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Refining Sterile Neutrino Exclusion through Joint Analysis: STEREO Phase 2 Reproduction and Analytical Response Modeling

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Motivated by the Reactor Anti-neutrino Anomaly (RAA, an experimental 6% flux deficit), recent reactor anti-neutrino experiments have explored the existence of a fourth, sterile neutrino. Its experimental signature is oscillations induced over short baselines. The STEREO and PROSPECT experiments have excluded the RAA's best-fit oscillation parameters at over 4σ and produced exclusions contours for other areas of the parameter space. A joint analysis combining STEREO, PROSPECT, and Daya Bay is currently underway to improve the exclusion contours.

This talk will present my work in this context on reproducing STEREO Phase 2 results, focusing on numerical optimizations to improve computational efficiency. I will also discuss the development of an analytical response model, used to enhance flexibility in fitting procedures and better handle systematic uncertainties.

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