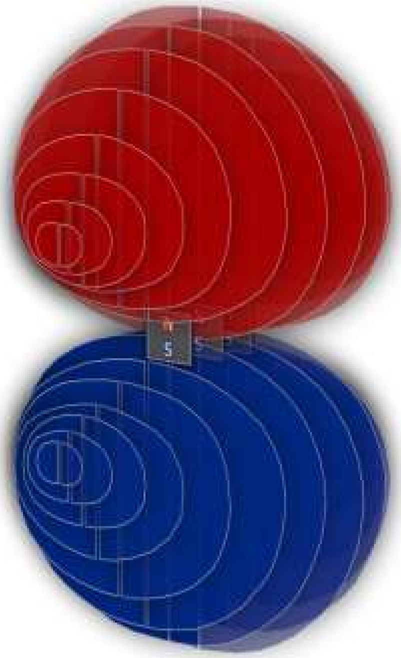
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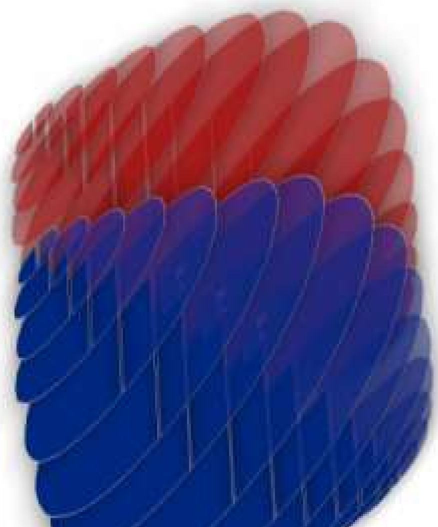

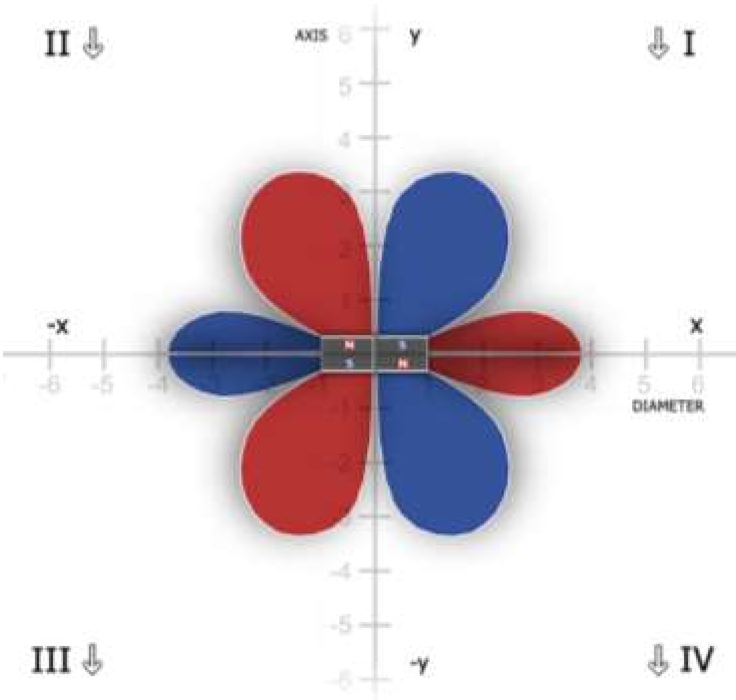
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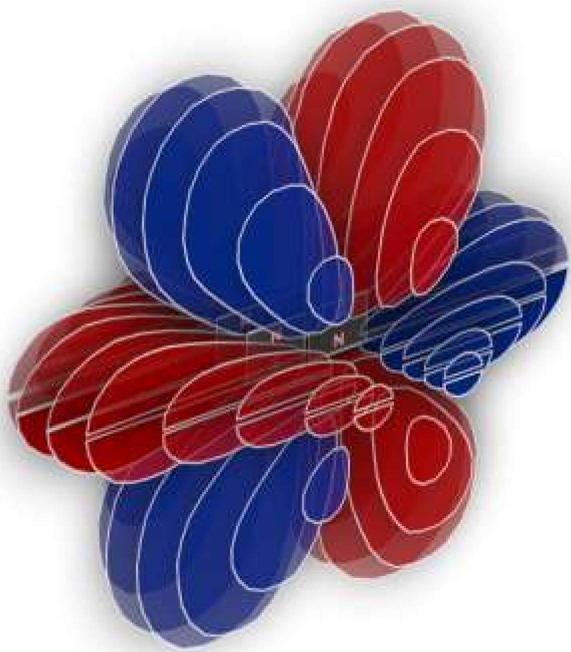

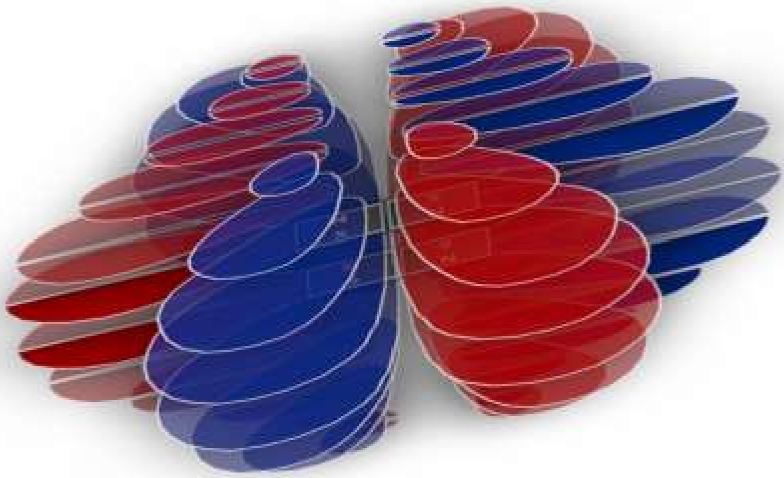

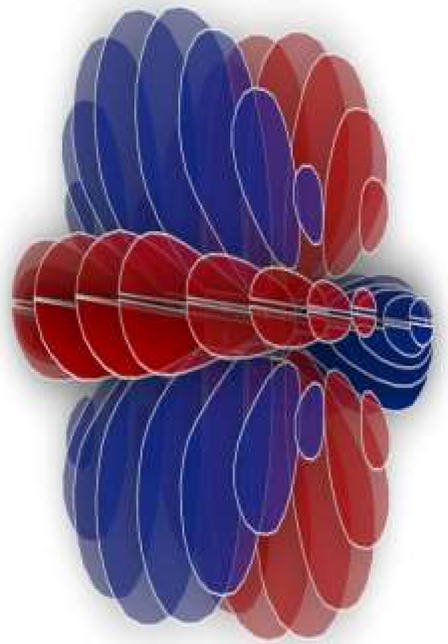

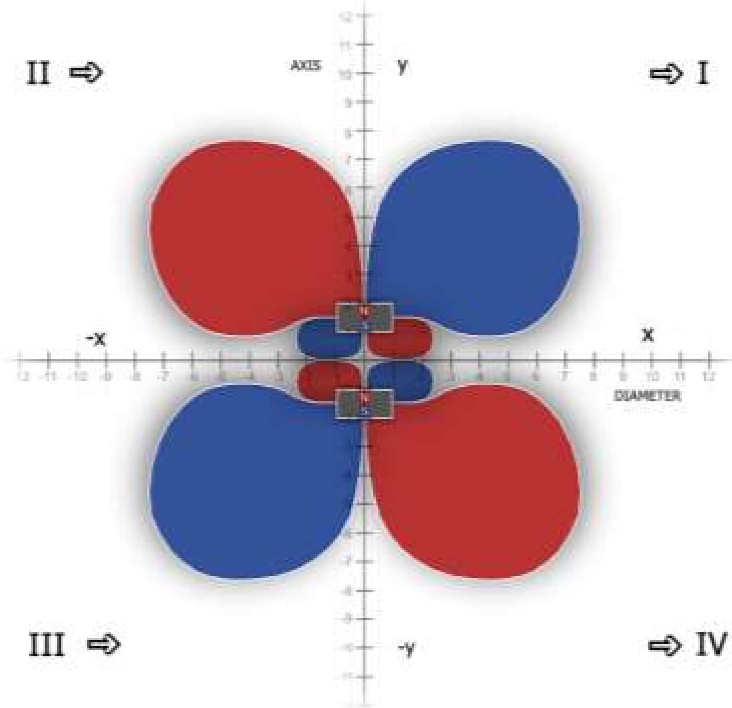

II ⇨
AXIS
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DIAMETER
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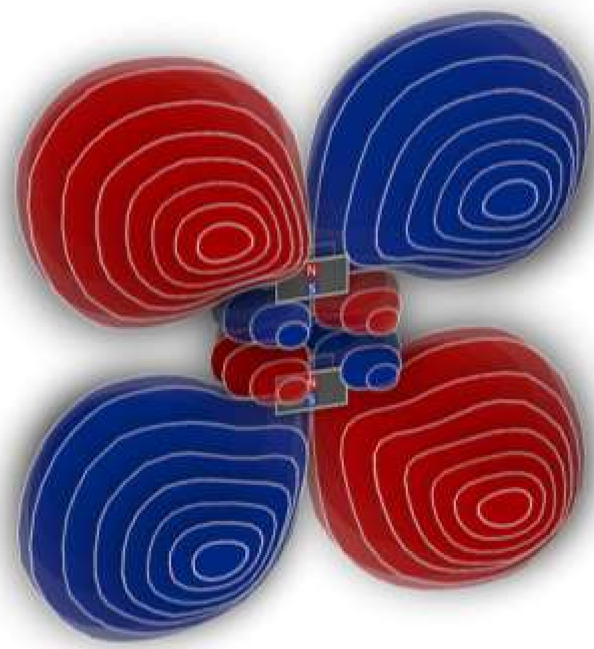

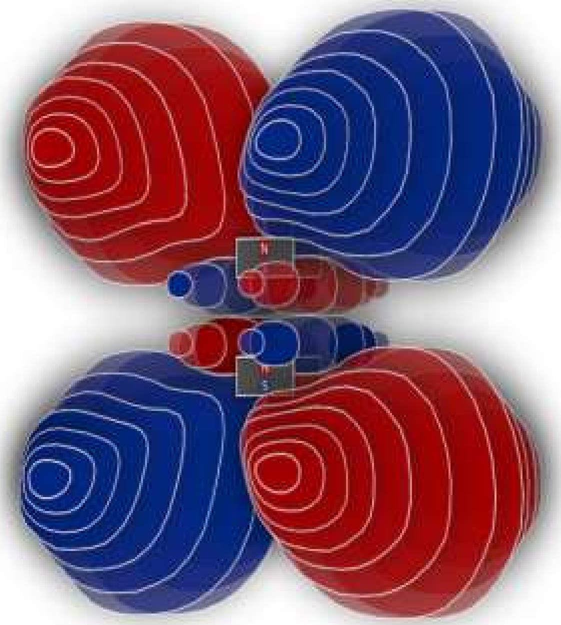

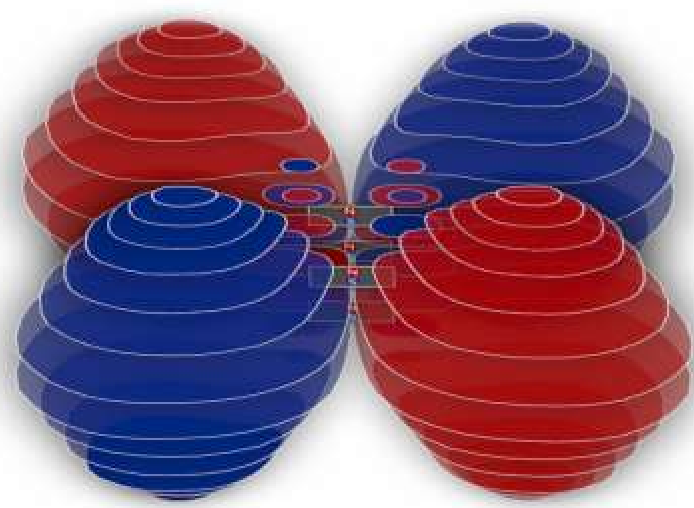

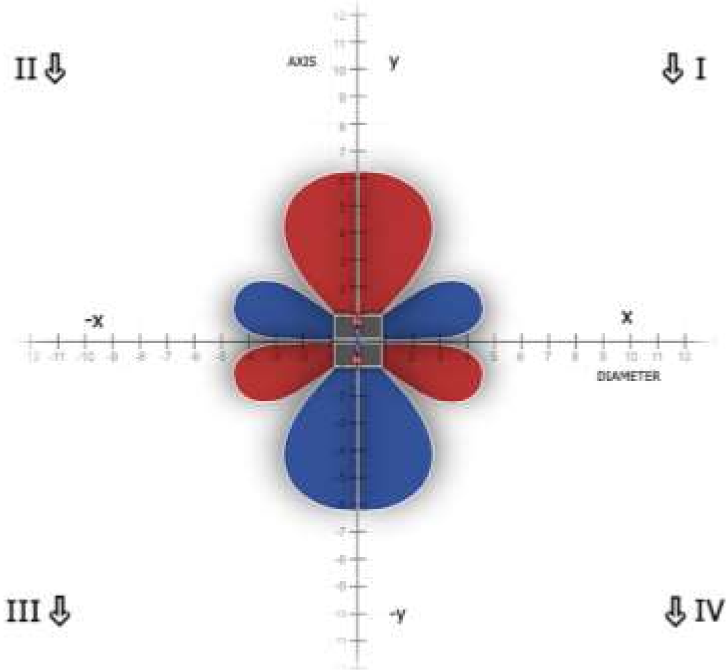
II ⇩
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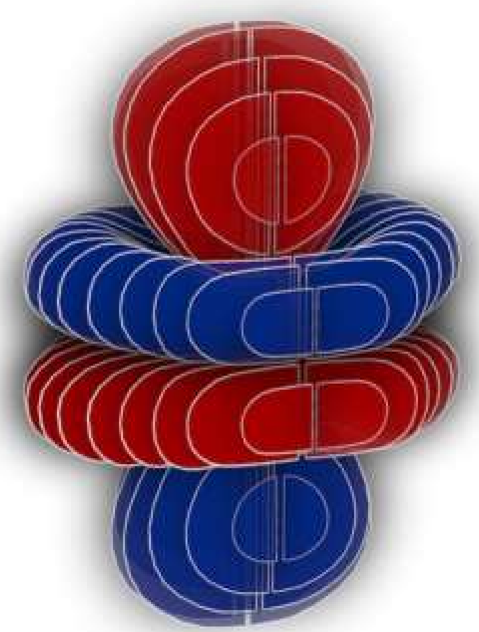

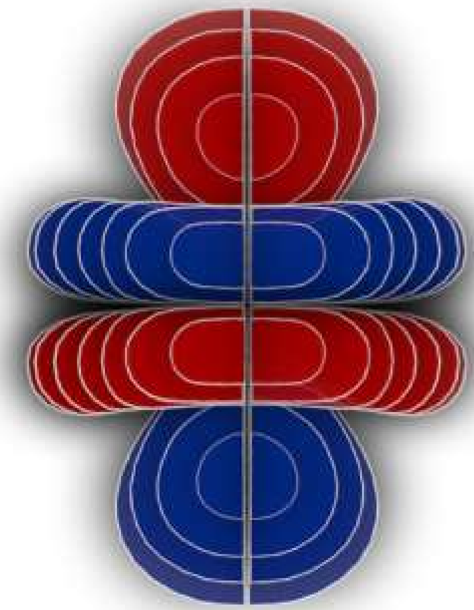

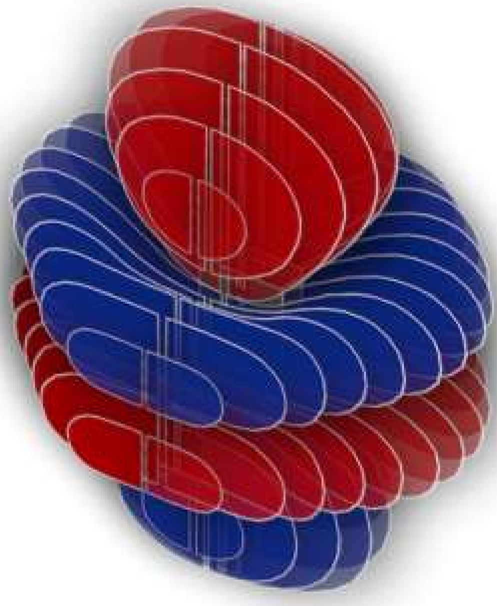

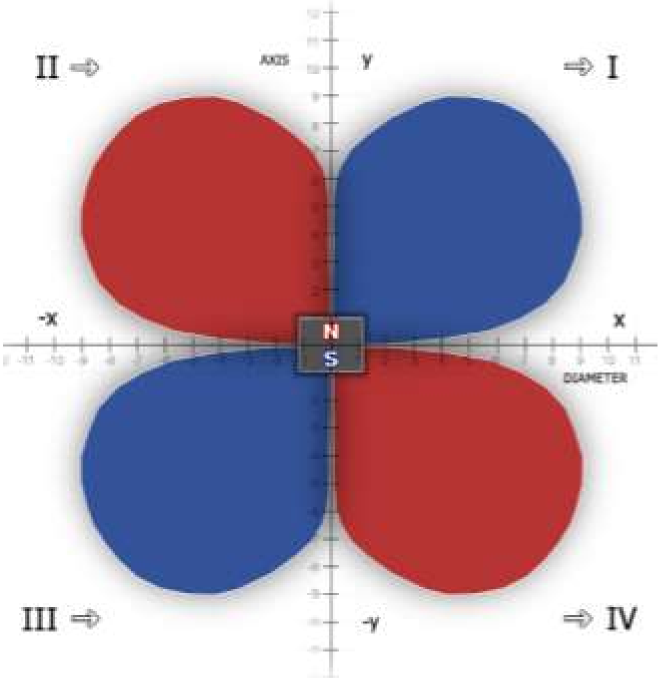
II ⇨
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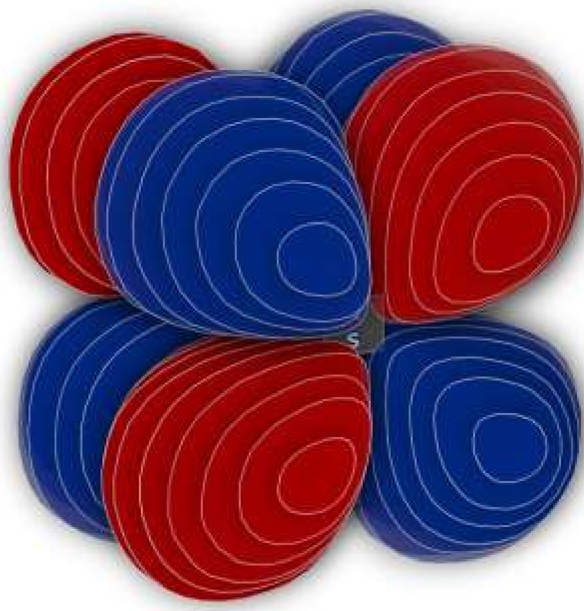
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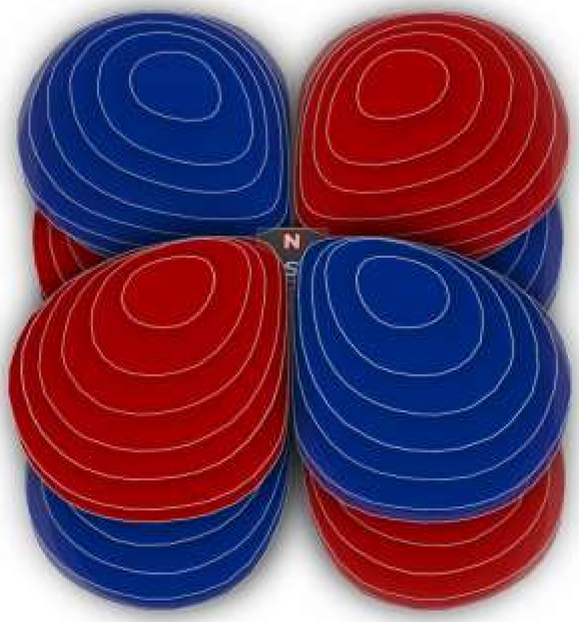
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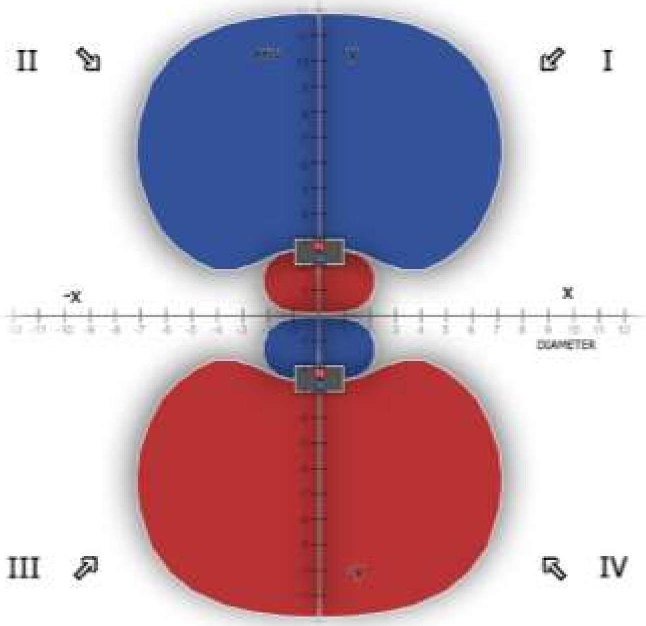
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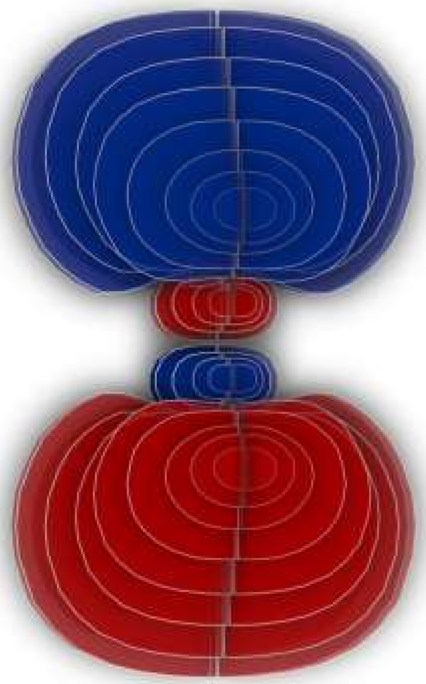

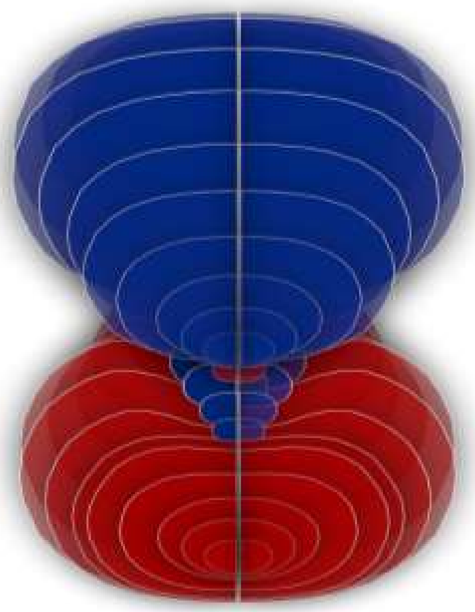

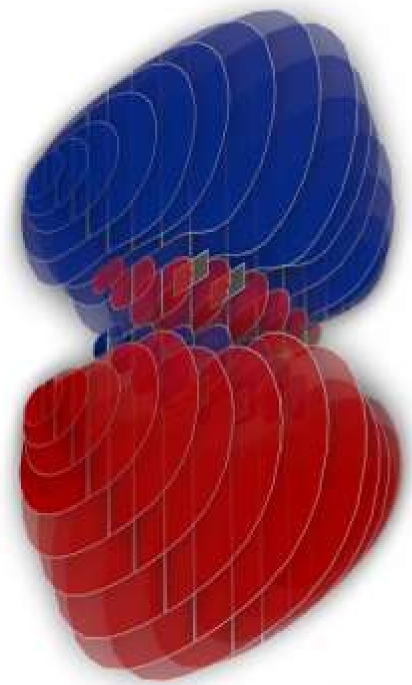

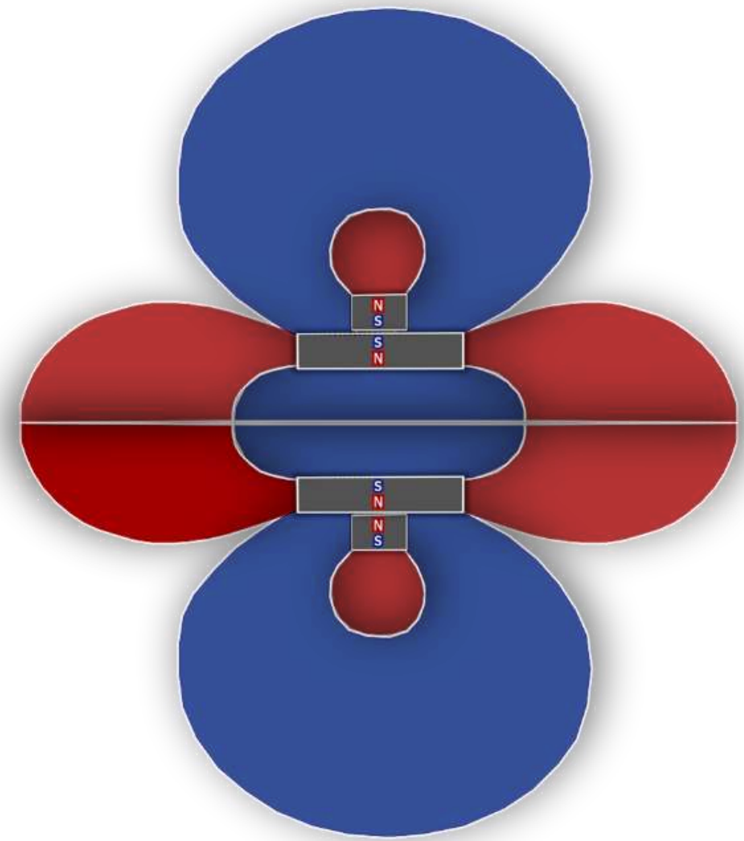
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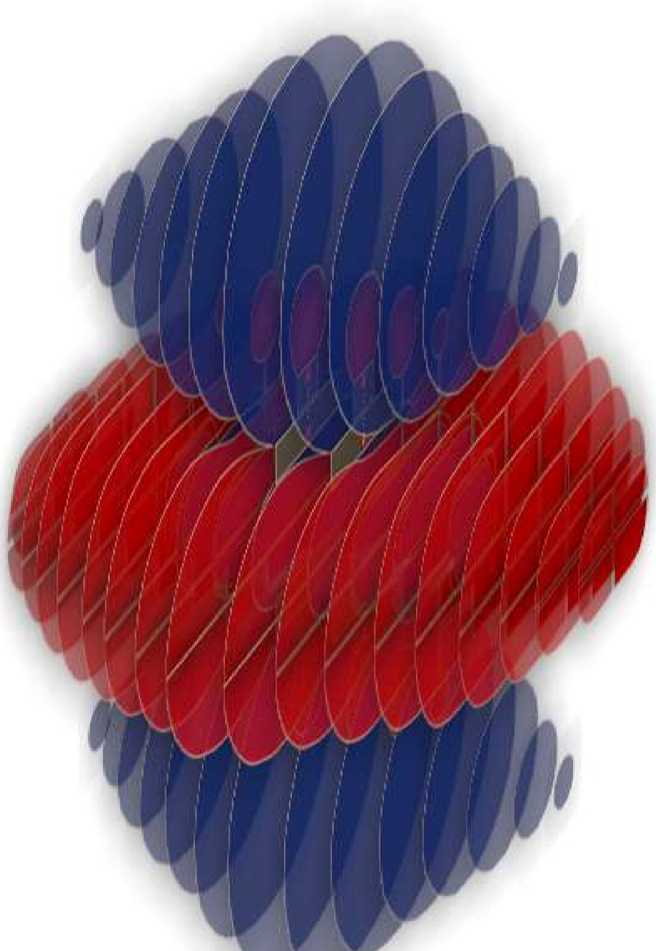

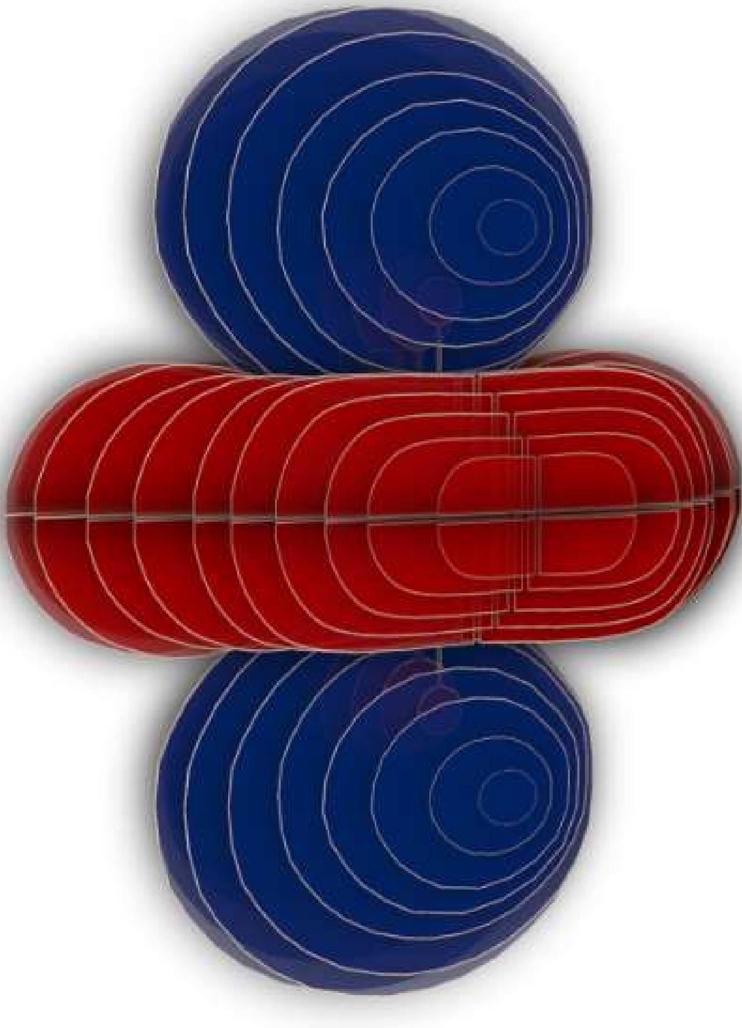

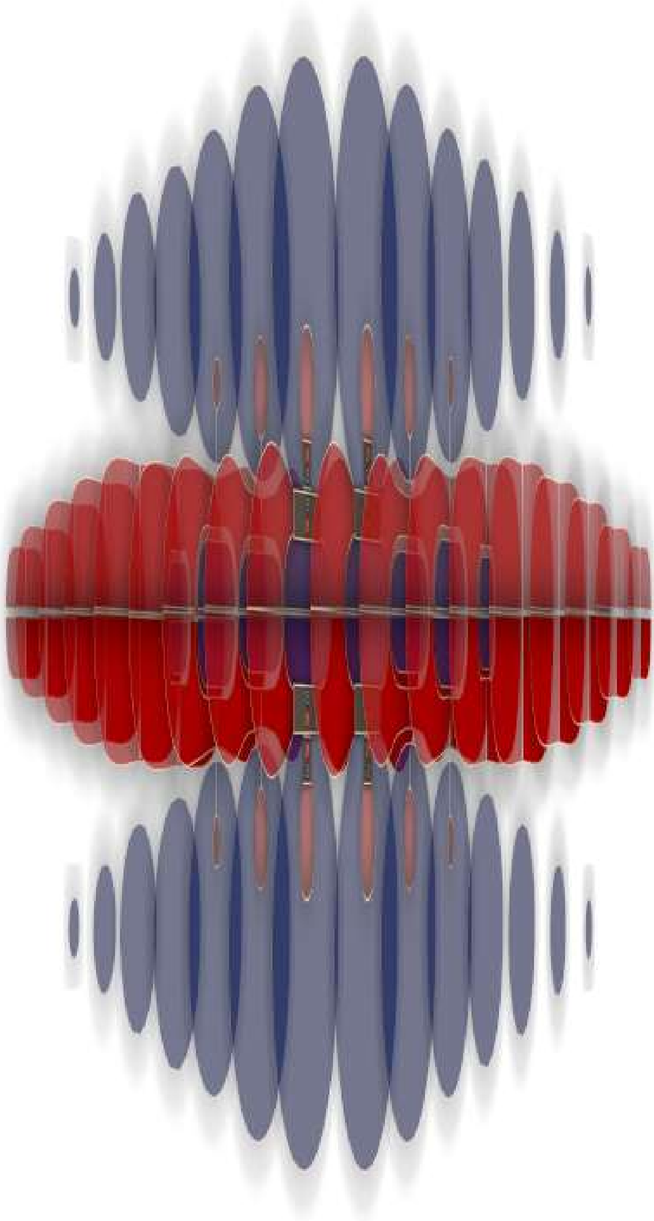

NOTE AND REMARKS