NASA SBIR/STTR Technologies

Tissue-equivalent radiation dosimeter-on-a-chip

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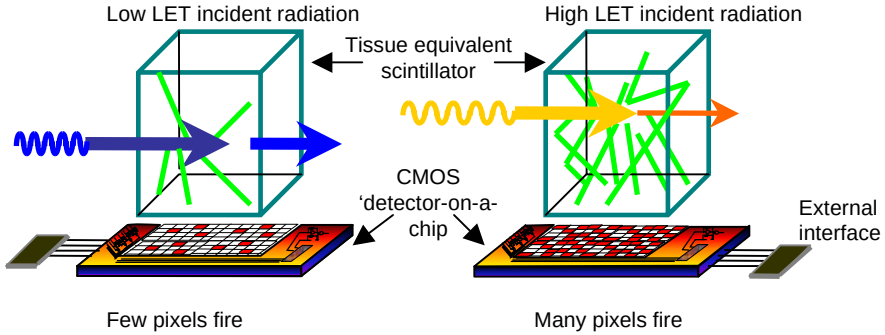
Identification and Significance of Innovation

- Dosimetry is best with tissue equivalent scintillators but current read-out methods are incompatible with space flight;
- An array of photodiodes that count individual photons provides a low-noise, high-gain solution;
- CMOS platform provides compact, integrated sensor system with low power consumption.



Technical Objectives

- Investigate the optimal design of an SSPM consisting of an array of CMOS Geiger APD pixels;
- Investigate the response of a small scintillation crystal coupled to a prototype SSPM;
- Examine the output from this detector across a range of relevant electromagnetic radiation at different operating temperatures .

Work Plan

1. Survey existing pixel designs and model dosimeter/rate-meter performance;
2. Design and fabricate prototype chip;
3. Characterize dosimeter elements;
4. Characterize prototype with space equivalent radiation at NSRL.

NASA Applications

• Immediate rate and total exposure information recorded during a mission including sensor webs measuring many areas simultaneously.

• Ground-based radiation monitoring research such as at the NASA Space Radiation Laboratory at Brookhaven National Laboratory.

Non-NASA Applications

Inexpensive radiation dosimeters for commercial personnel or waste monitoring, border monitoring for homeland security. The ability to inexpensively mass-produce these devices creates a entirely new market for arrays of distributed sensors.

Contacts

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