Why Galaxy M110 is Very Peculiar

By Clark M. Thomas

ABSTRACT

M110 is a prominent satellite galaxy of nearby M31, the great Andromeda galaxy. It is the only peculiar dwarf elliptical in the famous Messier list. This essay explains how and why M110 became so peculiar, with important cosmological consequences for dark matter halo theory.

There are many billions of galaxies of several types in our visible local universe, and each seemingly fuzzy galaxy contains billions of stars. Most galaxies are quite distant from us, more than a *billion* light *years* away. [One light year is almost six trillion miles. Our own star is only eight light *minutes* away.] The much smaller number of galaxies nearby, including our Local Group, are visible in some detail from Earth – including Messier 110, the only *peculiar* dwarf elliptical in the Messier list.[1]

M110 orbits a near twin to our Milky Way, the great Andromeda Galaxy (Messier 31, or M31), a "mere" 2.5 *million* light years away. It is generally the most distant object visible to unaided eyes. Our MW and Andromeda are now moving toward each other – and will end up merged as a giant, somewhat elliptical, galaxy – but that's a concern only for whomever (or whatever with high consciousness) will exist in our galaxy four or more billion Earth calendar years hence.

This essay is focused on one of M31's larger satellite galaxies, Messier 110 (a.k.a. M110, NGC 205, etc.). It has about ten billion stars, versus over a trillion solar masses in M31. Its relative closeness makes it easier to image in detail. Amateur astronomers with moderate telescopes visually see it as an apparently ordinary elliptical smudge with a brighter center area.

By comparison, the Milky Way itself has two substantial irregular satellites, the Large and Small Magellanic Clouds, but neither of them makes the peculiarity headlines.

However, the apparently boring M110 is very different. The solution to its very peculiar puzzle should figure centrally in any discussion of Dark Matter's essential nature, and its role in star formation. That likely solution is the purpose of this essay.

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1 https://www.messier-objects.com/messier-110-edward-young-star/

Ordinary and Peculiar Elliptical Galaxies

It has been hypothesized, among other theories,[2] that galaxies very early in our visible universe's life started out as irregular protoclusters, then became spiral, and only later elliptical as their star-producing, baryonic, dark clouds were used up. Young, hot, blue stars perished within millions of years, and were recycled into more ordinary main sequence stars, such as our sun, which can last ten billion years.

Our sun is not first-generation within the MW galaxy, itself nearly as old as the visible universe. Our sun is only as old as our Earth's solar-system-producing normal dark cloud, about 4.6 billion years. The visible universe is about 13.8 billion years old.

[That the truly dark portion of our Milky Way is not visible to us is significant. More significant is the bubble-bath-like *multiverse* of local universes beyond. Universes beyond our own belong with ours inside an interpenetrating whole that defines and confines Dark Matter, "Dark Energy," and gravity, as well as aspects of Quantum Theory. It is because of very numerous crazy-math dimensions that today's physics models fail at critical dimensions, starting with the smallest foundational dimensions. As with the flat Earth theory, modern astrophysics is good, but only so far.]

Over the next four to five billion years both great local group galaxies, Andromeda and the Milky Way, will gravitationally approach each other. They will appear to dance around each other for hundreds of millions of years, and end up merged as a large somewhat elliptical galaxy that we now projectively envision as Milkomeda.[3] However, none of this future galactic dancing makes today's M110 peculiar.

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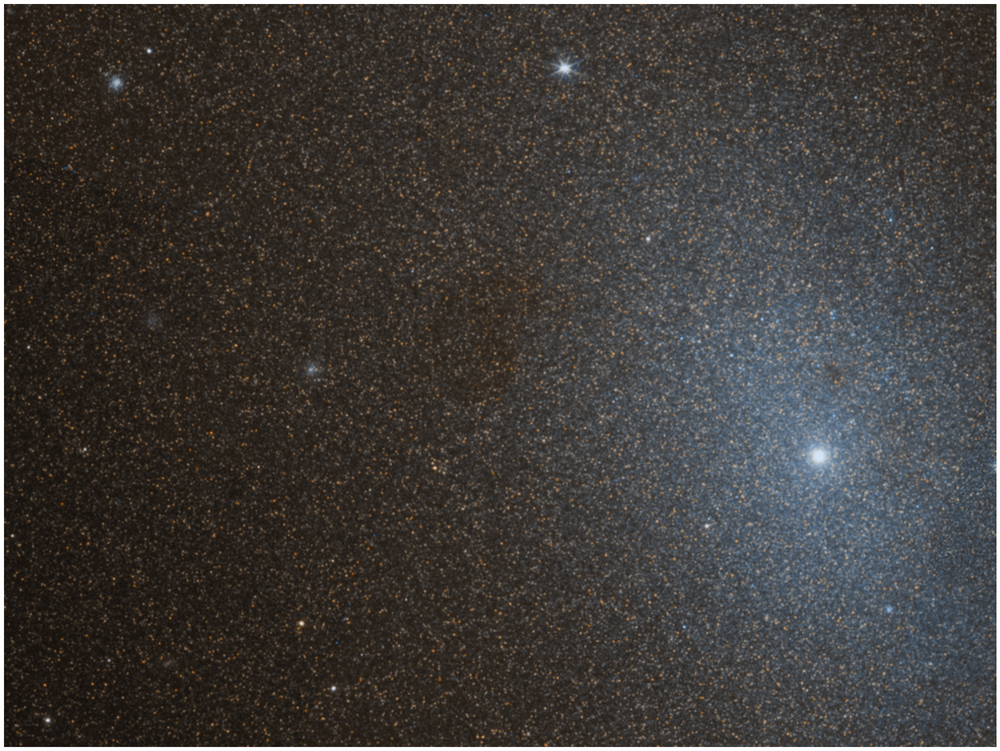
2 https://astronomy-links.net/Dwarf.And.Large.Galaxies.pdf

3 https://en.wikipedia.org/wiki/Andromeda–Milky_Way_collision



Our local group of galaxies is a distal small population of the Virgo Supercluster centered some 50+ million light years away. The larger members of this much more massive collection can be seen with amateur telescopes from Earth inside the Virgo star constellation. The greatest of their number is classically elliptical Messier 87. At its center is an especially supermassive black hole with event horizon that was recently first imaged.[4]

One of the generally great distinctions between most spiral and elliptical galaxies is the relatively large amount of visible dust and similar matter available for new star formation within spiral galaxies such as ours. While billions of years pass, new blue stars appear less frequently as the supply of baryonic dusty fuel is used up. Therefore the central stellar population of classical ellipticals tends to be more yellow and less blue.

However, M110 is indeed peculiar, not just classical, as the sharp Hubble color image above shows. (This Hubble image was taken in visible and near-infrared light with the Wide Field and Planetary Camera 2.)

4 http://astronomy-links.net/BH.Image.Reveals.pdf

M110 is notable for the large number of fairly massive blue stars toward its center – many of which must be at least three times the mass of our sun – and outside its core which appears to not have a supermassive black hole. There is very little visible dust ready to support so much new star formation; so what seed source does?

It should be noted by comparison that the giant M31 spiral above which M110 floats is a classical spiral, with plenty of star-forming "normal" dark matter, and a so-called normal distribution of colored star types, plus a large supermassive black hole. M110 does have a number of scattered older stars, as are seen by their yellow and red colors, which is typical of elderly dwarf ellipticals.

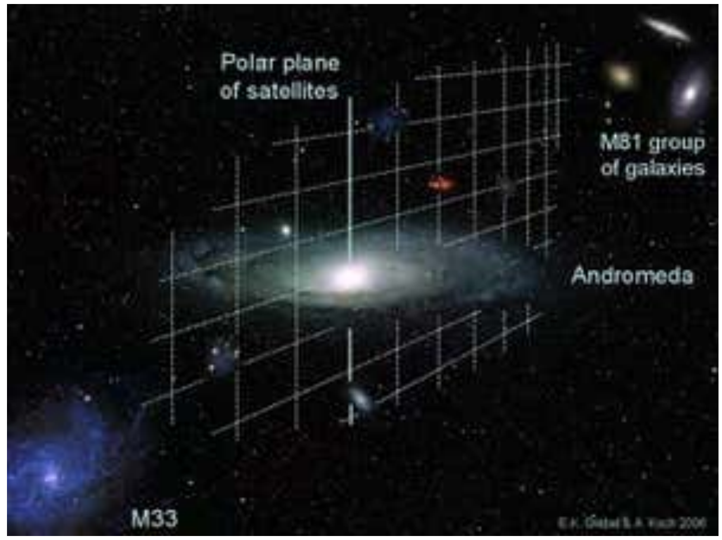
Still, the presence of a large number of central, young, blue stars without an obvious source has been an enduring mystery. Thus the proper question is to ask how such a mysteriously large number of young, bright-blue stars appears deep inside M110?

Four Possible Source Solutions to the Mystery

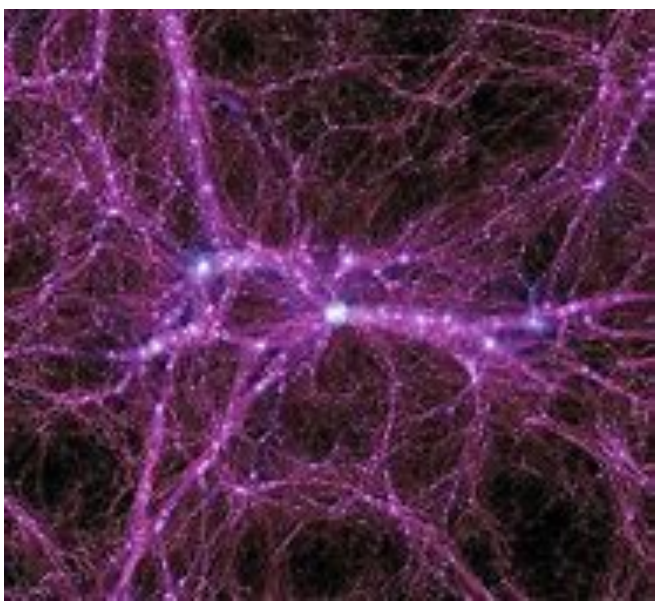
It is *my hypothesis* that the peculiar population of these blue stars indicates a local "food" source other than just "normal" dark matter. This dark matter is Dark Matter, as properly understood. This new birth model is based on its dynamics being more likely than any other theory, and therefore is a parsimonious solution.

Large elliptical galaxies are generally considered "dying" in the sense that they are not being renewed by the appearance of new generations of blue stars. Such large ellipticals can also host disruptive large black holes that could suck in sufficient visible dark matter to put an end to new star formation.

In contrast, M110 and possibly some others of its size appear to *not* have a supermassive black hole, which could remove much normal dark matter, a source of recent blue stars. The presence of a population of older red and yellow stars does match the idea that ellipticals are old galactic structures. There is also a small amount of baryonic dark matter still within M110, but not enough to produce a large population of blue stars toward the core.



SOURCE ONE: Looking at the spatial distribution of M31's satellite galaxies, one clue stands out: Two-thirds are generally aligned along a narrow polar plane that seems to point toward M81 and its nearby satellites some eleven million light years away from M31. Here *above* is a diagram that illustrates this local alignment.[5] M110 appears below M31.



A likely scenario is that these smaller galaxies flowed along an invisible-to-us filament of Dark Matter between M81 and M31.

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[5] https://www.newscientist.com/article/dn8571-mini-galaxies-may-reveal-dark-matter-stream/

The smaller galaxies we see today may be survivors of a larger group, some of which were gravitationally incorporated into M31.

The visible universe is already known to be largely organized by such Dark filaments – themselves directly invisible to us, but evidenced by the string-like clustering of galactic groups:

SOURCE TWO: There is a second hypothesis for the odd alignment of these satellites of M31: It is possible that they are remnants of one large galaxy that was incorporated into the great galaxy. At this time we cannot clearly confirm or remove this possibility. Nevertheless, their axis pointing toward the "nearby" M81 group would be an unlikely coincidence if all of these aligned galaxies were only the result of one galactic cannibalism by M31.

SOURCE THREE: There is a third possible source for all those relatively new blue-giant stars: the very large *baryonic* ("normal matter") ethereal halo of supernova remnants from M31. A vast baryonic halo extends out almost one million *radius* light years.[6] Collectively, that's a very large volume of increasingly ethereal baryonic mass. Diffuse normal mass from all directions would hardly clump and cluster, without help, in sufficient quantities near tight central areas where we find the M110 blue stars.

This even dispersement would not characterize a Dark Matter halo, especially proximal to the spiral arms. Therefore, there could be two types of halos around M31: an ethereal baryonic; and a smaller-radius Dark Matter lumpy halo.

Sources One through Source Three are *where something is, but really isn't.* There is a fourth source, *where something isn't, but really is*: Clustered DARK Matter interpenetrating M110.

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6 https://phys.org/news/2015-05-hubble-giant-halo-andromeda-galaxy.html

The Most likely Solution: SOURCE FOUR

Having minimized the first three sources, we now examine the most likely solution. First, however, we need to revisit just what constitutes *Dark Matter*:

Physicists are entranced by the high-percentage of currently invisible Dark Matter in our gravitational local universe. Things we could mistake for dark matter, such as baryonic dark dust nebulae, are only apparent cousins of primary, omnipresent Dark Matter. There are all sorts of weird ideas for what Dark Matter really is. This topic has become the astrophysics version of "Nature abhors a vacuum." Amazingly, the fact that interstellar and intergalactic space is not a true vacuum or void – which is a thesis near and dear to quantum foam theory – leads us partway to what Dark Matter is really composed of.

On multiple occasions I have explained aspects of what is really the essence of Dark Matter. That which is at the core of Dark Matter is also at the base of all forms of larger baryonic matter that we can experimentally identify.

That core is the protean phenomenon of *yin/yang spheres* which are individually at about the 10^-37 m dimension, even smaller than the photon-inspired Planck scale of 10^-35 m. These spheres adhere by *primary* electromagnetism to create real bead-like, 3D strings – quite unlike imaginary, smooth 2D String-Theory hyperdimensional math strings.

The real electro-physical spheres also combine into 3D dynamic structures, building up to all the so-called fundamental particles, plus atoms and molecules. It starts with individual Coulombian perfect spheres commonly aligned as attached-to-their-base wavy 3D strings. They stretch and snap back during strong centrifugal vibrating at their base, liberating photons. Here is how and why "c" always equals "c."[7] It has nothing to do with any sort of

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[7] http://astronomy-links.net/LightSpeed.pdf

geometric spacetime – just the exceptionally brief time it takes for spheres in new photons to snap back at release.

As with ancient Eastern philosophy, the “yin” aspect represents the inward flow of energy, or mass as potential energy – and the “yang” is outward flow of energy, or mass as kinetic energy.

The *primary electromagnetic* aspect of *simultaneous* yin/yang (+/- *and* -/+) can and will differentiate into *dipole* (+ and -) directional forces on larger scales that we can measure. In other words, simultaneous elementary electromagnetic units kinetically and dialectically compound to achieve dimensional scales from near Planck to multiversal, thus constituting the multiverse.

Throughout vast multiversal space, within which our relatively compact local universe exists, *yin/yang, energy/mass particles and particle strings* are individually and inter-universally flowing up to the speed of light, equally in all directions. These flows constitute the omnipresent push force of *push/shadow gravity*.

Within all space there are also large collections of yin/yang particles that have exchanged most of their kinetic for potential energy, some of which settle into coherent *gravity clouds* with various combinations of near-fundamental structures.

The smallest emergent forms are vibrating rings of joined strings, or spherical gravitons from which individual strings are launched by oscillations of these gravitons (which have nothing to do with weird String Theory tractor gravitons). Centrifugal forces allow for new super-high-frequency string photons to launch from their anchors at exactly “c.”

Here is how “c always = c” from its original frame of reference, either within a 4D mutiverse, or within the fanciful idea of unified spacetime: It is the terminal speed of strings of yin/yang particles as they *stretch and snap* away from their collective vibrating base in virtually infinitesimal time. Centrifugal stretching and snapping does not occur in zero time, due to mass, so the terminal speed is "c" rather than infinity.

Masses of extremely high-frequency collections of yin/yang particles are also able to gravitationally accumulate into loose cloud "highways" that can be billions of light years across, with push/shadow gravity that seemingly comes out of nowhere.

If we could craft instruments capable of directly seeing the base yin/yang world, then we could do away with all sorts of nonsense physics. We would see that "ordinary" matter and "Dark" matter are *dimensional aspects of the same foundation*. (We could also see that quantum uncertainty is a measurement problem.) However, we can't yet directly observe this unitary foundation in the foreseeable future, so we must look for other manifestations of Dark Matter, such as the gravitational creation of blue stars in M110 seemingly from nothing.

Small individual strings, and circular or spherical real gravitons are smaller than comparatively large solar neutrinos (at up to 10^-22 m) that easily penetrate dense matter. However, these wiggling units can collectively stabilize relative to a regional frame of reference, as within an otherwise baryonic galaxy. Locally stabilized and sufficiently massive yin/yang gravity structures dialectically build all sorts of baryonic structures, including electromagnetic blue stars.

The difference between undetectable Dark Matter beaded strings, and detectable baryonic matter beaded strings is in the number of their adhering yin/yang spheres. Short strings vibrate or spin at extremely high frequencies with very small waves. Baryonic strings are longer, and they vibrate/spin at frequencies we can detect. By extension, combinations of Dark Matter energy/matter strings can yield baryonic matter strings, which in turn can assemble into larger units of visible matter, such as blue stars.

Some experimentalists may prefer to operationally *ignore* as "meaningless" all existence that we cannot directly detect with our experiments. That clear choice arbitrarily "cleans up" their work field, but does not eliminate the gaping holes of willful *ignorance*. This mindful research strategy is the scientific version of Logical Positivism, a formerly popular school of early 20th century philosophy which imploded.

By way of dimensional (logarithmic) comparison, *a yin/yang particle IS TO a solar neutrino AS the core of an atom IS TO one adult human.* Therefore, not even relatively large solar neutrinos that zip undetected through dense baryonic matter such as our bodies in vast numbers are primary foundational units. The same dimensional caution applies for even larger quarks.

We can image with electron microscopes something down to an atomic nucleus diameter at 10^-15 m, but that does not prove we are measuring anything truly fundamental. The same caveat applies to wave frequencies, as there are many we cannot detect.

It is amazing that something besides neutral neutrinos, so powerful as neutral Dark Matter, can penetrate baryonic matter without obvious effect, except for push/shadow gravity. At this point we could go deeply into the *push/shadow model for gravity*, which eloquently replaces the old GR model, while utilizing aspects of its descriptive correlative math. However, I have already written about this causative net force several times, such as:[8,9]

<u>*Bottom line number one*</u> is that all non-push/shadow gravity *correlational* models – from Newtonian, to GR, and to quantum gravity – can fit nicely together within the *causative* dynamics of real yin/yang architecture.[10]

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8 https://astronomy-links.net/DipoleRepellerExplained.pdf

9 https://astronomy-links.net/GGvsGR.html

10 https://astronomy-links.net/correlation.and.causation.pdf

Bottom line number two is that relatively small clouds of almost stationary Dark Matter may have been the original gravitational food sources that collected sufficient baryonic dark matter from the great Andromeda halo, and from other Dark Matter sources close to M31, all drawn near the core of M110.

These gravity influencers allow for young, blue stars to pop out seemingly from nothing – but actually from everything that is already there, seen or currently unseen. Thus, some Dark Matter dialectically emerges into normal dark matter and blue stars.

Our near-twin Milky Way offers additional perspective. New 2018 data sets from the Gaia and Hubble satellites help science correlate globular cluster movement within the MW.[11] The great Andromeda star family has globular clusters too, but the subtle measurements necessary for linking Andromeda globular clusters' gravity movements to their proximal Dark Matter clouds do not yet exist. Still, it is fair to extrapolate MW astrophysics to M31. Also, what goes for large globular clusters should also apply to dwarf ellipticals just three dimensions larger.

Neither MW nor Andromeda inside their visible spirals required Dark Matter to create new stars, as they both have had sufficient baryonic dark matter clouds available. Nevertheless, Dark Matter clusters within their great spirals may have significantly enhanced creation of their renewing blue stellar populations.

A small elliptical galaxy just outside the visible spiral would still be within the general Dark Matter halo. It would likely encounter sufficient local gravitational Dark Matter clouds to stimulate new blue stars that would then gravitate toward its central mass. Among the different theories of structural gravity, this yin/yang Dark Matter starbirth scenario in M110 most efficiently matches the push/shadow model – and neither GR nor Quantum models can do this.

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[11] https://www.groundai.com/project/mass-and-shape-of-the-milky-ways-dark-matter-halo-with-globular-clusters-from-gaia-and-hubble/1