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Novel Ge Detectors in Exploring Geo-Neutrinos .[1] MATHBAR RAUT, SANJAY BHATTARAI, DONGMING MEI, University of South Dakota — The source of most of the heat flux coming from inside the Earth is believed to be radiogenic heating along with secular cooling of earth. Among all radiogenic heating elements, Uranium-238, Thorium-235, Thorium-232, and potassium-40 radiate almost 99 percent of heat. Due to relatively shorter half-life of Potassium-40, it is crucial to know the abundance of Potassium and its spatial distribution in crust, mantle as well as in core. These radiogenic elements decay by emitting electron-neutrinos of different energies. Direct detection of geo-neutrinos, especially the ones from Potassium-40, has been challenging task for decades. Neutrino-nucleus coherent scattering and neutrino-electron scattering are two promising methods to detect geo-neutrinos from Potassium-40 and Thorium-232. High purity germanium detectors with extremely high energy resolution and pulse shape discrimination of the signals over the backgrounds can be a good detector for detecting geo-neutrinos. In this paper, we present a study on the amount of high purity germanium detector needed to detect geo-neutrinos from Potassium-40 and Thorium-232 directly over the vast background of solar neutrinos.

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