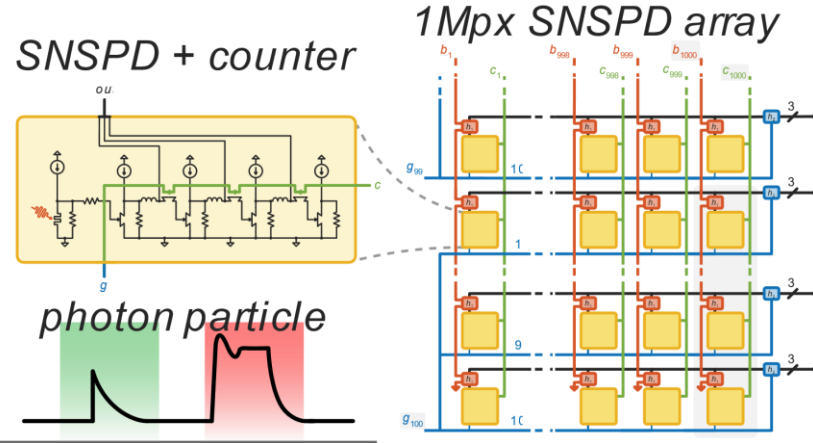


Radiation Hard Superconducting Detectors and Electronics

PI: Karl Berggren, Massachusetts Institute of Technology



Design of a megapixel array of SNSPDs with integrated nanowire electronic ROIC for long-term space applications

Research Objectives

- Understanding and developing strategies to mitigate the fundamental mechanisms and impact of long-term radiation exposure on superconducting-nanowire devices.
- Understanding and developing strategies to mitigate single-event upsets (SEUs) in the nanowire detectors and readout electronics

Approach

- Study long-term effects of TID on superconducting nanowires using highly controlled helium ion beam.
- Mitigate TID effects using new material or fabrication processes.
- Study single effect upsets in superconducting nanowire detector and electronic subsystems using a radioactive source.
- Mitigate SEUs in both subsystems through post-processing or redundant ROIC architectures.

Potential Impact

- Radiation hard single-photon detector and integrated electronic readout.
- An entirely superconducting, passively cooled, ultra-lightweight, ultra-low-power spacecraft