



GEOMETRY, TOPOLOGY, AND PHYSICS SEMINAR

Matter From Geometry Without Resolution

James Halverson
KITP

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Room 6635 South Hall

Abstract: Singular elliptic fibrations play a critical role in describing certain physical theories; this includes Seiberg–Witten theory, for example, but also geometric compactifications of M-theory, F-theory, and string theory on elliptically fibered Calabi–Yau manifolds. In the latter cases the ADE structures associated to holomorphic curves is inherited by physical objects wrapped on those curves, giving multiplets in ADE representations. These are necessary ingredients for realistic theories of particle physics. I will comment on limitations on matter representations in the string landscape and potential importance for model building.

Mathematically, studying matter from geometry is usually done via standard blow-up methods in algebraic geometry. However, simple physical arguments show that there must exist another description when the singularities are deformed, rather than resolved. I will present recent work with A. Grassi and J. Shaneson on these ideas. As an appetizer, ADE root systems arise from two-cycles which can be described as vectors in Z^N , where N is determined by Kodaira’s classification, but is never the rank of the gauge group. Other aspects of representation theory arise naturally. As a concluding example, I will study monodromy induced by a codimension two singularity which reduces D4 to G2 in the deformation picture.

This seminar is part of the NSF/UCSB ‘Research Training Group’ in Topology and Geometry. Information about future meetings can be found at <http://www.math.ucsb.edu/~drm/GTPseminar/>