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Initial Performance Results of the High Energy Telescope (EPD/HET) on Solar Orbiter

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Solar Orbiter is ESA's next solar and heliospheric mission, planned for launch in January 2017 and approaching the Sun as close as 0.28 AU. One of Solar Orbiter's scientific questions is "How do solar eruptions produce energetic particle radiation that fills the heliosphere?". The Energetic Particle Detector (EPD) will provide key measurements for this and the other Solar Orbiter Science Objectives. The High-Energy Telescope (HET) will detect and characterize electrons from 0.3 - 25 MeV, protons 10 - 100 MeV and heavy ions 50 - 200 MeV/n using dE/dx vs. total E measurements. The total energy of stopping particles is measured in a high-density inorganic scintillator crystal while Si-solid-state detectors measure the energy loss of penetrating particles. Thus, the scintillator detector lies the heart of the proposed design. High density, fast time response, good energy resolution and a radiation hardened scintillator are key to a successful science phase of EPD and HET.

Based upon past experience and literature surveys, we chose Cerium-doped Gadolinium Silicate (GSO:Ce) and Bismuth Germanate (BGO) as the most suitable candidates, better than other materials such as CsI:Tl, NaI:Tl, etc. To verify the performance of these two scintillators, a demonstration model of HET was designed with a 2 cm thick hexagonal GSO:Ce and/or BGO crystal. Two Hamamatsu photo diodes with 1x1 cm2 were glued to the crystals for light collection and silicon detectors are used as dE detectors. This simple design allows to study key characteristics of the crystals like light output, quenching, etc. Here we will present initial results of the demonstration model of the HET instrument for both crystals, GSO:Ce and BGO and compare their properties.