



## **THOR Field and Wave Processor – FWP**

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If selected, Turbulence Heating Observer (THOR) will become the first mission ever flown in space dedicated to plasma turbulence. The Fields and Waves Processor (FWP) is an integrated electronics unit for all electromagnetic field measurements performed by THOR. FWP will interface with all fields sensors: electric field antennas of the EFI instrument, the MAG fluxgate magnetometer and search-coil magnetometer (SCM) and perform data digitization and on-board processing. FWP box will house multiple data acquisition sub-units and signal analyzers all sharing a common power supply and data processing unit and thus a single data and power interface to the spacecraft. Integrating all the electromagnetic field measurements in a single unit will improve the consistency of field measurement and accuracy of time synchronization.

The feasibility of making highly sensitive electric and magnetic field measurements in space has been demonstrated by Cluster (among other spacecraft) and THOR instrumentation complemented by a thorough electromagnetic cleanliness program will further improve on this heritage. Taking advantage of the capabilities of modern electronics, FWP will provide simultaneous synchronized waveform and spectral data products at high time resolution from the numerous THOR sensors, taking advantage of the large telemetry bandwidth of THOR. FWP will also implement a plasma resonance sounder and a digital plasma quasi-thermal noise analyzer designed to provide high cadence measurements of plasma density and temperature complementary to data from particle instruments. FWP will be interfaced with the particle instrument data processing unit (PPU) via a dedicated digital link which will enable performing on board correlation between waves and particles, quantifying the transfer of energy between waves and particles.

The FWP instrument shall be designed and built by an international consortium of scientific institutes from Czech Republic, Poland, France, UK, Sweden and Austria.