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Bayesian parameter estimation in effective field theories MATTHIAS R. SCHINDLER, DANIEL R. PHILLIPS, Ohio University — Estimation of low-energy constants (LECs) is an important component of the effective field theory (EFT) program for low-energy QCD. So far the calculation of LECs from QCD is only possible in very few cases, and in practice the LECs are determined by fits to experimental data. There are several questions that need to be considered regarding such a fit: How does one incorporate the information that the LECs are of natural size? At which order in the EFT expansion should the fit be performed? And which data should be used to determine the LECs? We propose a method to address these questions that is based on Bayesian probability theory. The Bayesian framework allows us to incorporate the naturalness assumption by use of a prior probability density. Our method also accounts for the uncertainty due to the vagueness in the definition of "naturalness". In addition, the choice of the order of the EFT calculation is addressed by marginalization over the order, again systematically accounting for uncertainties. To demonstrate our method we present the application to a "toy" problem as well as a problem in chiral perturbation theory.

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