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Impact of Fission Neutron Energies on Reactor Antineutrino Spectra KEITH HERMANEK, BRYCE LITTLEJOHN, IAN GUSTAFSON[1], Illinois Institute of Technology — Recent measurements of the reactor antineutrino spectra (Double Chooz, Reno, and Daya Bay) have shown a discrepancy in the 5-7 MeV region when compared to current theoretical models (Vogel and Huber-Mueller). There are numerous theories pertaining to this antineutrino anomaly, including theories that point to new physics beyond the standard model. In the paper "Possible Origins and Implications of the Shoulder in Reactor Neutrino Spectra" by A. Hayes et al., explanations for this anomaly are suggested. One theory is that there are interactions from fast and epithermal incident neutrons which are significant enough to create more events in the 5-7 MeV by a noticeable amount. In our research, we used the Oklo software network created by Dan Dwyer. This generates ab initio antineutrino and beta decay spectra based on standard fission yield databases ENDF, JENDL, JEFF, and the beta decay transition database ENSDF-6. Utilizing these databases as inputs, we show with reasonable assumptions one can prove contributions of fast and epithermal neutrons is less than 3% in the 5-7 MeV region. We also discovered rare isotopes are present in beta decay chains but not well measured and have no corresponding database information, and studied its effect onto the spectrum.

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