

BACKGROUND INTERCOMPARISON WITH AN ACTIVE SHIELDED HPGE DETECTOR EXTENDED TO FREIBERG MINE IN GERMANY

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A key requirement for underground nuclear astrophysics experiments is the very low background level in germanium detectors. The reference for these purposes is the world's so far only underground accelerator laboratory for nuclear astrophysics, LUNA. LUNA is located deep underground in the Gran Sasso laboratory in Italy, shielded from cosmic rays by 1400m of rock. The background at LUNA was studied in detail using an escape-suppressed Clover-type HPGe detector [1]. Exactly the same detector was subsequently transported to the Felsenkeller underground laboratory in Dresden, shielded by 45m of rock, and the background was shown to be only a factor of three higher than at LUNA when comparing the escape-suppressed spectra, with interesting consequences for underground nuclear astrophysics [2]. As the next step of a systematic study of the effects of a combination of active and passive shielding on the cosmic ray induced background, this detector has recently been brought to the "Reiche Zeche" mine in Freiberg, Germany, shielded by 150m of rock.

The data available with one and the same actively shielded HPGe detector at the Earth's surface and below 45, 150, and 1400m of rock allow getting a general understanding of the effects of active shielding with depth.

– Supported by the Helmholtz Association (HGF) through the Nuclear Astrophysics Virtual Institute (HGF VH-VI-417).

[1] T. Szücs *et al.*, *Eur. Phys. J. A* 44, 513 (2010).

[2] T. Szücs *et al.*, *Eur. Phys. J. A* 48, 8 (2012).