

First-forbidden decays in the reactor anomaly and shoulder

The study of beta decay has continually been at the forefront in the search for new physics, not in the least in the reactor antineutrino anomaly. These results depend critically on the knowledge of individual electron beta spectrum shapes. In previous analyses, all spectra were treated using simple allowed shapes even though those of forbidden decays can change drastically. We have, for the first time, calculated the forbidden spectral shapes for the dominating beta transitions above 4 MeV using the nuclear shell model. One observes spectral changes in both electron and antineutrino spectra on the order of several percents in the region of interest. Contrary to previous arguments, these spectral changes are non-negligible and become a crucial ingredient in the explanation of the spectral shoulder. We extend the results of the shell model calculations through a parametrization of forbidden shape factors to arrive at an estimated spectral correction from all forbidden transitions.

Session and Location

Monday Session, Poster Wall #207 (Ballroom)

Poster included in proceedings:

no

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Track Classification: Poster (participating in poster prize competition)