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Constraining effective theories using causality

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Effective field theories (EFT) are widely used to parameterize long-distance effects of unknown short-distance dynamics or possible new heavy particles. It is known that EFT parameters are not entirely arbitrary, and in particular must obey positivity constraints if causality and unitarity are satisfied at all scales. We systematically explore those constraints from the perspective of 2 to 2 scattering processes, and show that all EFT parameters in units of the mass threshold M are bounded below and above: causality requires a sharp form of dimensional analysis scaling.

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