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DEVELOPMENT OF THE ESA ENERGETIC PARTICLE TELESCOPE (EPT) FOR FLIGHT ON BOARD PROBA V

Abstract

The Energetic Particle Telescope (EPT) instrument is a highly innovative science class radiation spectrometer designed to detect, directly identify and measure the energy of electrons, protons, alpha-particles and heavier ions in the space environment. The EPT project is managed by QinetiQ Space N.V. for the European Space Agency in cooperation with the Center For Space Radiations (CSR) in Louvain-la-Neuve, the Principal Investigator and founder of the EPT concept, the Belgian Institute for Space Aeronomy in Brussels (BIRA-IASB) and the Aboa Space Research Oy (ASRO) in Finland. The first Flight Model (FM) of EPT shall fly on-board PROBA-V planned for launch beginning of 2013 after more than a decade of Research and Development.

The EPT particle discrimination concept allows full discrimination at high energy without using a huge amount of sensor material. Also, the EPT can provide real-time (ready for use) flux measurements needed for detailed space weather forecasting.

As such, EPT is a solution to inaccuracies in radiation flux data, which affects the quality of engineering space radiation models. Most of the particle instruments on board satellites in recent missions are radiation monitors that measure fluxes with huge uncertainties mainly due to contamination of the different particle channels. The limited energy range covered by monitors is among the other main limitations on scientific studies based on this kind of instruments. EPT is a high-fidelity instrument based on a new functional principle that eliminates contamination between electron and proton channels even at energies as high as 10 MeV electrons and 300 MeV protons. This allows accurate flux measurements of both electrons and protons in the space environment, while also providing accurate -particle spectra.

EPT is also a solution to space weather data availability. Indeed, besides being the main source of inaccuracies which affect the quality of engineering space radiation models, contamination corrections in monitors requires time consuming case by case raw data post-processing not suitable for space weather applications. The real-time measurement capabilities of EPT make it a perfect instrument for space weather forecasting. By using the flux measurement capabilities of EPT it is for example possible to forecast flux levels at precise locations after geomagnetic storms. For flying instruments whose data acquisition capacity is reduced when a certain flux level is exceeded, real-time flux determinations are required if one needs to predict the “availability” of these instruments (star imagers, cameras, etc. . .).