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Systematic Uncertainties of the Inverse Amplitude Method

Effective Field Theories such as HEFT, organized as momentum expansions, are a controllable approximation to strong dynamics only near threshold, as they miss exact elastic unitarity, reducing their predictive power at a higher scale if small separations from the Standard Model are found at the LHC or elsewhere. Unitarized chiral perturbation theory extends their reach to saturation of unitarity but, generally, with unknown systematics. Our contribution follows the derivation of the Inverse Amplitude Method (IAM), a serious unitarization procedure, quantifying the uncertainty introduced at each step. Provided a check for zeroes of the amplitude is performed and, if appropriate, they are taken into account, we find that the IAM extension of EFT partial wave amplitudes can be assigned a limited uncertainty band up to and including the first resonance or structure of the amplitude, and if none appears, up to energies of the order of $4\pi F$, nominal validity limit of the EFT.

Collaboration / Activity

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