Prague, Czech Republic June 21-25, 2021

Contribution ID: **229** Type: **Oral presentation**

#02-229 Introduction of hybrid silicon/scintillator detector for space experiment BION-M2

Thursday, June 24, 2021 11:00 AM (20 minutes)

Space experiment BION-M2 focuses on research of effects of ionizing radiation to biological samples such as geckos and mice. The return module of BION-M2 carries the life support systems for all living organisms. The launch of the satellite is planned on the year of 2023, the average altitude will be 800 km.
The newly developed hybrid silicon/scintillator detector will support this experiment with measurement of radiation doses in combination with other detectors such as thermoluminescence detectors, track-etched detectors CR-39 and silicon-based detectors.
The detector is based on silicon strips which are deployed in 4 layers. The layers are placed in such pattern that when a charged particle crosses all four layers the incident angle of the particle can be calculated. Each layer contains 64 strips. Altogether there are 256 strips in all layers. The block of plastic scintillator EJ-276 is placed between second and third layer. Plastic scintillator is coupled with silicon photomultiplier (SiPM) which converts scintillation photons to electrical signal. EJ-276 supports technology of pulse shape discrimination (PSD) which can be used to estimate the linear energy transfer (LET) of the particle. The considerable effort has been made to optimize the PSD performance with the SiPM component. The detector is designed to manage large fluences of radiation which can be encounter for example when satellite passes through South Atlantic Anomaly (SAA) which is located at the coast of Brazil. Such arrangement of the detector provides detection capabilities to calculate radiation quantities related to biological response to ionizing radiation. The goal is to obtain time resolved LET spectrum, absorbed dose and dose equivalent rates.
We would like to introduce newly developed hybrid silicon/scintillator detector and present the preliminary results from experiments performed at high energy accelerators. The type of the particles and their energy were chosen so it was close to the ionizing radiation at Earth orbit.

Primary authors: SOMMER, Marek (Department of Radiation Dosimetry, Nuclear Physics Institute, The Czech Academy of Sciences); Mr KRIST, Pavel (Nuclear Physics Institute, The Czech Academy of Sciences); Mr PLOC, Ondřej (Department of Radiation Dosimetry, Nuclear Physics Institute, The Czech Academy of Sciences)

Presenter: SOMMER, Marek (Department of Radiation Dosimetry, Nuclear Physics Institute, The Czech Academy of Sciences)

Session Classification: 02 Space Sciences and Technology

Track Classification: 02 Space Sciences and Technology