

ESA technology development plans

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- Starting
 - CIRSOS – ITT window just ended
 - Plasma induced antenna noise – negotiation
 - Detection of micro-particle impacts on spacecraft via their plasma effects, GSP – kicked-off
 - Needle Langmuir probes for SSA, 2MEuro
- Soon
 - 3-D Time-Dependent Modelling of Internal Charging in MEO and Model Validation Through Experiment, TRP T604-301EE, 150kEuro, 2013
 - SPIS Developers kit, 30kEuro, 2013 (maintenance budget)
 - Interoperability for space environment analysis tools TRP, 200kEuro, 2013

- Proposed
 - Phase C/D Compact Hot Plasma Monitor, GSTP ID 1372, 1.4MEuro, 2014 (proposed)
 - ESD Monitor, GSTP ID: 1407, 500kEuro 2013 (proposed)
 - C/D development of magnetometer for solar wind monitoring missions, SSA 500kEuro (proposed)
 - Implementation of hosted payload units, SSA 2MEuro (proposed)
- What more is needed?
 - E.g. Galileo environment (EMU and other analysis)

CIRSOS – Collaborative Iterative Radiation Shielding Optimisation System



- The objectives of this activity are to reduce radiation shielding mass through a system that efficiently supports collaborative industry and instrument provider shielding analyses, providing configuration controlled geometry and shielding data, reliable interfaces with company (prime and unit provider) processes, and high speed validated physics simulation, implementable on low cost scalable computing resources.
- Budget 500k
- Proposal(s) in evaluation

Plasma induced antenna noise spectroscopy for space weather monitoring



- The objective of this study is to evaluate the applicability of the Antenna Noise Spectroscopy Technique to perform plasma parameters (electrons density, temperature) / space weather oriented measurements which have specific requirements in the context of the SSA application program. Such measurements are needed in the solar wind, the magnetosphere and the ionosphere during both quiet and disturbed periods.
- In this context, it is proposed to investigate whether potential platforms identified for future SSA instruments piggy-backing deployment can fulfill the measurement requirements using existing onboard structures such as non plasma dedicated antennae, booms, solar panels, etc ...
- Budget 100kEuro

3-d time-dependent modelling of internal charging in MEO and model validation through experimental comparisons



- TRP 2013
- Objective: To create and validate a time-dependent 3-d internal charging code for application to the high electron flux environment of MEO navigation satellites.
- A preliminary study is generating limited 3-d modelling capability for internal charging using the GEANT-4 radiation transport code and elements of the SPIS spacecraft charging code. This first step will address the steady state case but will have limited capabilities for time dependent solutions.
- It is proposed to extend the capability of this new tool to calculate time-dependent electric fields and currents.
- Validation of the code will be required and this will be performed via experimental simulations

Deliverables: Software Budget (in kEuro): 150

SPI S Developers kit



- Under maintenance budget 2013 (provisionally)
- Update developer's manual
- Provide developer's course

Deliverables: documentation and course Budget (in kEuro): 30

Interoperability for space environment analysis tools



- TRP 2013
- Improve the interoperability of GEANT4, SPIS and ESABASE2 as well as other industry space environment and effects tools, and provide for their integration in space system end-to-end design.
- Particular attention will be given to those tools which need a detailed geometrical model of the system. The activity will consolidate and further extend the recently developed STEP-SPE protocol, updating it in line with the latest STEP-TAS protocol and creating a truly open source version.
- Budget 200kEuro Procurement policy C(1)

Phase C/D Compact Hot Plasma Monitor



- GSTP 2014 (proposed)
- Under TRP contract 106680, a breadboard development of a new type of plasma monitor is being carried out.
- The monitor is needed for spacecraft charging effects but also able to supply data for environment modelling and space weather monitoring.
- In phase C/D the detector and electronics will be developed with the goal of 15years lifetime in geostationary orbit.
- Relevant qualification testing including radiation, vibration, shock and thermal testing will be performed.

Deliverables: PFM

Budget (in kEuro): 1400

- GSTP 2013 (intended)
- A monitor will be developed to measure the amplitude and characteristic time-scales of electrostatic discharge (ESD) transients directly in spacecraft electrical systems.
- The operation will be verified by realistic irradiation experiments looking at both surface and internal charging.
- The result will be the monitor equipment itself and the characterization of realistic ESD transients to be used in defining requirements for ESD testing of future systems.

- A compendium of potential activities is being circulated to industry and delegates in advance of workplan confirmation. (in EMITS)
- Interest should be expressed to national delegates before May IPC
- Budget (in kEuro): 500