# WP07-JRA3, Cumulative radiation effects on electronics - Results of task 7.3: TNID

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https://indico.cern.ch/e/radnext-2023

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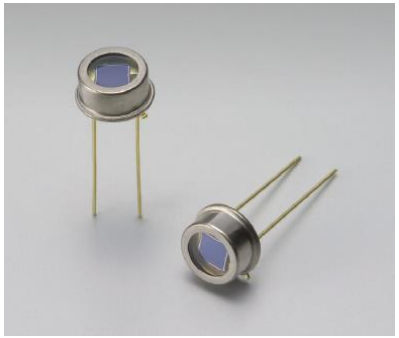
# WP7.3: Study of TNID effect (ISAE-SUPAERO)

**Objective:** Evaluate the relevance of the use of Si p-n junctions and the visible pixel array as a total non-ionizing dosimeter to compare facilities

1st sub-task (7.3.1): Study the effect of the displacement damage on the silicon p-n junction leakage current



HAMAMATSU S1223

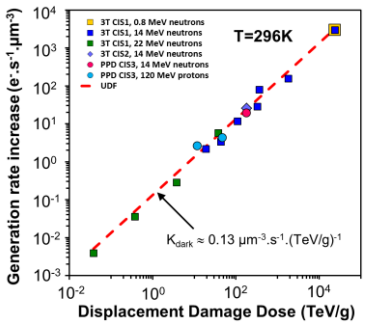
Irradiation of commercial samples with:
-> neutrons (effect of dose rate, biasing, annealing)
-> low energy electrons (cluster defect generation regime)
-> high energy electrons (point defect generation regime)
-> mixed particles environment

Measurement of the I(V) function at different points in time before and after the irradiation (1 week, 1 month, etc…)

**At the same neutron-equivalent fluence**
**Target dose: 400 TeV/g**
**⇔ $2.10^{11}\ 1MeVn_{eq}/cm^2$**

We expect **linear dark current increase with the DDD**

If the I(V) function is consistent with each sample at the same fluence
-> Same measurement but with different fluences




C. Virmontois et al., IEEE TNS Aug. 2012

# WP7.3: Study of TNID effect (ISAE-SUPAERO)

**Objective:** Evaluate the relevance of the use of Si p-n junctions and the visible pixel array as a total non-ionizing dosimeter to compare facilities

2nd sub-task (7.3.2): Study the effect of the displacement damage on silicon based pixel arrays

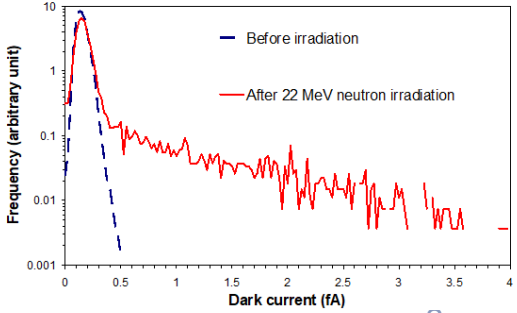

SONY IMX 219

Same irradiations as with the photodiodes HAMAMATSU S1223 but with the SONY IMX 219

Instead of looking at the I(V) function, we will look at the **dark current distribution**, especially its « tail »

We expect an **increase of the « tail »** of the distribution with DDD →

If the I(V) function is consistent with each sample at the same fluence
-> Same measurement but with different fluences




**Pre-irradiation test campaign on-going, first irradiation targeted for mid-2023**

# Thanks for your attention!

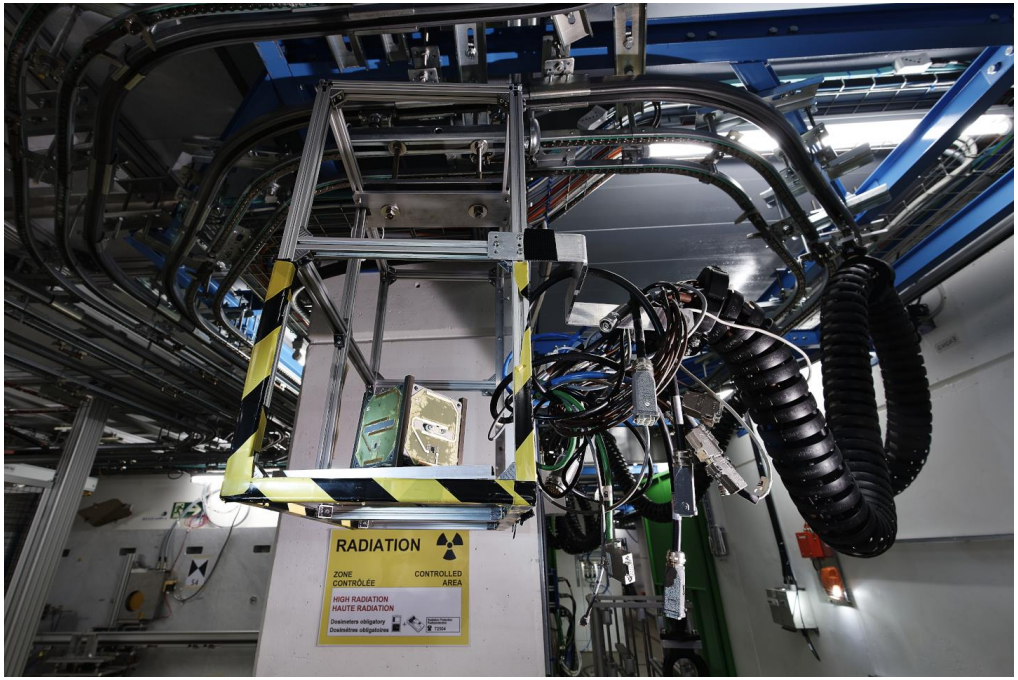



*Image Source: CERN*