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Improved electronic-recoil modeling in Xenon detectors with NEST[1] SOPHIA ANDALORO, Rice University, NEST COLLABORATION — Noble-element detectors are broadly employed in rare-event nuclear and particle physics searches. The physics reach of these experiments requires accurate background and signal models. To this end, we developed the Noble Element Simulation Technique (NEST): a comprehensive, semi-empirical package for end-to-end simulation of noble element detector response. NEST simulates fundamental quantities, such as the scintillation and ionization yields of various particle interactions with noble elements, as well as detector-specific responses, such as the detectors energy resolution and other observables. Recent upgrades to NEST, and to its Python equivalent, nestpy, have increased its flexibility when integrated into an experiment-specific code, and NESTs options to simulate detector sensitivities enhance its applications from a phenomenological perspective. Most importantly for Xenon-based detector experiments is the recently-improved electronic recoil (ER) model within NEST, critical for calibration and background modeling. I will highlight NESTs ER model, which we have expanded empirically to account for more unique ER-type particle interactions. The plans to finalize NEST for present and future generations of Xenon-based experiments will also be discussed.

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