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The Noble Element Simulation Technique (NEST) Version 2.0

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The latest release of the Noble Element Simulation Technique (NEST) is presented here. Noble element target media have become common in rare event searches, and an accurate comparison model is critical for understanding and predicting signals and unwanted backgrounds. Like its predecessors, NESTv2.0 is a simulation tool written in C++ and is based heavily on experimental data, taking into account most of the existing ionization and scintillation data for solid, liquid, and gaseous xenon. Due to the large amount of precise data for liquid xenon, most theoretical models in NEST have been replaced with simple, well-behaved, empirical formulas, such as sigmoids and power laws. NESTv2.0 also uses an empirical, non-binomial, recombination fluctuations model. In addition, NESTv2.0 simulates S1 and S2 scintillation signals with correct energy resolutions in dual-phase xenon time-projection chambers, and this is done without using an external package. While NEST can be used with GEANT, NESTv2.0 is fully capable of operating as a stand-alone command-line tool.

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