# Generating the Universe from Scratch

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## *Abstract*

The creator created the universe from scratch, and after that instant, the creator left his creatures alone. The observers under these creatures can read the historic part of the read-only repository in which the creator archived the universe.


## The universe

The universe is a field that carries the information that other observers and we can perceive. All discrete objects are embedded in that field, and for massive objects, this means that the field gets deformed. It also means that the transport of the information through the field affects the format of that information. That effect becomes noticeable when the relative speed between the observed event and the observer approaches the maximum speed that the field can support. This effect is known as relativity. The field is part of a construct that stores both the field and all dynamic geometric data of the discrete objects that exist in the universe. That construct acts as a read-only repository. This means that from the instant that this construct is created, it already contained all this data. Observers can only read these data, and they can only read data that with respect to their own time-stamp are stored with a historical time-stamp.
This means that the archived information tells a story and that story starts at the instant of the creation of the universe. That instant coincides with the creation of the repository. Deformation of the field takes time. Thus, in the beginning, the field that represents the universe was flat. If a multidimensional function describes that field, then, in the beginning, that field was identical to its parameter space.

## Basic field deformers

A quaternionic function can describe the field that acts as our living space. Deforming the field means that the spatial part of the function increases or decreases. Some mechanism must deform the field. A potential candidate is a process that generates isotropic pulses, which cause spherical pulse responses. The quaternionic equivalent of the wave equation, which is one of the second order partial differential equations, describes such spherical pulse responses. Over time, the pulse responses integrate into the Green's function of the field. That Green's function possesses some volume, and the isotropic pulse injects that volume into the field. The pulse response indicates that the volume quickly spreads over the field. Consequently, the field expands, but the deformation quickly fades away. To create a longer-lasting deformation, the process must keep generating isotropic pulses, and it must do that with high enough repetition frequency and in a significant spatial density. This can occur in two ways. It can occur at a compact region such that a densely packed object is generated, or it can occur in a more spread way such that swarms of pulse responses generate a significant local deformation that keeps living in the universe and moves around. It is also possible that the process generates spurious isotropic pulses, but these do not form coherent and long-lasting deformations. Still, they expand the field, and in huge ensembles, they can nevertheless produce a noticeable impact that is known as gravitational lensing.

## Floating platforms

So, what can be the nature of the processes that generate the pulses? First, we postulate that only isotropic pulses can generate the spherical pulse responses and that only the spherical pulse responses can inject volume into the field that subsequently spreads over the field. Thus, this injected volume temporarily and locally deforms the field, but the deformation quickly fades

away. The pulses must recurrently be regenerated in a dense swarm to produce a significant and persistent deformation.
Next, we suppose that the creator of the model archived the dynamic geometric content that describes the discrete objects in private parts of the read-only repositoy. These private repositories are separable quaternionic Hilbert spaces that contain the data in the eigenspace of a footprint operator. This private separable Hilbert space applies a selected version of the quaternionic number system, and all such separable Hilbert spaces reside on the same underlying vector space. The separable Hilbert space uses the members of the selected version of the number system for the specification of the inner product of pairs of Hilbert vectors. This means that it uses the same members for specifying eigenvalues of operators. A special reference operator manages in its eigenspace the private parameter space of the separable Hilbert space. The geometric center of this parameter space floats over the parameter space of the field that embeds the corresponding discrete object. The symmetry properties of this parameter space determine the symmetry properties of the floating platform. The parameter space of the field is the eigenspace of a reference operator that resides in a non-separable Hilbert space where a dedicated operator manages the field as its eigenspace. This Hilbert space owns a unique quaternionic infinite dimensional separable Hilbert space that it embeds in a natural way. Its reference operator applies the same version of the quaternionic number system as the non-separable Hilbert space does.
A mechanism embeds the content of the eigenspace of the footprint operator in the field. Due to the disparity between the two involved versions of the quaternionic number system, a symmetry break can be generated that fulfills the requirements for an isotropic pulse that can cause a spherical pulse response. This embedding occurs step by step. If the archived time-stamps define the sequence, then the archived locations define a hopping path. After a while, the hop landing locations form a recurrent coherent hop landing location swarm that is stochastically regenerated in a cyclic way. The coherence is ensured when the location density distribution of the hop landing location swarm equals the Fourier transform of a characteristic function. In other words, at the instant of creation, the content of the eigenspace of the footprint operator was filled by a stochastic process that owns a characteristic function. This platform and the described stochastic process can generate the type of swarms that can populate relative free space in the embedding field. Many such platforms may float over the field.
The swarms can figure as elementary particles. Elementary particles act as elementary modules. Together, they constitute all other modules that exist in the universe. Some modules constitute modular systems.

## Composed modules

A private stochastic process that owns a characteristic function also controls each composed module. The characteristic function of this type of stochastic process equals a dynamic superposition of the characteristic functions of the components of the module that can be elementary modules or composed modules. The dynamic superposition coefficients act as displacement generators. Thus, they control the internal oscillations of the components that together with the deformation of the embedding field install the binding of the components within the composed module. The binding of components is further stimulated by the deformation of the embedding field. Without this extra stimulus binding is not effective. This is shown by the fact that quarks must first superpose into hadrons before the colorless result can deform the embedding field. This phenomenon is known as color confinement.

## Fermions and bosons

It appears that only elementary fermions act as elementary modules. Bosons do not participate in the modular construction of massive objects. Physics categorizes photons as bosons, but photons possess no mass and are no elementary particles. Instead, photons are strings of equidistant one-dimensional shock fronts that each carry a standard bit of energy. They obey the Einstein-Planck relation $E = h\nu$ . The one-dimensional shock fronts are suitable candidates for dark energy. In isolation they cannot be detected.

## Compound modules

Compound modules are composed of modules for which the geometric centers of the platforms coincide. The charges of the platforms of the elementary modules establish the binding of the corresponding platforms. Physicists and chemists call these compound modules atoms or atomic ions. The platforms and thus the charges do not participate in the internal oscillations. Consequently, the electric charges do not radiate. Only the hopping paths of the elementary particles fold around the oscillation paths. Fermionic components cannot share the same oscillation mode. A change of oscillation mode causes the emission or absorption of a photon.

Molecules are conglomerates of compound modules. These compound modules share oscillating electrons that bind the compound submodules.

## Compacted platforms

The compacted pulse responses are enclosed inside a region that they cannot leave. Their mutual attraction is so high that the front of the pulse response cannot pass the border of the region. The region represents the most efficient packaging of the pulse responses. These pulse responses may create a foam of separate objects. This is not the spin foam of Loop Quantum Gravity.

The stochastic processes that control the generation of elementary particles might have an equivalent that operates in the realm of the compacted platform. The compacted platform attracts massive objects, and when these enter the border of the compacted platform, then the character of their pulse generating stochastic processes will change. The activity of the stochastic processes that bind the components of the composed modules will be completely disrupted.

The result is a region that is uniformly filled with extra volume which progressively expands by internal volume injection and by absorbing volume via the border.

If deformation must be generated, then at least two types of Hilbert spaces must be involved. One is the embedding Hilbert space, and one is the embedded Hilbert space. The embedded Hilbert space must break the symmetry of the embedding Hilbert space.

## Dark matter

It is not clear what generates the spurious shock fronts. Like imaging devices, stochastic processes may produce a veiling glare that becomes noticeable as a halo surrounding the actual image. In the characteristic function of the stochastic process, the veiling glare causes a quick drop of the amplitude of the modulus near zero frequency. In optics, this is a well-known phenomenon.

## At the beginning

At the begin, the pulse generating stochastic processes have not yet done any work. Consequently, the embedding field equals its parameter space. Directly after the start, at each floating platform, a stochastic process starts pumping volume into the embedding field. This means that the evolution of the universe does not start at a single point, but instead. Its starts simultaneously at a huge number of points that are spread all over the parameter space of the embedding field. Only after a full generation cycle, the first elementary particles become available. Also, the first compacted platforms are beginning to develop. Only after this first cycle the second type of stochastic processes can start with superposing elementary particles.

The spurious pulse responses cause wide spread expansion of the embedding field.

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