Optical Simulations of Wavelength Shifting Fibers

Wednesday, 29 May 2013 10:00 (25 minutes)

We have constructed a GEANT4-based detailed software model of photon transport in polystyrene-based clear and wavelength shifting fibers. We have validated the model using data from several experiments and test bench studies using LEDs. In the model, we account for all spectral properties of materials such as bulk absorption and (re)emission and refractive indices. In this talk, I will present features of the general model and input components. I will then demonstrate that by accounting for the spectral properties of all detector components, the model accurately predicts the light response for a broad range of fiber lengths, diameters, and configurations. This model serves as a useful tool for optimization of the next generation plastic scintillator-based particle detectors and can be easily extended to study other fluorescence based materials including coumarins and TPB.

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