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Dave Higdon* (dhigdon@vbi.vt.edu). *A case study in combining a physical model and experimental measurements for atomic nuclei.* Preliminary report.

Newly discovered heavy elements, astrophysical observations of neutron stars, and increased computational power have led to renewed interest in understanding and modeling the behavior of atomic nuclei. The NUCLEI project, a joint collaboration involving multiple national laboratories and universities, is attempting to develop a reliable model of all nuclei - light, heavy, and superheavy. A part of this project centers on calibrating and assessing accuracy of a density functional theory (DFT) model, which models the behavior of a wide range of atomic nuclei. This talk will describe scientific and statistical aspects of this problem, presenting a Bayesian approach to combine various sources of information to estimate parameter and prediction uncertainties. Finally, predictions produced from this approach will be compared to recently carried out experiments at the rare isotope facility at Argonne National Laboratory. (Received January 20, 2015)