Institut Henri Poincaré
11 rue Pierre et Marie Curie, 75231 Paris cedex 05
String Theory in Greater Paris

Rencontres Théoriciennes
“Supergravité, théorie des cordes et théorie M”

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Fractons in curved space

In recent years, a new class of physical systems have been unearthed admitting quasiparticle excitations that are unable to move freely in space, known as fractons. In the continuum limit, these systems give rise to quantum field theories featuring exotic symmetries such as conserved dipole or multipole moments. Despite immense efforts over the past few years, the nature of these new quantum field theories still remains elusive to us. Hoping to add to these efforts, in this talk we will consider fracton field theories in curved spacetime. In addition to being interesting in their own right, coupling fractons to background spacetime sources allows us to unambiguously obtain the spacetime Noether currents (associated with conserved energy and momentum) and their transformation properties under the dipole (multipole) symmetry transformations. As an interesting aside, we find evidence for a mixed gauge-gravitational anomaly in the symmetric tensor gauge theory which naturally couples to conserved dipoles. The talk is based on a recent paper : https ://arxiv.org/pdf/2111.03973.pdf.

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