

Dark rates induced by radioactive decays in optical modules for neutrino telescopes

In the framework of a planned upgrade of the IceCube Neutrino Observatory and a next-generation neutrino telescope at the South Pole, new optical modules are being developed which are expected to significantly increase the detector sensitivity. As the deep ice at the South Pole has no intrinsic optical activity, light produced by the modules themselves represents the dominant background. Two major sources of dark rate are Cherenkov and scintillation photons produced by radioactive decays inside the module's pressure vessel and photomultiplier (PMT) glass. This poster presents the investigations of the underlying production mechanisms and their parametrization based on measurements and simulations. With this parametrization, the response to background from radioactive decays is estimated and compared with a Geant4 simulation of the multi-PMT digital optical module - one of the new modules being proposed for the next IceCube extensions - and the current IceCube optical module.

Authorship annotation

for the IceCube Collaboration

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yes

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