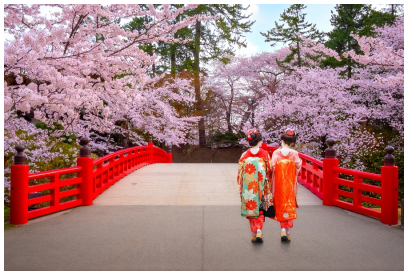

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Revised summation calculations of reactor antineutrino fluxes and spectra

mercredi 29 mars 2023 09:30 (15 minutes)

Over the last decades, Inverse Beta Decay (IBD) antineutrino experiments conducted at short and long baselines from nuclear reactors have revealed significant discrepancies on both the rate and shape of measured spectra compared to state-of-the-art predictions. No evidence for an experimental bias has been detected, and the sterile neutrino interpretation of the reactor antineutrino anomaly has been mostly excluded by recent very short baseline reactor experiments. The validity of the predictions is then seriously questioned as the source of the observed discrepancies. This last lead has motivated a thorough revision of reactor antineutrino spectrum modeling, which is also relevant in view of the forthcoming new generation of reactor experiments aiming at measuring neutrinos through the Coherent Elastic Neutrino-Nucleus Scattering (CEvNS) process.

This revised summation modeling includes significant refinements to the beta decay formalism used to compute the thousands of beta branches making up a reactor spectrum, and a comprehensive and exhaustive uncertainty budget is presented in regards to the modeling of the formalism and to input evaluated nuclear data. This presentation will especially detail the many improvements this new prediction brings over past state-of-the-art predictions, and will then compare the new prediction to IBD datasets collected by recent short and long baseline reactor experiments. Finally, the low energy portion of the reactor antineutrino spectrum will be discussed in regards to the current experimental effort aiming at observing CEvNS at reactors.

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