

Radiation induced single events and cumulated dose effects on CMOS and InGaAs image sensors

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Space applications can benefit state of the art performances with **commercial of the shelf (COTS) CMOS image sensors**.

They are low cost, but they need a full **environmental qualification** campaign. The **radiation tests** are of particular importance.

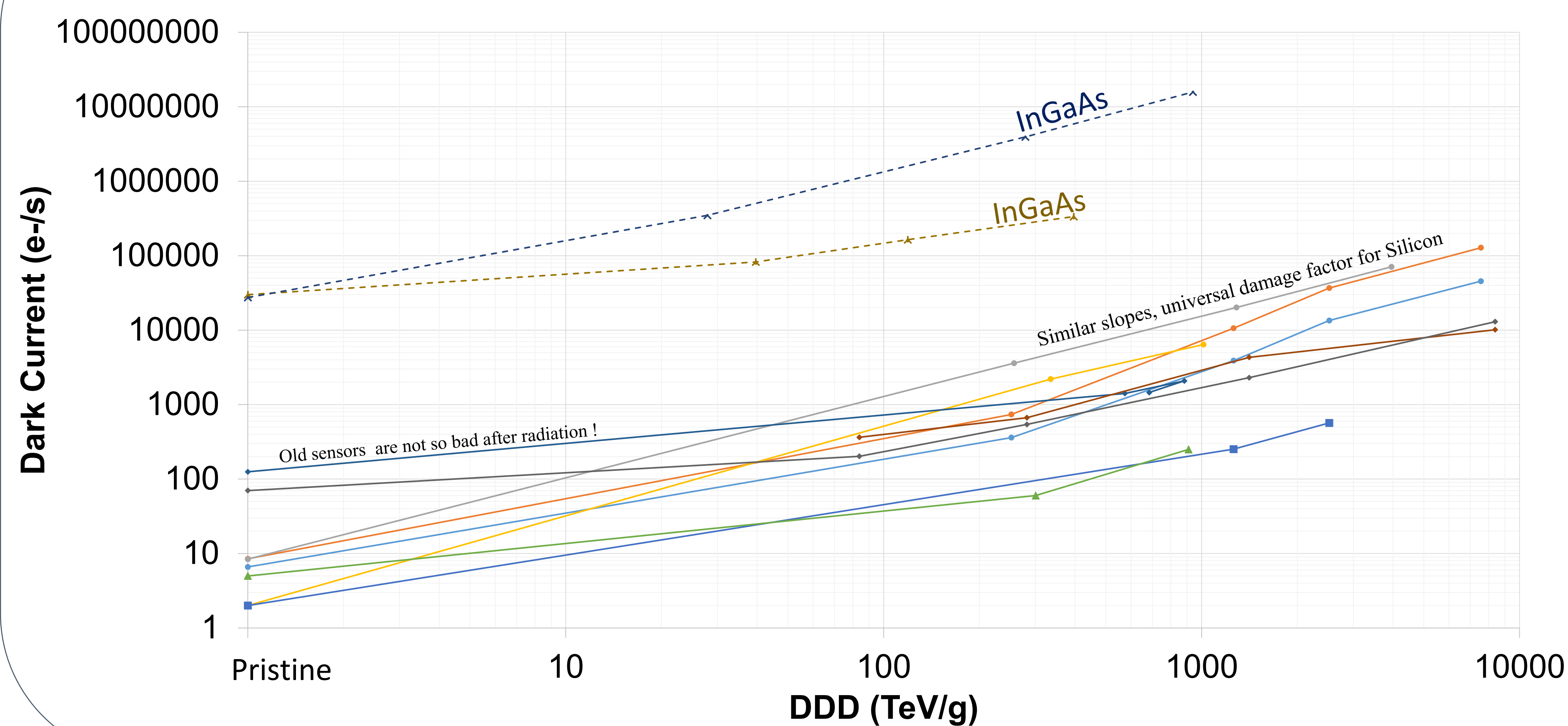
Radiation effects include :

- **Displacement Damage Dose** effects (DDD)
- **Total Ionizing Dose** effects (TID)
- **Single event effects** (SEEs)
 - Destructive : Single Event Latchup (SEL)
 - Single Event Functional Interrupts (SEFI) caused by SEU, MBU, μ latchup ...

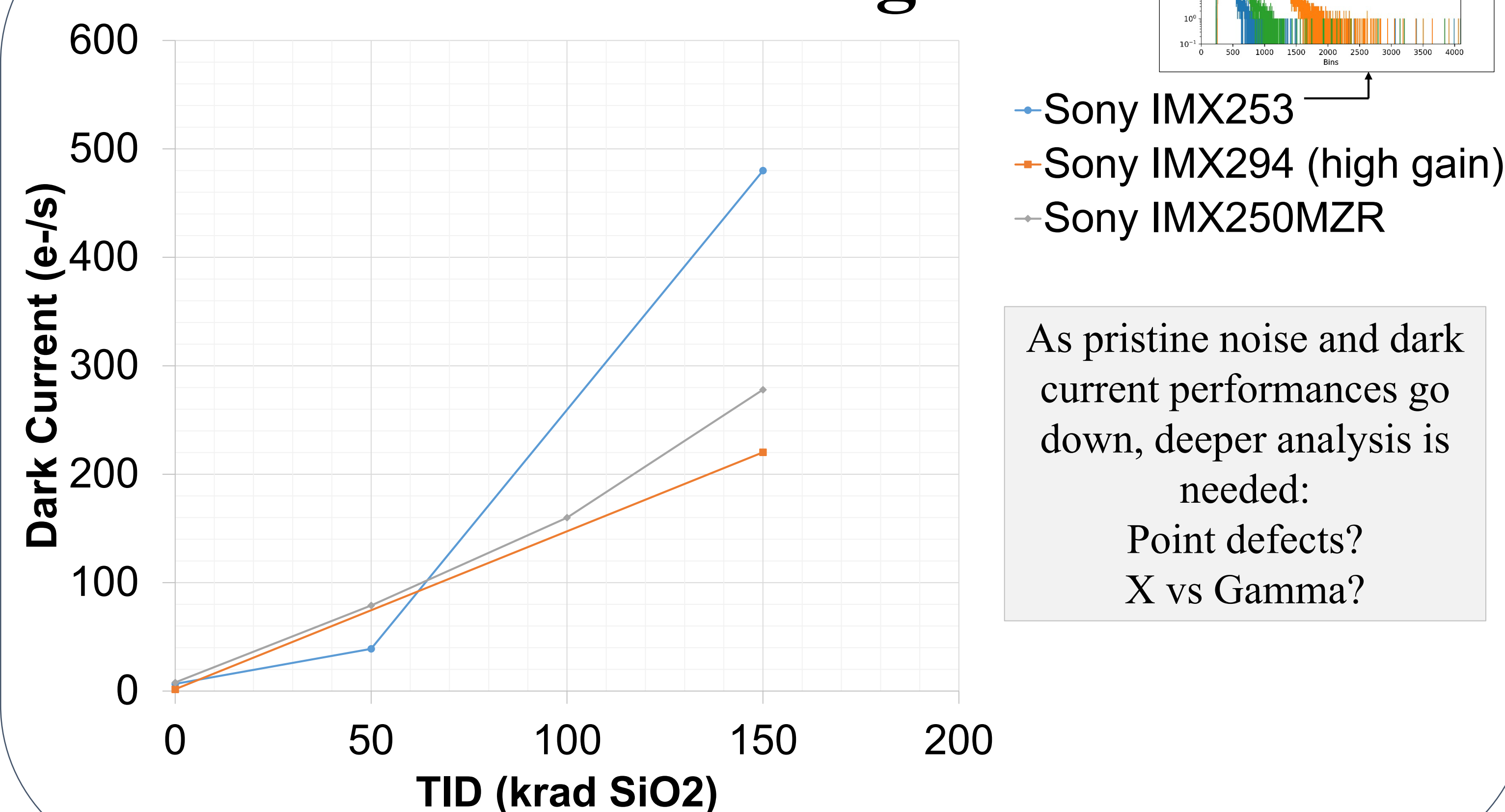
Cumulative dose effects degrade the performances.

The main degradation is the dark current. Spatial noise, temporal noise, and non-uniformities can also be impacted. Often, there is negligible CVF and QE change pre and post-irradiation.

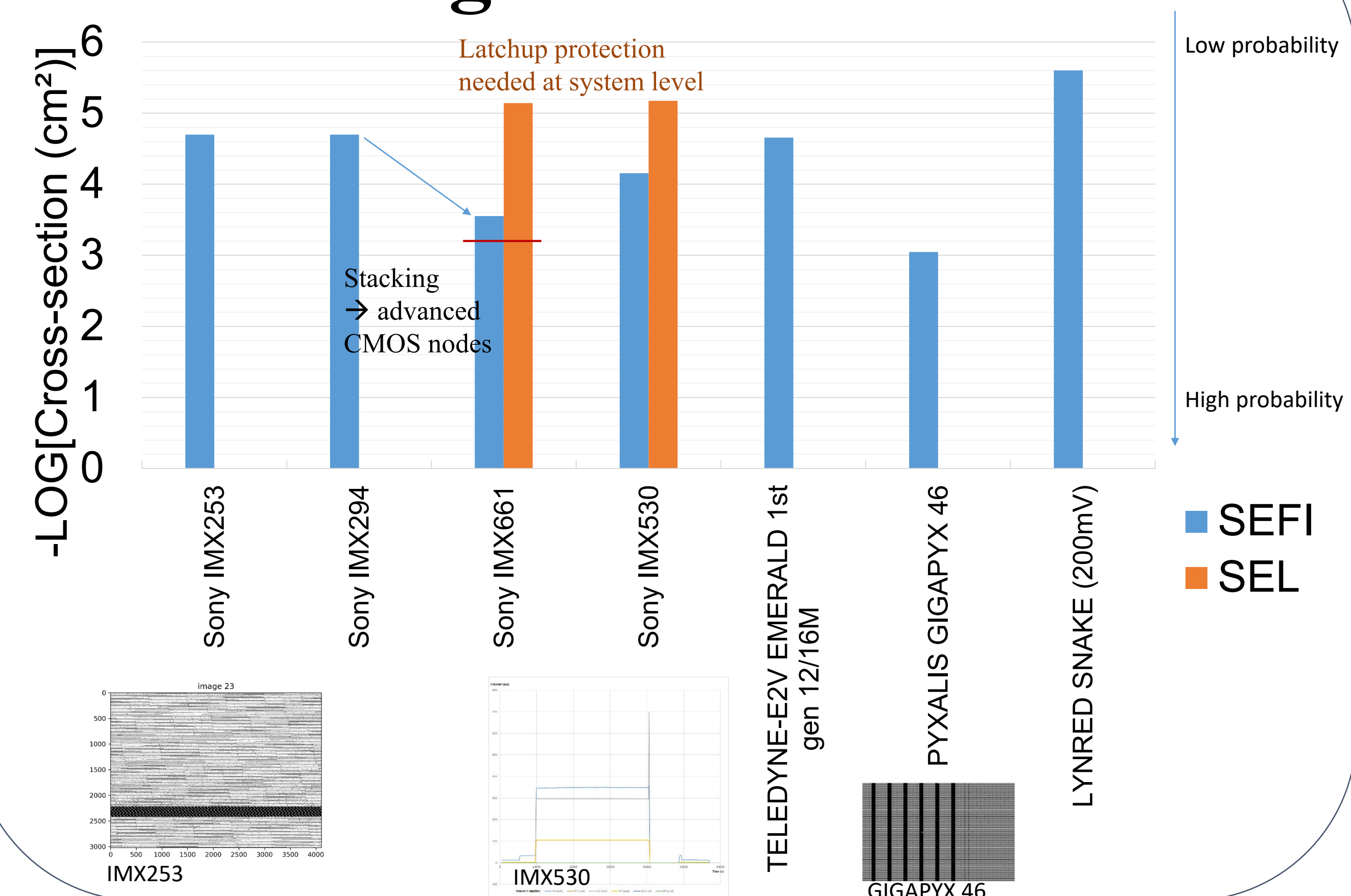
Displacement Damage Dose (Room Temperature, unbiased)



Total Ionizing Dose



Single Event Effects



The wide range of commercial products makes complete COTS testing impossible for pre-qualification of generic missions. Technological and performance considerations can help narrow down the list of parts to be tested (foundry, technology node, pixel size ...).