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The Noble Event Simulation Technique (NEST) for Xenon Detectors SOPHIA ANDALORO, Rice University, THE NOBLE EVENT SIMULATION TECHNIQUE COLLABORATION — Noble-element detectors are common in rare-event searches, such as those involving dark matter and neutrinos. The sensitivities of these searches require an accurate model to identify backgrounds and predict signal topologies. The Noble Event Simulation Technique (NEST) is a comprehensive, mostly-empirical package for complete and accurate simulation of noble element detector response. NESTs capabilities include simulating the scintillation and ionization yields of various particle interactions with noble elements. I will present recent upgrades to the NESTv2.0 package concerning xenon response. NEST's use for xenon detectors is based heavily on experimental data from a number of solid, liquid, and gaseous detector experiments. Due to this abundance of data, most theoretical models in NEST for xenon have been replaced with simple, well-behaved, empirical formulas. Furthermore, NEST can be customized to a detectors various experimental parameters such as electron lifetimes. NEST employs an empirical, non-binomial recombination model and simulates scintillation and ionization signals in dual-phase time-projection chambers with correct energy resolution. NESTv2.0 can be operated as a standalone command-line tool, used with GEANT4, or more recently with Python as nestpy.

Sophia Andaloro
Rice University

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