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Accelerated radiation hardness qualification of CMOS image sensors

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Imaging relativistic electrons in electron microscopy induces radiation damage in image sensors and detectors that dictates the life time of such devices.
Radiation hardness qualification is a destructive test that potentially raises as many questions as it answers.
This work discusses the challenges and presents a characterization of accelerated radiation hardness qualification, to dozens of MRad on CMOS image sensors. The linear relation between fluence and damage per unit time is challenged and the effect of acceleration of relaxation processes is considered, to highly increase the fluence and test throughput.
We show how radiation damage manifests in an image sensor and how exposure and relaxation are balanced for a repeatable qualification.
Understanding and controlling test acceleration opens opportunities to optimize costly system tests and improve product quality.

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