

**ESA-CNES Final Presentation Days on Space Environments
and Radiation Effects on EEE Components**

CNES CONTRIBUTION TO RADIATION EFFECTS ON EEE COMPONENTS SESSION

Françoise BEZERRA

*Space environment and new components office
DSO/AQ/EC*

March 8th, 2017

ESTEC, Noordwijk, the Netherlands



ALREADY 10 YEARS OF COLLABORATION AND EXCHANGES

May 2005 - 7th QCA Final Presentation Day & RADECS workshop on facilities
RADEF, Jyvaskyla, Finland



The idea of ESA/CNES RFPDays is adopted

January 2007 – UCL, Louvain la Neuve, Belgium

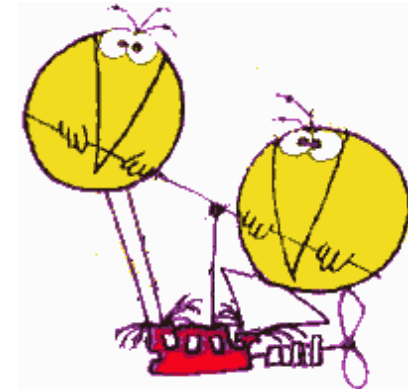
January 2009 – PSI, Villigen, Switzerland

March 2011 – ESA/ESTEC, Noordwijk, The Netherlands

June 2013 – ESA/ESTEC

March 2015 – CNES (CLS), Toulouse, France

March 2017 – ESA/ESTEC



2019... CNES (Toulouse TBC)

CNES CONTRIBUTION TO RFPDAYS PART « RADIATION EFFECTS »

Recently finished or on-going studies.



CNES CONTRIBUTION TO RFPDAYS PART « RADIATION EFFECTS »

Technology evolution
New missions constraints

New effects
Detection/circumvention techniques

Sample preparation difficulties
Radiation facility availability



Better knowledge on basic phenomena

Suggest improvements on:

- Radiation test methods
- RHA techniques (calculation, circumvention)

Main goal: give the most accurate and complete answer to users.

2015-2017 RESULTS

New phenomena:

- Electron induced SEE
- Proton induced SEE by direct ionization
- Weakened cells/ Intermittent Stuck Bits

Calculation improvements

- TRADCARE Tool for SEE prediction
- Recoil atom flux calculation

Investigating new RHA techniques:

- Effect of preliminary multiple write cycles on Nand Flash memories radiation behaviour.

Test facilities

Special thanks to:

- Ali Zadeh
- Véronique Ferlet-Cavrois
- Alessandra Costantino
- Marco Vuolo
- Robert Ecoffet
- Reno Harboe-Sorensen

- ...and all contributors.