

# SGRB

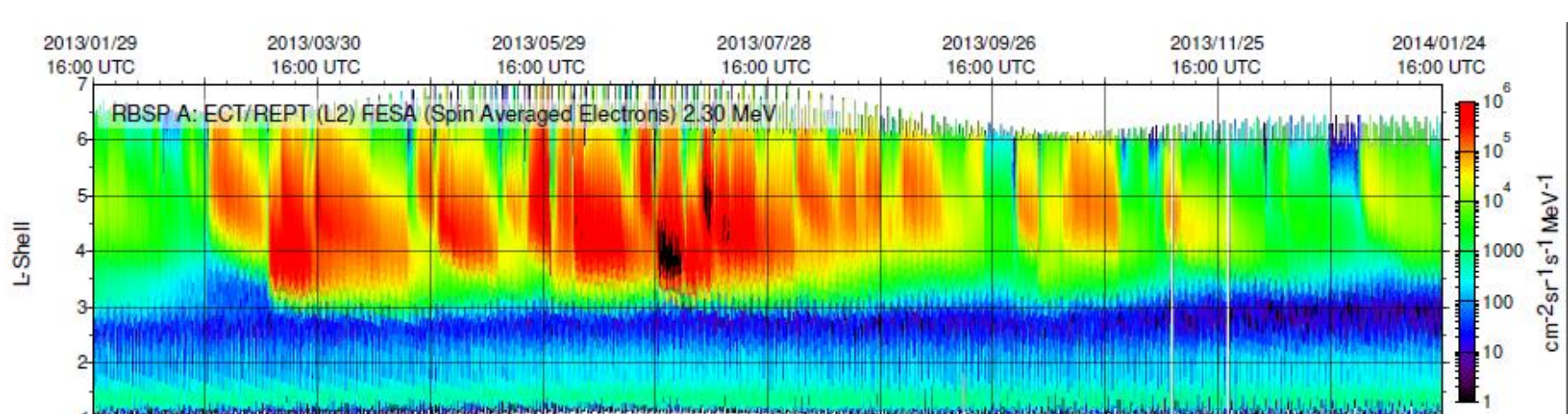
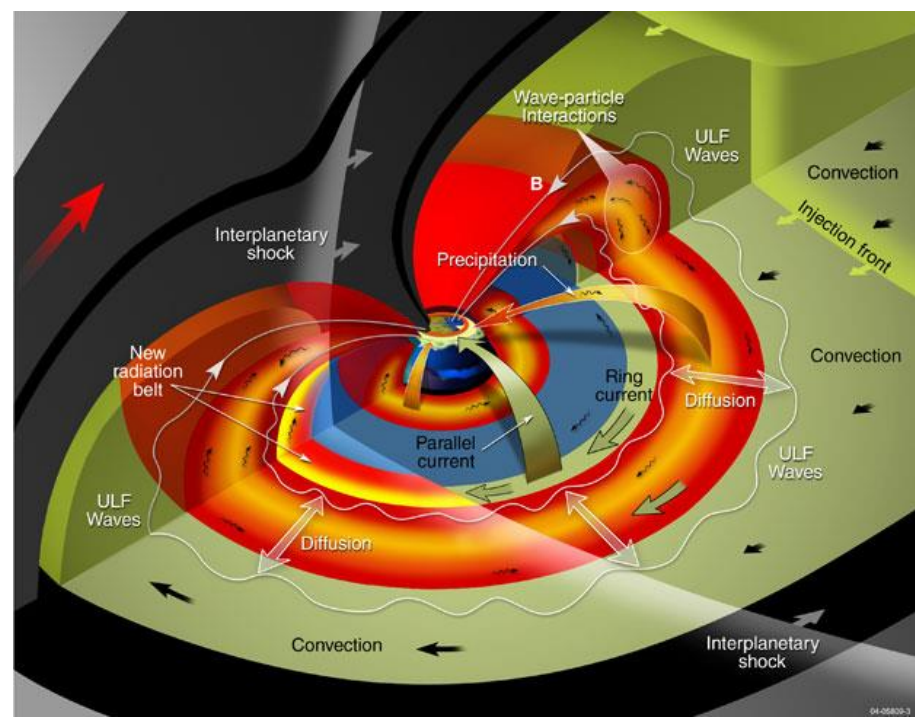
## COnstellation of Radiation BElt Survey program CORBES

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### Abstract

COSPAR established a Sub-Group on Radiation Belt (SGRB) to conduct precise observations of radiation belts with dedicated space missions. The group plans to deploy about ten CubeSat satellites flying in constellation on a highly elliptical orbit. The fleet aims to provide unprecedented high-time resolution measurements of dynamics in the Earth's outer radiation belt.

Two crucial physical processes: wave-particle interactions and radial transport (as well as magnetopause shadowing) will be studied using high energy electron detectors and magnetometers provided by group-members institutions. We present flight-spare instrumentation from previous projects allowing, after some adaptations to the mission objectives, for quick payload delivery.

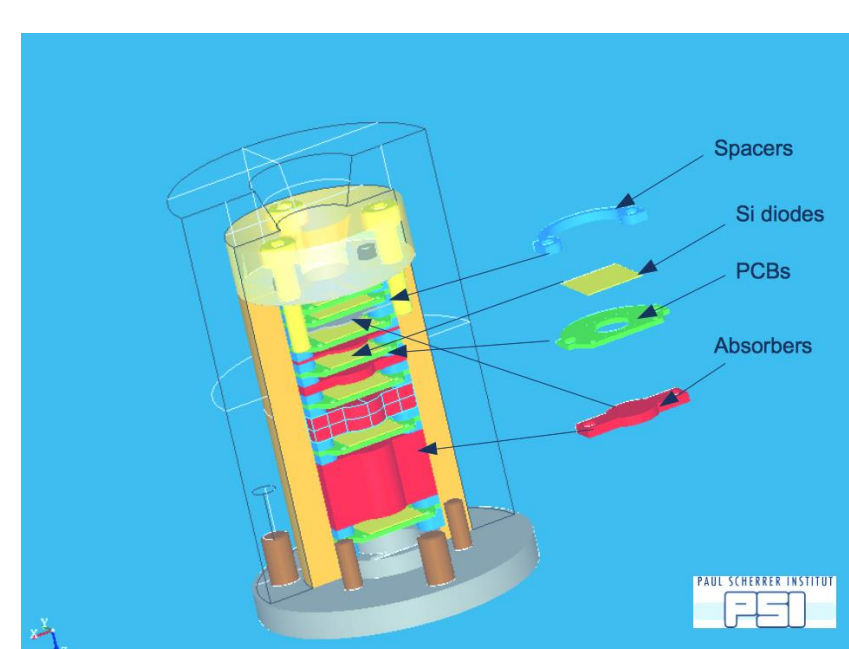
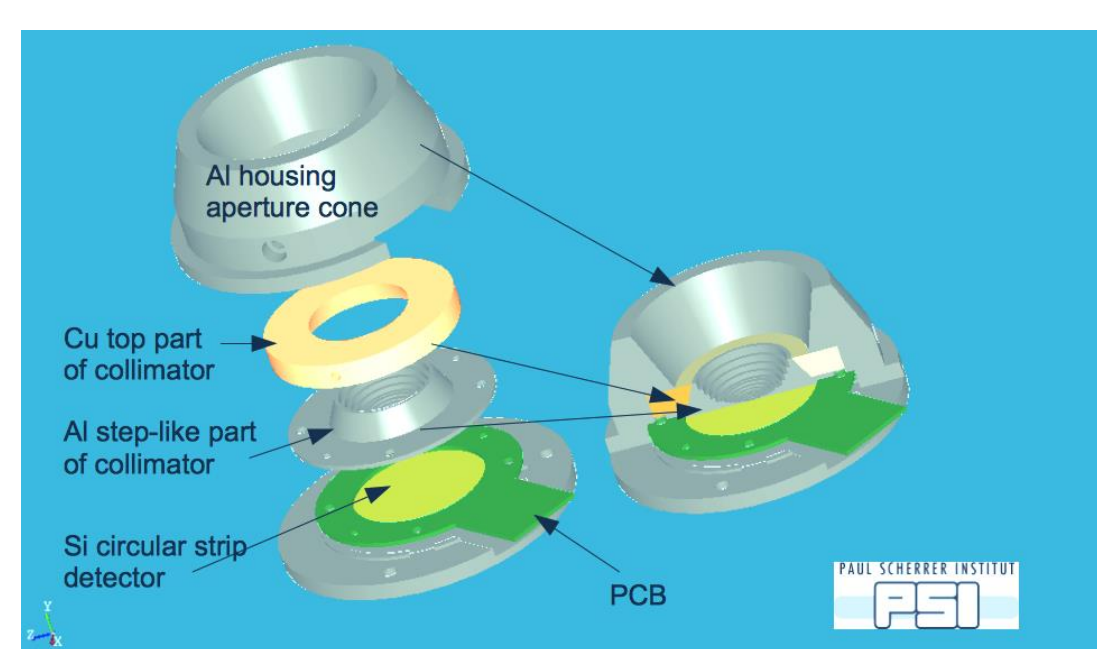
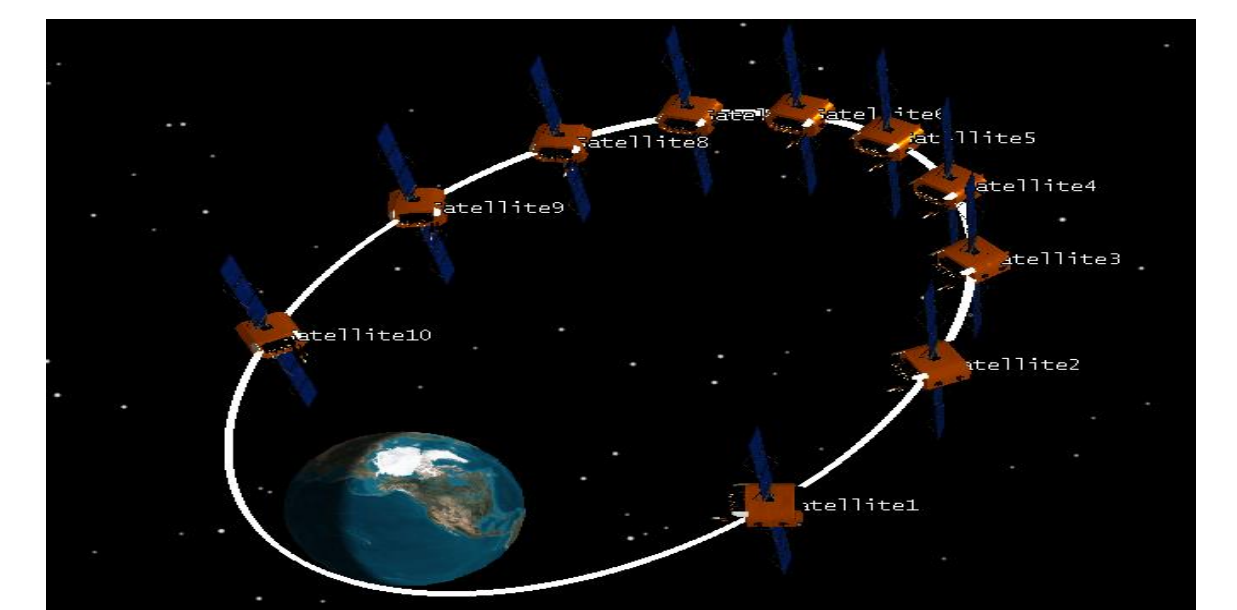
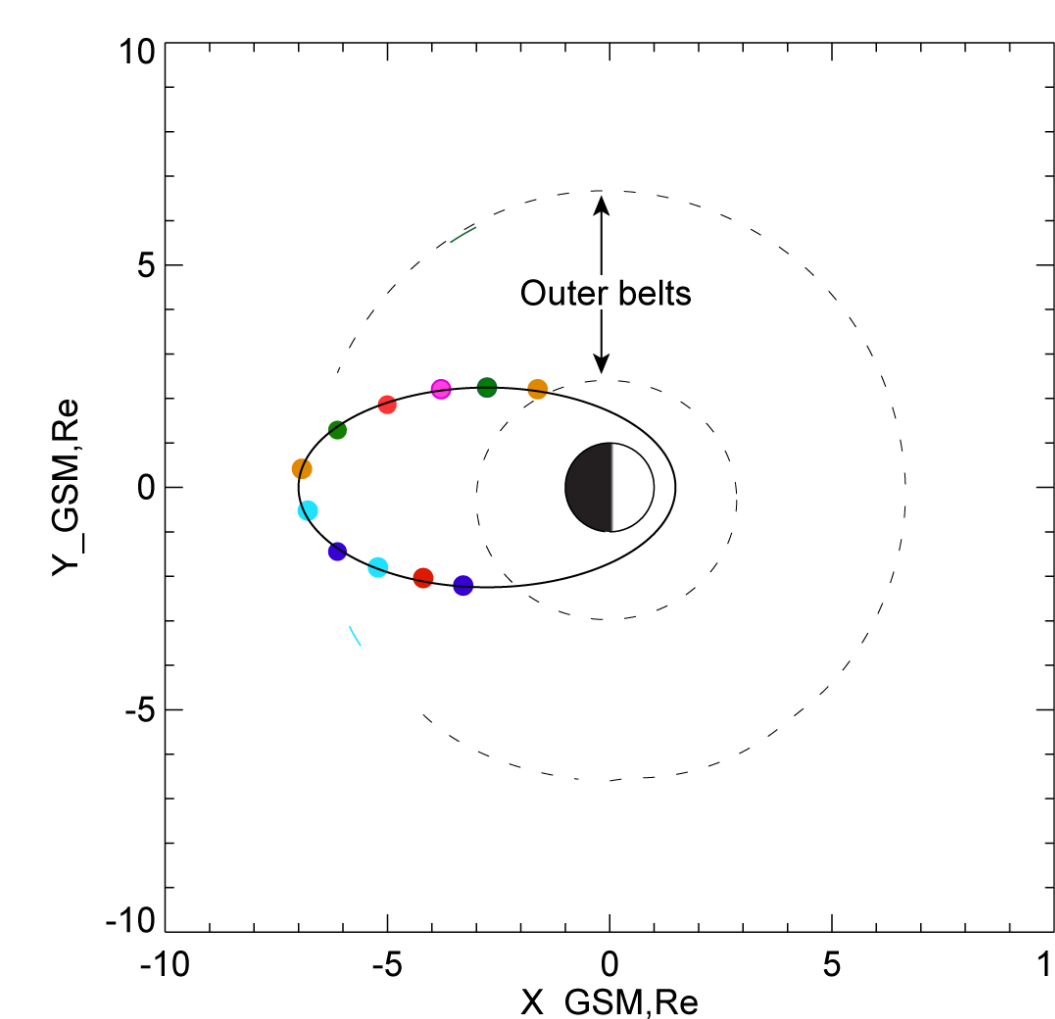


### Rationale

- Space science exploration; Space Weather and Space Situational Awareness
- COSPAR based Roadmap on Small Satellites for Space Science
- Establishing Sub-Group on Radiation Belt as large international collaboration
- Providing unique, high- time, space and energy resolution electron data
- Detailed studies of wave-particle interactions & whistler, EMIC and ULF waves
- Observations of radial transport including shock and sub-storm injections as well as storm convections, incoherent radial diffusion and shadowing

### Constellation

- Complete survey of radiation belt by the same-orbit satellites
- Fleet of 10-12+ cube-satellites operating similar instruments
- Simultaneous data taking and correlated observations
- Orbit: GTO like: 500 km – 7Re, period ca 12h, inclination ~20°
- Each partner provides one (or more) instrument
- Mission duration of about one-year; issues TID



*Standard PSI solutions will do (NGRM, RADEM) but we can adapt ready POLAR spare modules*

### Adaptation for electron detections

- Several spare POLAR modules available
- All subsystems qualified including frontends
- Full module: 60x60x230 mm<sup>3</sup>, 450g
- Only small adaptations needed
  - adding HVPS converter
  - minor changes in FW
  - replacing scintillators

### Key instruments & requirements

- Electron detector and magnetometer
- Requirements tailored to the outer belt environment
- Capable to fly on nano- or cube-satellites
- Electron energy range 0.3 – 7 MeV
- Minimum 10 energy bins (or spectra)
- Fluxes detection up to 1E8 e/cm<sup>2</sup>/s
- Time resolution ~ 10s

