Enhancement of waveform simulation for low-energy physics in XENON1T[1] TIANYU ZHU, Columbia Univ, XENON COLLABORATION — The full simulation of signals in the XENON1T dark matter detector is made up of Geant4, models for scintillation light yields and ionization yields, and a so-called waveform simulation. This last step is a comprehensive model of the detector response, including position-dependent effects, photomultiplier responses and the pulse shapes created by scintillation and ionization signals. The simulation uses both external measurements and empirical data from XENON1T analyses, and its output may be passed directly to the data processing software used for real data. In a recent search for nuclear recoils produced by solar ^{8}B neutrinos in XENON1T data, extending and validating the waveform simulator played a central part in computing the signal efficiency of the neutrino signal or low-mass dark matter. The enhancements we present address the mismatch between previous simulations and data, improving the simulation for the low-energy response.

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