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CONFLUX: A Standardized Framework to Calculate1 Reactor Antineutrino Flux

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Nuclear fission reactors are abundant sources of antineutrinos for neutrino physics experiments. The flux and spectrum of reactor antineutrinos can indicate the activity and compositions of reactors, offering the application opportunity of reactor survey with neutrino measurements for the wider society. The success of using antineutrinos to survey reactor components and a number of neutrino physics study requires precise prediction of the iso- topic flux of fission generated neutrinos. The past predictions methods are widely dispersed and had involved various methods, data, and assumptions. Disagreements between reactor neutrino measurements and theoretical predictions inspired revision of reactor neutrino calculations in the particle and nuclear physics fields. A standardized neutrino prediction tool is needed to provide physicists methods to easily reveal the impact of their studies to general calculations of reactor neutrino flux, to the theory of beta decay, and to the nuclear physics. The CONFLUX software framework, Calculation Of Neutrino FLUX, is built with the goal to simplify and standardize the calculation. CONFLUX packages three methods to calculate neutrinos generated from reactor neutrinos or individual beta decays with common nuclear data and beta theories for direct cross-method comparison. The software prepacked the latest nuclear database, as well as methods to process the uncertainties. It also allows customized nuclear data and beta theories and user generated time dependent reactor models for convenient adjustment of fission products, theoretical corrections. We will present the structure, usage of CONFLUX with the focus on predicting neutrino flux for CEvNS detection.

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