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Exploring Bayesian model selection methods for effective field theory expansions[1] TAYLOR SCHAFFNER, YUKARI YAMAUCHI, RICHARD FURNSTAHL, Ohio State Univ - Columbus — A fundamental understanding of the microscopic properties and interactions of nuclei has long evaded physicists due to the complex nature of quantum chromodynamics (QCD). One approach to modeling nuclear interactions is known as chiral effective field theory (EFT). Today, the methods greatest limitation lies in the approximation of interaction potentials and their corresponding uncertainties. Computing EFT expansion coefficients, known as Low-Energy Constants (LECs), from experimental data reduces to a problem of statistics and fitting. In the conventional approach, the fitting is done using frequentist methods that fail to evaluate the quality of the model itself (e.g., how many orders to use) in addition to its fit to the data. By utilizing Bayesian statistical methods for model selection, the models quality can be taken into account, providing a more controlled and robust EFT expansion. My research involves probing different Bayesian model checking techniques to determine the most effective means for use with estimating the values of LECs. In particular, we are using model problems to explore the Bayesian calculation of an EFT expansions evidence and an approximation to this value known as the WAIC (Widely Applicable Information Criterion).

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