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Gravitational phenomena Weyl semimetal interfaces[1] YARON KEDEM, EMIL BERGHOLTZ, Stockholm University — After the discovery of TaAs as a Weyl semimetal, a different type of Weyl fermions was predicted and shortly after found in several materials (including MoTe2, LaAlGe, and WTe2). In this so called type-II Weyl semimetal, the spectral cone is heavily tilted such that it is crosses the Fermi energy. For a fundamental Weyl particle, this type-IIs tilting is prohibited by Lorentz symmetry, which is absent in condensed matter systems, but introducing a gravitational background would break the symmetry and allow tilting. The metric that is needed in order to over tilt the cone is analogues to the one describing the space-time behind a horizon, i.e. inside a black hole. This allows us to study the interface between type-I and type-II Weyl semimetals using an equivalent system described by the Dirac equation on a gravitational background, in the vicinity of a horizon. The Hawking temperature, associated with the gravitational system, is connected to a change in the effective chemical potential due to the effect of the spin connection, coming from the covariant derivative. We discuss several phenomena of general relativity that can be simulated in this context.

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