



Basic Structures of Matter: Supergravitation Unified Theory, S. Sarg, Trafford Publishing, 2001, pp: 614, ISBN 1412083877; Price: CA\$50

Beyond the Visible Universe: From a New Space-Time Concept of the Physical Vacuum, S. Sarg, Helical Structures Press, 2004, pp: 188, ISBN 0973051531; Price: N/A

In *Basic Structures of Matter*, S. Sarg presents his BSM theory for explaining physical phenomena ranging from the quantum to the cosmic scales. The second book, *Beyond the Visible Universe*, is a briefer discussion of the theory. It also provides pointers to chapters in the bigger book to direct readers to more comprehensive developments of new concepts.

Basic Structures of Matter (BSM) theory uses a classical approach to find a common footing for quantum mechanics and relativity theory. According to the author, the new theory provides a common logical and physical basis for the existing theories, and invites new interpretations of existing experimental data.

The theory assumes the existence of two spherical fundamental particles differing only in relative size. Each particle consists of indivisible matter and an associated vibrational energy. The theory proposes that a galaxy's space-time structure and atomic particles are formed from a dense mass of these fundamental particles in the void. The initial density is such that spheres form tetrahedral structures as the lowest energy state. Each tetrahedral structure is made of spheres of only one size, and each has a stable common mode of vibration that depends on the size of its constituents. This resonance is the basis for a force called *supergravitation* (SG). Expected instabilities cause explosions of the dense mass, and the tetrahedral structures combine in the new state to form a number of higher-level geometrical structures, leaving a residual mass of the fundamental particles at the center of the galaxy. The most important new structures are two sizes of twisted, rod-like shapes called prisms. These prisms are constrained to form both a three-dimensional, void-filling grid structure called the *cosmic lattice* (CL) space, and more complex and dense helical structures that form the particles of atomic physics we know as electrons, protons, neutrons, etc.

Each node of the cosmic lattice is composed of four prisms of one type held together by the SG force. The prisms in each node are arranged in a tetrahedral pattern so that their relative orientations are non-rectangular. The four adjacent nodes are composed of the other type of prism, and mutual attraction and repulsion maintain the integrity of the lattice. The SG energy causes complex oscillations in each node at a preferred frequency determined by the energy well resulting from the node's geometry. The node dynamics are the basis for electric and magnetic field propagation. An EM wave is the excitation of nodes in the lattice followed by propagation of the phase of the wave from node to node. Thus, the speed of light can be predicted from the lattice dynamics. Further, the CL structure parameters are related to a number of known physical parameters including the Compton wavelength, Planck's constant, the unit electrical charge, the fine-structure constant, and the magnetic permeability of the vacuum.

The familiar elementary particles are formed from denser rectangular lattice (RL) arrangements of one or the other type of prism. The RL structures are further organized into helical structures of increasing complexity. For example, an electron is said to consist of an

open helical shell with a structure at the core representing a positron. A neutron consists of a circular, higher-order helical shell composed of a lower-order helix, with internal structures representing two pions and a kaon. A proton is the same as a neutron but with the circular helix twisted into a figure-eight shape. The proton's positive charge compared to the neutron is attributed to leakage of the SG field due to the resulting loss of symmetry. According to the author, this rich organization is required to account for the many constraints imposed by known physical properties as well as observed interactions in particle collision experiments. An appendix contains an "Atlas of Atomic Nuclear Structures" that shows schematics of the structures of more than 100 chemical elements. A number of physical constants and properties of matter are predicted that are now determined empirically, such as the masses of elementary particles and their associated charges or lack thereof.

The theory also has much to say about mass and inertia. The mass of particles made of RL structures, and the gravitational attraction between such particles, is directly related to the SG force that maintains the CL equilibrium. The property of mass is due to localized pressure exerted by the cosmic lattice on the particles. Newtonian gravitational attraction arises from CL-mediated SG field interactions between objects of atomic matter. The space curvature of general relativity in the vicinity of a massive object has its counterpart in BSM as local shrinkage of the CL inter-node distance. The inertia of a particle is a consequence of acceleration through the less dense cosmic lattice. During constant motion, the connections between the CL nodes are symmetrically broken and rejoined to make way for the particle. During accelerated motion, this symmetry is lost and there is some resistance to the movement.

Given that atomic matter and the cosmic lattice are said to come into being during the birth of a galaxy, it should come as no surprise that the theory makes predictions relevant to cosmology. The current Big Bang theory is rejected in favor of many smaller bangs, each resulting in the formation of a galaxy. A cosmic lattice and the atomic particles are created independently in each galaxy, and CL dynamics are expected to differ slightly from one galaxy to the next. The resulting mismatch between adjacent lattice spaces would cause light crossing the boundary to lose energy and produce the red shift that is often observed. Additional cosmological support for the theory is the good correspondence between the theoretical calculation of the CL background temperature and the experimentally measured value.

BSM theory rejuvenates ideas of an absolute frame of reference and of a space filled with a medium for light propagation. This is contrary to the results of the famous Michelson-Morley experiment, which seemed to prove that such a concept is groundless. However, the author points out that there is significant disagreement about the analysis of that experiment, and some re-analyses of the same data have supported the existence of an all-pervasive medium in space. So the idea of a cosmic lattice space proposed by BSM theory is not conclusively contradicted by experimental data.

The major contribution of BSM theory is the possibility of asking and answering many new and interesting questions about our physical reality. The detailed descriptions of the cosmic-lattice dynamics and the properties of the elementary particles open up interesting avenues of investigation for experimental physics. For example, the author indicates that CL dynamics suggest ways to control gravitation and to devise new sources of energy. The author also

includes a warning about possible unforeseen effects of nuclear explosions on the sustainability of the earth's atmosphere.

The theory creatively builds on some very old ideas about the use of geometry to describe nature. Readers, especially those versed in quantum mechanics, should suspend disbelief until the theory's predictive power is fully understood. The effort should be worthwhile for those who welcome a return to a more classical theory of everything in exchange for the mathematical abstractions of the current paradigm.

Caveat

The organization of the smaller *Beyond the Visible Universe* could be improved. An overall plan seems to be lacking as chapters seem to stand alone and often repeat information already presented in other chapters. Repetition is not a serious issue since it helps to ingrain the new concepts, but a logical flow from one chapter to the next would be helpful. Further, although the message is clearly presented, both books would benefit from editing to correct spelling and grammatical errors.

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