

## SPACE SYSTEMS SYMPOSIUM (D1)

Hosted Payloads - Concepts, Techniques and Challenges, Missions and Applications (7)

Author: Mr. Andres Russu

Universidad Alcala de Henares, Spain, Andres.Russu@edu.uah.es

Dr. Juanjo Blanco

Universidad Alcala de Henares, Spain, Juanjo.Blanco@uah.es

Prof. Bernd Heber

CAU, Germany, heber@ihy2007.de

Dr. Sebastian Sanchez

Universidad Alcala de Henares, Spain, Sebastian.Sanchez@uah.es

Prof. Robert Wimmer-Schweingruber

University of Kiel, Germany, wimmer@physik.uni-kiel.de

Dr. Javier Rodriguez-Pacheco

Universidad Alcala de Henares, Spain, fsrodriguez@uah.es

Dr. Manuel Prieto Mateo

Spain, mpm@aut.uah.es

Dr. Cesar Martin

University of Kiel, Germany, martin@physik.uni-kiel.de

Dr. Raul Gomez-Herrero

Universidad Alcala de Henares, Spain, Raul.Gomez@uah.es

## SOLAR PARTICLE ANALYSER EXPERIMENT (SPAX)

**Abstract**

Solar Particle Analyser eXperiment (SPAX) consists in Solar Energetic (SEPs) Particle event-forecasting instrument. SEPs are an important hazard to spacecraft systems and constrain human activities in space. The forecasting concept is based on the empirical forecasting technique of radiation hazards from solar energetic ion events with relativistic electrons information.

SPAX instrument is envisaged to be embarked as piggyback payload on a near term launched satellite mission. The developer team is a Spanish and German consortium currently working on the Energetic Particle Detector (EPD) instrument for the Solar Orbiter mission. The instrument development is also based on the experience of the same team on EPD instrument.

The SPAX instrument is a low budgets profile, therefore suitable as piggybacked payload. The estimated mass is less than 12 kg (excluding intraharness 138 g/m). The power consumption has been calculated for 28 V regulated line (26 – 29 V) with the result of 21 W at full operation. The telemetry budget shall be less than 3.1 kbps and limited amount of commanding for operation is required.

SPAX suite consists of three sensors with a common S/C electrical IF. The sensors are:

The **Ground Level Event Monitor and Electron Proton Telescope** (GLEMEPT) is direct heritage of the EPT/HET EPD. Two sensor heads, GLEM and EPT, and a common electronics compose the GLEMEPT sensor unit. The Ground Level Event Monitor (GLEM) measures electrons from 600 keV up to about 20 MeV, protons from 10 – 500 MeV, and heavy ions from 10 to  $\lesssim$  500 MeV/nuc. The Electron and Proton Telescope (EPT) measures electrons from 20 keV to 400 keV and protons from 20 keV to 7 MeV. The **Partículas Energéticas Solares y Componente Anomala (PESCA)** will measure 0.150 to 1 MeV electrons and 1.5 to 50 MeV/n protons and species discrimination for alpha, CNO and Fe.

The **Instrument Control Unit (ICU)**, direct heritage of EPD instrument, provides data processing and power distribution for sensors and is the unique electrical interface to the spacecraft. The ICU can be redesigned for S/C requirements accommodation maintaining sensor units independent.

The preferred orbit for SPAX operation is a halo orbit around the first Lagrange Point L1 but can be operated in any orbit outside the magnetosphere, including inner interplanetary mission. The orientation of the SPAX sensors shall be nominally towards Parker spiral in Sun pointing.