

Measurement of ^{210}Po α contamination in a BGO cryogenic bolometer

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We present a study of the capability of cryogenic phonon scintillating bolometers in the detection of trace radionuclides. A dedicated BGO crystal with a volume of 1 cm^3 , grown with ^{210}Po contamination, is used as the absorber of the bolometer. The detector is operated at a temperature of about 20 mK and surrounded by a 15 cm thick copper shielding to suppress environmental background. The detector performance is evaluated after optimization of the working point, stabilization of the baseline, and coincidence analysis between the heat and light signals.

An energy resolution of 4 keV FWHM at 5.4 MeV is achieved. A separation between α and β/γ events is observed. Two independent measurements conducted 18 months apart yield decay results consistent with the half-life of ^{210}Po . The α event rate of ^{210}Po contamination is measured to be approximately 0.02 Hz currently.