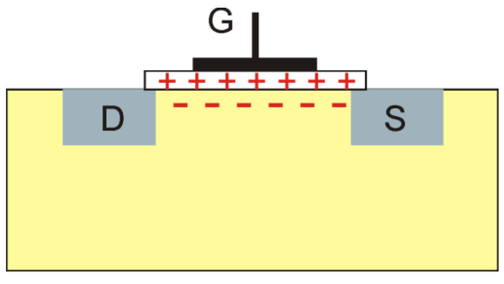
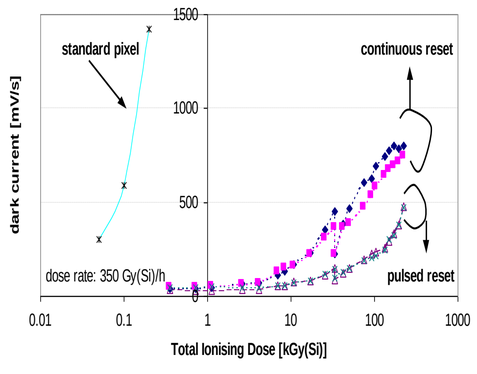
RELIABILITY OF ELECTRONIC CIRCUITS EXPOSED TO RADIATION

Radiation = gamma rays, particles (protons, heavy ions) in specific environments (e.g. space)

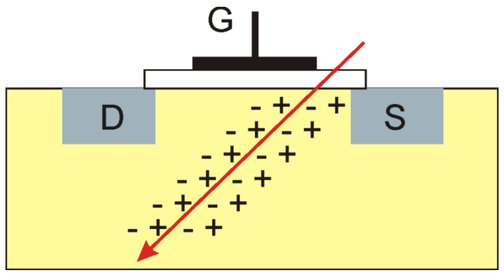
Effect on reliability of electronic circuits:

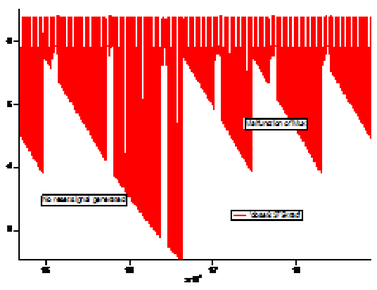
Total Ionizing Dose = slow device degradation due to cumulative charge build-up





Single event effects = temporary trail of charges causes faulty (typ. digital) electronics operation

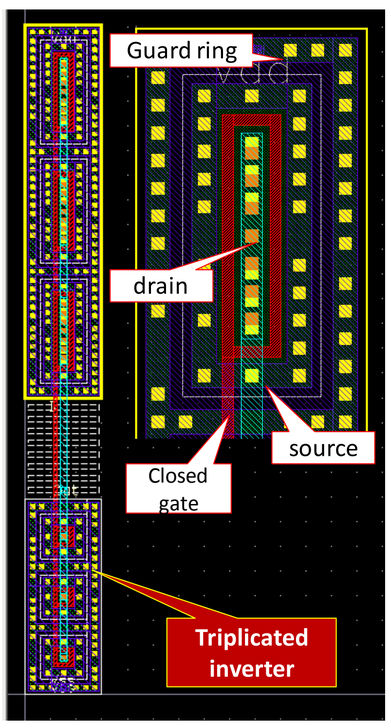




Expensive and non-flexible solution: develop dedicated CMOS technology

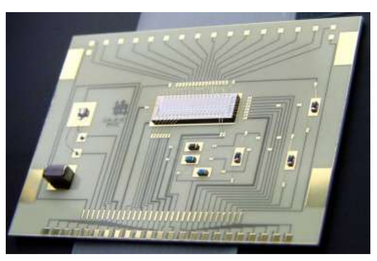
Imec solution: use standard CMOS technology and dedicated radiation tolerant design:

- **By layout: dedicated transistor shapes**
- **Using dedicated architectures and redundancy in digital circuits**



Results:

- **Cryogenic radiation hard read-out electronics for PACS instrument on the Herschel satellite**
- **DARE180 (0.18um) radiation hard library free use for European space industry**



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