ulm university universität ulm

Physikalisches Kolloquium — Physics Colloquium

Einladung — **Invitation**

Tuesday, 03 December 2019

Lecture Hall H2, 16:15

Coffee and cookies will be served in front of the lecture hall from 16:00

Novel Theory of the Structure of Elementary Particles

Prof. Harald Rose

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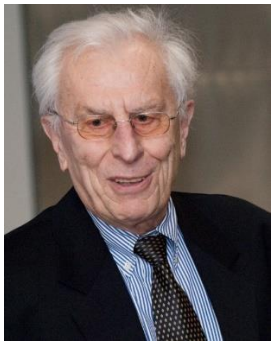

A novel theory is outlined which represents an extension to the Standard Model and to the Dirac theory of the electron and explains the origin of the spin, the mass, and the charge of elementary particles. The particles resemble four-dimensional tops with a finite four-dimensional radius R. The internal structure of the 4D angular momentum is determined by the eigenfunctions of the 4D rotational Hamiltonian, which depend on the radius R and on three angles, one of which is imaginary. This angle describes the rotation of the time-like axis with respect to the three-dimensional subspace and corresponds to a Lorentz transformation.

For obtaining the wave equation of the basic elementary particles, such as the photons, neutrinos and quarks, we suppose that they are mass-less propagating with the speed of light. Elementary particles with opposite angular momentum interact with each other forming massive particles. The forces acting between the constituent elementary particles result from four-dimensional hyper-symmetric potentials, which depend only on the four-dimensional distance between the centres of the constituents. The results of the analytical calculations show that massive particles can only be stable if they have a characteristic four-dimensional elementary radius. This radius is an eigenvalue of the rotational energy, which determines the mass of the particle. In the case of a two-component system, the four-dimensional potentials are solutions of the four-dimensional Poisson equation. The results show that the eigenvalues of the four-dimensional radial wave equation determine the mass of the compound particle.

As a result, we do not need the Higgs field for explaining the origin of the mass. The results show that electrons and positrons are two-component systems. We prove the novel theory by revisiting the hydrogen atom. The resulting fine-structure formula differs from that derived by the Dirac theory and accounts for the Lamb shift.

Host: Prof. Dr. Ute Kaiser, Electron Microscopy Group of Materials Science

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