Contribution ID: **111** Type: **Gong Show Talk**

Fractons on curved space and their soft charges

Fractons are quasiparticles with the distinctive feature of having only limited mobility. This bizarre trait and their unusual symmetries also make the coupling to curved spacetime nontrivial. I will show how aristotelian geometry provides the right framework, review the state-of-the-art on this issue, provide a novel no-go theorem for theories with linear dipole symmetry, spatial derivatives in the action, or a Gaussian action and comment on connections to carrollian and partially massless theories.

I will also emphasize that the very definition of isolated fractons requires a careful study of asymptotic symmetries. I describe asymptotic conditions that encompass all known solutions, lead to finite charges and resolve the problem of the divergent energy coming from the monopole contribution. There are, analog to electrodynamics and general relativity, infinitely many soft charges which hints at a rich infrared structure and a fracton infrared triangle.

Based on: 2111.03668, 2203.02817, work in progress

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Session Classification: Gong Show