

# CPT Implementation Plan: Phases B, C/D

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## **Executive Summary**

### **Title:**

Charged Particle Telescope (CPT)

### **Objective:**

The Charged Particle Telescope will be used for investigating the Earth's radiation belts. CPT is suitable also for space weather monitoring and is capable of measuring solar energetic particles penetrating into the magnetosphere. CPT will provide high-precision data for both scientific purposes and for technological applications.

### **Performance:**

CPT is composed of the Low Energy Telescope (LET) and the High Energy Telescope (HET) operating at slightly overlapping energy ranges. CPT is capable to

- unambiguously separate and measure differential fluxes of electrons and protons in the energy ranges 100 keV - 20 MeV and 1 - 133 MeV, respectively
- provide integral flux measurements of electrons above 20 MeV, and measurements of proton fluxes in three coarse energy channels between 100-400 MeV and provide integral measurements above 400 MeV
- identify heavy ions (He, CNO, (Fe)) above energy thresholds of a few MeV/n
- provide directional measurements of electrons and protons within a total view cone of about 90°
- to adapt to high flux conditions by electronic reconfiguring
- to count particles to above 100.000 counts/s
- to record particle samples with a time resolution of a few milliseconds and flux integration time of 5-30 seconds.

### **Spacecraft resources requirements:**

The required spacecraft resources can be summarised as follows:

- mass 7.0 kg
- envelope dimensions 230 mm x 200 mm x 117 mm
- power consumption of the electronics 6.5 W
- bitrate 250 bits/s.

**Operational and ground segment requirements:**

CPT will be a highly autonomous part of a payload with in-flight operations deviating from the nominal operational mode limited to occasional calibrations and software uploads. A near-real-time distribution service of quick-look data is foreseen. For this purpose an internet connection between the payload operations centre and the CPT data centre is required.

**Model philosophy:**

The model philosophy is based on a hybrid approach. As a baseline, one ProtoFlight Model will be built and subjected to the full qualification programme. In addition, however, development models and an Engineering Model for functional verification will be produced.

**Maturity:**

CPT represents a completely new design. A clear design heritage from SOHO/ERNE exists, however, but is carried further into a highly integrated design of the analog electronics and into an improved implementation of the digital logic and data processing system. The conceptual design of CPT has been carried out during the 9-month Phase-A Study.

**Industrial consortium:**

CONFIDENTIAL

**Schedule:**

CONFIDENTIAL

**Funding status:**

CONFIDENTIAL

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