# CNES Activities & Plans

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Outline

- **Materials in a charging Space environment**
  - Facilities
  - Testing
- **Arcing on Solar array**
  - Secondary arcing test set-up; Flashover measurement
  - ISO : Nedo participation
  - Aging effect
- **ESD Physical model**
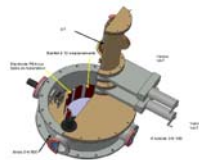- **Low energy Space data analyse**
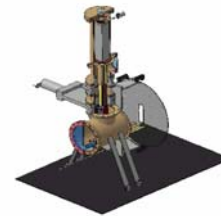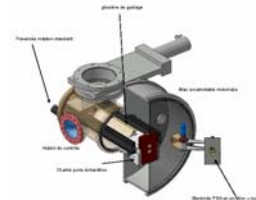- **Amber sensor**

Facilities improvement

■ **SIRENE facility**

   ◆ **Development of a new sample holder Wih or without PEA measurement**
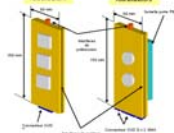
   ◆ **Development of a sample transfer Unit under vacuum**
   ◆ **Development of a Sample storage Unit under vacuum**

   ◆ **The objective is to let under vacuum samples for life**

Materials in a charging Space environment

■ **Material tests**

   ◆ **Long duration relaxation under vacuum**
   ◆ **Conductivity under realistic charging environment**
   ◆ **Temperature influence**
   ◆ **Tests of new material under development**
   ◆ **PEA (ElectroAcoustic Pulse) measurement**

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Arcing on Solar array

- **Long distance triggering (influence of the test set-up)**
- **Flashover measurement on large sample (10 to 12m²)**

- **Representativity of flashover propagation with plasma tests**
- **Expertise and standardisation**
    - ◆ ISO : Nedo participation – Aging type C coupon
- **Aging effect; extra power loss have been seen on LEO spacecraft, possible ESD aging effect will be studied**

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## ESD Physical model - Testing

- **Secondary emission**
    - ◆ **Adaptation of a MEB for secondary emission measurements. CNES/ONERA/INSA-Toulouse study for implementation of in a facility in the CNES quality department**
- **Optical spectroscopy**
    - ◆ **Objective is to see all the different phases of a discharge, to understand what happens and to learn when short-circuit start (Kapton pyrolise)**
- **Study of specific geometry**
    - ◆ **Semi grouted gap**
    - ◆ **Over covering coverglass**
    - ◆ **Thermal effect of a discharge**

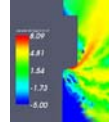**ESD Physical model - Modelling with SPIS**

■ **Modelling IVGD in a cell gap with SPIS CRIL-ALYOTECH**

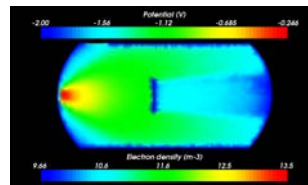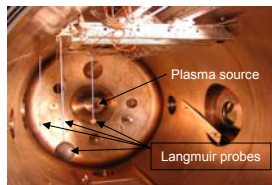◆ **Study of specific geometry taking into account surface conductivity**
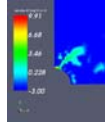
- Semi grouted gap
- Over covering coverglass

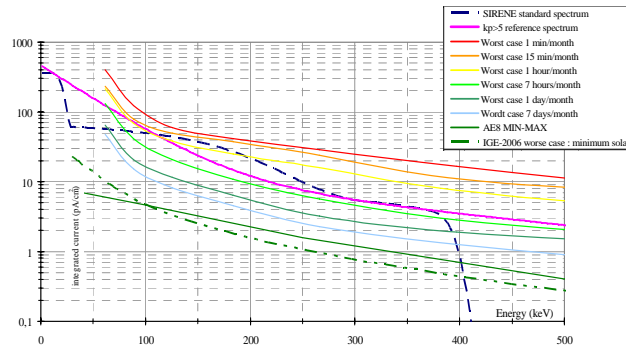◆ **Modelling vacuum test systematically for better understanding**

Plasma source

Langmuir probes

■ **French/Japanese cross calibration MUSCAT-SPIS**
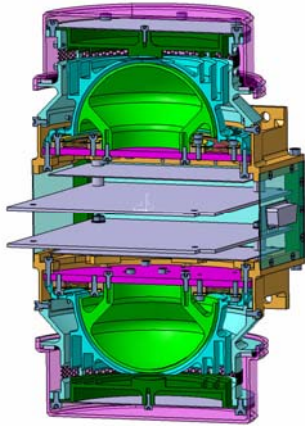
◆ **Plasma interaction with a surface, Ram effect**

Low energy Space data analyse

■ **Analyse LANL data to have worst case environment for 1keV-50keV charging particles**

■ **Worst case are defined 1% of the time, 3% of the time, …..**

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AMBER Sensor

- **Analyse and Measurement on Board of Electrostatic Risk**
  - ◆ **Electron and Ion head should be defined this year**
  - ◆ **Budget for a light and low consumption model have been asked for 2OO8. CDR done.**

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SPIS Activities

- **Study of the feasibility of SPIS-GEO (ARTENUM 23k€).**
- **CNES-ESA funding for SPIS**

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Future requirement

- Setup a SPIS licence including install & maintenance (ARTENUM 10k€/year)
- Develop and maintain French modelling capability in a little company for space application (CRIL ALYOTECH 20k€/year)