

Phonon simulation of low temperature acoustic waves for rare event detector

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We present a simulation to calculate heat signal spectrum from low temperature bolometer attached to a crystal. This implementation is based on the elementary acoustic wave theory at low temperature, and has been developed using modern Monte Carlo techniques by tracking individual phonon's polarization, wave, and group velocity vectors in anisotropic media. Physical processes include phonon transmission and absorption at the interface, scattering in the bulk, and reflection on the surface. The obtained time dependence of signal is compared against real experimental data to validate our simulation process. Development of this simulation can be used to understand and predict signals from low temperature rare event detector for astro-particle and neutrino physics experiments.

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