In-depth study into the algebraic structure of elementary particle physics

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Projekt-Website: furey.space

Physics: Our most trusted theory of elementary particles is known as the Standard Model. This theory has now survived 40 long years of rigorous experimental testing, nearly completely unscathed. However, despite being able to use the Standard Model to make impeccably accurate predictions, we have never come to understand why the Standard Model is the way it is. Knowing how to drive a car does not mean that we understand how its engine works. For example, we do not understand why nature seems to rely on a certain set of elementary particles, and not some other set. Furthermore, we do not understand why these particles interact with each other in the way that they do. In my work, I aim to understand if there is a mathematical logic behind the Standard Model's curious structure. Mathematics: The number system that we use in everyday life is known as the real numbers. The real numbers, incidentally, are just the first of four very special number systems in pure mathematics. These are known as the real numbers, the complex numbers, the quaternions, and the octonions. Evidence increasingly suggests that these four special number systems might in fact be responsible for the inner workings of elementary particle physics. This research may enable us to understand particle physics on a deeper level. It is expected to go beyond the Standard Model and yield new experimental predictions.

Projektbeteiligte

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One generation of standard model Weyl representations as a single copy of RCHO
Division algebraic symmetry breaking
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An Algebraic Roadmap of Particle Theories: Part II, Theoretical checkpoints
An Algebraic Roadmap of Particle Theories: Part III, Intersections