Abstract: Radiation test results of Intel state-of-the-art 14nm "Broadwell" U-series processor / System-on-a-Chip (SoC) for total dose are presented, along with exploratory results from trials at a medical proton facility. Investigation builds upon previous collaborative efforts [1] by utilizing commercial laptop motherboards and software stress applications as opposed to traditional automated test equipment (ATE).

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total dose readings more that normal

Proton Test Results

Three types of Single Event Effects (SEE) generally observed

- System Cores (Fast Errors (FE))
- Recoverable Errors (Fast-Fail Errors (NFE))
- Non-System Cores: Voltage (V) or Current (I) transient failures

Contra: These are rough results
- Compared test times and statistics
- Test methods and facility interactions undergoing refinement

For core single cycle testing, the DUT was lead insensitive to any errors:

- FE Cross Section: 2x10^-8 cm^2
- NFE Cross Section: 3x10^-5 cm^2

Both types of stress tests, the DUT exhibited more variability:

- FE Cross Section: 10^-7 cm^2
- NFE Cross Section: < 3x10^-9 cm^2

Regarding Non-Fatal Errors:

- Generally appeared in conjunction with Graphical Glitches
- Possibility exists within fault mitigation block
- Caches (L1 and L2) in Intel Xeon Phi processors were not tested due to the high number of power, voltage, and temperature readings...