Dipartimento di Fisica
Università di Cagliari
INFN, Sezione di Cagliari

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High Energy Physics Colloquia

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High-energy theory on Dirac materials

Abstract

The work of our group at Charles University on reproducing scenarios of high energy theoretical physics (HEP-TH) on Dirac materials, like graphene, will be introduced. The main goal will be to show how versatile these systems are, and how far and wide into the HEP-TH territory we can venture with them.
I shall review why these materials lend themselves to the emergence of special relativistic-like matter and space, and of the various geometric gauge fields of gravity theories. I shall then mention some fresh results: from the time-loop to spot torsion, to the generalized uncertainty principle stemming from and underlying (lattice) length; from a model of grain-boundaries and their relation to (A)dS and Poincaré spacetime algebras, to Unconventional Supersymmetry and the role of the two Dirac points.
Then the focus will be on the emergence of curvature. I shall show why the (2+1) dimensions and Weyl symmetry, are crucial to identify the specific arrangements that realize a Unruh-Hawking kind of phenomenon. A variety of other interesting scenarios, that include the BTZ black hole and de Sitter spacetime, will be mentioned. Finally I shall brief comment on how far we went in the direction of experiments.

External Link:

Presentation room here.

Slides can be found on the INFN HEPC website
or at the indico event link after the seminar.

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https://theory.ca.infn.it/seminars/