APCTP SEMINAR

A Weyl Semimetal from AdS/CFT with Flavour

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October 21st (Thu.) 16:00 (KST)

Online via ZOOM

We construct a top-down holographic model of Weyl semimetal states using (3 + 1)-dimensional N = 4 supersymmetric SU(Nc) Yang-Mills theory, at large Nc and strong coupling, coupled to a number Nf less than Nc of N = 2 hypermultiplets with mass m. A U(1) subgroup of the R-symmetry acts on the hypermultiplet fermions as an axial symmetry. In the presence of a constant external axial gauge field in a spatial direction, b, we find the defining characteristic of a Weyl semi-metal: a quantum phase transition as m/b increases, from a topological state with non-zero anomalous Hall conductivity to a trivial insulator. The transition is first order. Remarkably, the anomalous Hall conductivity is independent of the hypermultiplet mass, taking the value dictated by the axial anomaly. At non-zero temperature the transition remains first order, and the anomalous Hall conductivity acquires non-trivial dependence on the hypermultiplet mass and temperature. We also study our model's thermodynamics, finding a rise in the entropy density just below the transition, presumably coming from the emergent IR CFT degrees of freedom. New results on quasi normal modes will be presented as well. Based on arXiv: 2012.11434.

■ **ZOOM Webinar**

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