Oberseminar Geometrie und Topologie

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A Mathematical Construction of an E6 Grand Unified Theory

30. Januar 2018 - 16 Uhr
Seminarraum IGT, Raum 7.530, Pfaffenwaldring 57

Abstract:
Of the five exceptional groups, E6 is considered the most attractive for unification due to the following reasons: (i) it contains both Spin(10) x U(1) and SU(3) x SU(3) x SU(3) as maximal subgroups, each of which admit embeddings of the Standard Model; (ii) uniquely among the exceptional groups, it admits complex representations; in particular, its 27 dimensional fundamental representation accommodates one generation of left-handed fermions under the usual charge assignments; (iii) all of its representations are anomaly-free. My talk will be on the main themes of my master's thesis, written under the supervision of Prof. Mark Hamilton. In the spirit of Baez and Huerta's 2010 paper "The Algebra of Grand Unified Theories", I presented therein a mathematically precise formulation of an E6 grand unified theory; this included excursions into the SU(5) and Spin(10) theories, the mathematics of Clifford algebras, Spin groups, and their representations, and an explicit construction of E6 and its fundamental representation. Time permitting, I will talk about a formula for the Weinberg angle in grand unified theories, and briefly survey the current experimental status of the E6 theory.
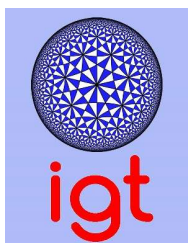
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