Nature's Basic Dark Quanta

By J.A.J. van Leunen

Last modified: 8 december 2017

Abstract

Two kinds of super-tiny shock fronts represent nature's basic dark quanta. These dark quanta configure all other discrete objects in nature.

1 Shock fronts

More than two centuries ago the wave equation was discovered. It got its name because among its solutions it offers waves. It has never become well known that this equation also offers other solutions that significantly differ from waves. All solutions can superpose, such that very complicated dynamic patterns can result. Dedicated actuators can start or support the different kinds of solutions. Only the waves became well known. They require a stable periodic actuator. This situation lasted until now. Physicists ignored that the wave equation supports shock fronts. In contrast, physicists paid much attention to the fact that electromagnetic waves exist, and we also have experienced that other media show wave behavior. We are not so familiar with the idea that our living space is a medium that can vibrate and deform. Thus, the fact that LIGO and Virgo detected gravitation waves was for many people a real eyeopener.

1.1 Spherical shock fronts

What about the shock fronts? In what media do they appear and what actuators trigger them? Is a shock front not one of the components in the detected gravitational vibration? Quite probably the answer is positive. The answer is interesting because waves vibrate the medium, but do not deform it. However, spherical shock fronts integrate into a non-zero volume. This fact means that they permanently expand the volume of the medium and temporarily, they locally deform the medium. After a short while, these phenomena fade away. Something that deforms our living space must own an amount of mass. Thus, a spherical shock front that vibrates our living space is an excitation of that medium, which at least temporarily owns an amount of mass.

If LIGO and Virgo measured this huge phenomenon, then such spherical shock fronts are no illusions. A huge explosion triggered the measured spherical shock front. This phenomenon certainly has many smaller equivalents. This document targets the super-tiny shock fronts that are triggered by point-like actuators. Two kinds of such shock fronts exist. One kind is the spherical shock front that integrates into the Green's function of the carrier. It temporarily carries a standard bit of mass. Moreover, it permanently extends the medium with the volume of its Green's function. Its effect is so tiny that nothing exists that can detect separate appearances of the super-tiny spherical shock fronts.

1.2 One-dimensional shock fronts

Similarly, super-tiny one-dimensional shock fronts exist. Single-shot one-dimensional actuators emit these shock fronts. During travel, these shock fronts keep the shape and the amplitude of their front. They carry a standard bit of energy. If a suitable actuator emits these shock fronts at equidistant instants, then the resulting string can implement the functionality of a photon. The extra requirement is that the spatial length of the string is restricted such that the Einstein-Planck relation $E = h \nu$ gets fulfilled. As with the separate super-tiny spherical shock fronts, observers cannot

perceive the one-dimensional super-tiny shock fronts in separation. However, obviously, photons become observable.

2 Particles

Elementary particles hop around in a stochastic hopping path that after a while forms a swarm of hop landing locations. The stochastic process that generates the hop landing locations owns a characteristic function that equals the Fourier transform of the location density distribution of the swarm. This characteristic function ensures that the swarm moves coherently as a single unit. This fact means that the characteristic function contains a gauge factor, which acts as a displacement generator. It also enables the wave behavior of the particle.

The recurrently regenerated swarm deforms the embedding carrier in a significant and persistent way. The corresponding gravitation potential equals the convolution of the Green's function of the carrier and the location density distribution of the swarm. This location density distribution equals the squared modulus of the wavefunction of the elementary particle. The wavefunction and the gravitation potential are familiar concepts.

All elementary particles are elementary modules. Together they constitute all other modules, and some of these modules constitute modular systems. Also, a dedicated stochastic process generates the footprint of the modules. The characteristic function of that process is the superposition of the characteristic functions of the stochastic processes that generate the locations of the components of the module. The superposition coefficients act as gauge factors that determine the internal locations of the components. An overall gauge factor acts as displacement generator of the module. Consequently, the module moves coherently as a single unit. The overall stochastic process binds the components of the module.

2.1 Gravity

The described mechanism explains how the super-tiny spherical shock fronts provide elementary particles with their mass. This explanation competes with the claim of the Higgs mechanism. One of the two explanations must be fake.

Modules act as observers and can figure in observed events. Reality archives the corresponding dynamic geometric data in a read-only repository that exists of a series of separable Hilbert spaces and a non-separable Hilbert space that embeds the separable Hilbert spaces.

The dynamic geometric data of elementary objects archive as a combination of a real number valued time-stamp and a three-dimensional spatial location. This combination fits in a quaternionic eigenvalue of a dedicated normal operator. This operator resides in private separable Hilbert space of the elementary particle.

3 Observers

Observers can only retrieve data that reality archived with a currently historic time-stamp. The embedding continuum transfers the corresponding information to the observer by vibrations or deformations of the continuum that embeds both the observer end the observed event. This argument is the reason that observers perceive in spacetime format. The Lorentz transform is a hyperbolic coordinate transformation that converts from Euclidean coordinates into spacetime coordinates. Deformation of the carrier field may deform the information path. This deformation also affects the transferred information.

What happens with the separate super-tiny shock fronts, cannot be perceived. These objects constitute nature's basic dark quanta. Still, these objects play an important role in everything that happens in the universe.

References

[1] https://en.wikipedia.org/wiki/Wave_equation#General_solution

[2] http://www.mathpages.com/home/kmath242/kmath242.htm

[3] https://en.wikiversity.org/wiki/Hilbert_Book_Model_Project