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Positivity constraints on EFT's with spontaneously broken Lorentz invariance

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The coefficients of the operators of an effective field theory (EFT) are constrained to satisfy certain inequalities, under the (mild) assumption that the UV completion satisfies general requirements of causality and unitarity. These "positivity" constraints have been the subject of intense investigation in the last 15 years, since they prove rigorously that some low energy theories cannot be UV completed. I will discuss the extension of these ideas to theories where the Lorentz symmetry is spontaneously broken, as it happens in cosmology and condensed matter physics. As a starting point I will focus on a conformal field theory at finite charge. The low energy excitations of this system are described by an EFT for the Goldstone of the spontaneously broken charge: a conformal superfluid. I will show that the coefficients of this EFT are constrained since, in analogy with what happens in the Lorentz invariant case, one can run a dispersive argument for the 2-point function of the conserved current and of the stress-energy tensor.

Presenter: CREMINELLI, Paolo (ICTP)