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Improved Modeling of Cherenkov Light Produced by Neutrino Interactions in the South Pole Ice EMILY THYRUM, DOUG COWEN, JUSTIN LANFRANCHI, Penn State Physics Department — Neutrinos are ubiquitous but not well understood fundamental particles that come in three flavors: electron, muon, and tau. When a muon neutrino collides with the nucleus of an atom, another fundamental particle, the muon, is often created. The IceCube Neutrino Observatory, located in the South Pole ice, detects light from charged particles (including muons) when they travel faster than light does through the ice. We use this to reconstruct the lengths (which translate into energies) and directions of the muons, from which we infer the original neutrinos' energies and directions. Our goal is to augment our model of a muon's light deposition to include that of particles created when the muon undergoes stochastic interactions in the ice. This should lead to more accurate reconstructions of energy and direction. In this project, we simulate muons interacting in ice, record the particles emitted, and parameterize their light output to inform our model.

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