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Causality with Gravity

Thursday, December 3, 2020 2:00 PM (1 hour)

In standard effective field theories, the notion of causality is intrinsically linked with that of subluminality and with a set of positivity constraints to be imposed on the low-energy scattering amplitudes. I will highlight how the presence of gravity leads to a more subtle relation between causality, (sub)luminality and positivity bounds. I will clarify why a mild level of superluminality is not in contradiction with causality, analyticity or Lorentz invariance and show how consistent gravitational low energy effective theories can self-protect by ensuring that any time advance and superluminality calculated within the regime of validity of the effective theory is necessarily unresolvable for such theories. These considerations are particularly relevant for putting constraints on cosmological and gravitational effective field theories and I will provide explicit criteria to be satisfied so as to ensure causality and a standard high energy completion in gravitational effective field theories.

Presenter: Prof. CLAUDIA, de Rham