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Observation of solar particle events from MGNS experiment onboard BepiColombo mission, HEND experiment onboard Mars Odyssey mission, and also FRENDD and Liulin-MO experiments onboard TGO mission during July-October 2021

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This report presents the results of observations of Solar Particle Events (SPE) in July-October 2021 that have been simultaneously detected by the MGNS (Mercury Gamma-ray and Neutron Spectrometer) instrument on board the MPO spacecraft of the BepiColombo mission which is currently on a cruise phase to Mercury, as well as by science instruments that are operated in near-Mars orbit: HEND (High Energy Neutron Detector) instrument onboard Mars Odyssey mission, FRENDD (Fine Resolution Epithermal Neutron Detector) instrument and Liulin-MO dosimeter onboard ExoMars TGO (Trace Gas Orbiter) mission. This location of the spacecrafts, allowed for stereoscopic observation of SPEs, in addition during the period July-October 2021 Mars is on the opposite side of the Sun from Earth, when it is difficult to observe these SPEs by instruments on a near-Earth group of spacecrafts for Solar monitoring. The report will present an analysis of the energy spectra deposition and analysis of time profiles. In particular it shows the Forbush decrease of GCR in effect of the arrival of the dense solar plasma to the SPE observation locations. The MGNS, HEND and FRENDD instrument developed and manufactured at the Space Research Institute of the Russian Academy of Sciences and are a Russian-made and Russian-funded contribution by the Russian Federal Space Agency (ROSCOSMOS) to the BepiColombo, Mars Odyssey and ExoMars TGO missions, respectively. Liulin-MO has been developed in Space Research and Technology Institute at the Bulgarian Academy of Sciences with participation of Institute of Biomedical Problems of the Russian Academy of Sciences (Moscow) and Institute for Space Research (Moscow).

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