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Reactor flux predictions for CEvNS experiments

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Coherent elastic neutrino-nucleus scattering (CEvNS) offers a unique way to study neutrino properties and to search for new physics beyond the Standard Model. As neutrino sources, nuclear reactors deliver very intense fluxes which, combined to the high CEvNS cross-section, could potentially allow to perform precision physics with drastically smaller detectors.

For high statistics measurements, typically reachable after few years of data taking with kg-scale detectors, the sensitivity of CEvNS experiments at reactors is expected to be limited by the knowledge of the reactor antineutrinos flux. Over the last decades, Inverse Beta Decay (IBD) experiments conducted at short and long baselines from nuclear reactors have revealed significant discrepancies on both the rate and shape of the measured spectra compared to state-of-the-art predictions, thus questioning their reliability. Thanks to their small uncertainties, both resulting from high statistics and an excellent control of systematics, reactor antineutrino spectra measured by IBD experiments can be used as the main ingredient to a prediction for CEvNS experiments.

In this talk, I will present an overview of recent results obtained by IBD experiments and report about the status of these anomalies. The construction of a reactor flux predictions based on IBD measurements to estimate the expected CEvNS rate and recoil spectrum at nuclear reactors will be explained. A particular focus will be given on the expected uncertainties. Prediction of the low energy part of the neutrino spectrum that cannot be derived from IBD measurements will also be addressed.

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