NASA SBIR/STTR Technologies

Tissue-Equivalent Radiation Dosimeter-on-a-Chip

PI: James Christian, Radiation Monitoring Devices, Inc., Watertown, MA

Grant No: NNJ08JA55C

Identification and Significance of Innovation

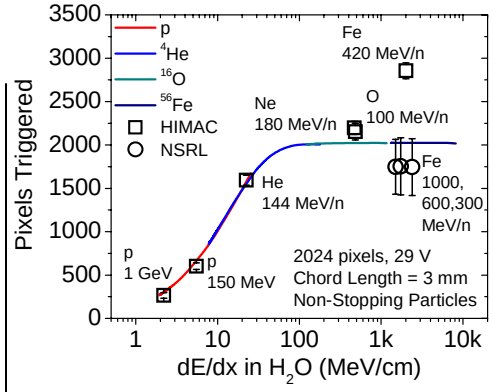
- Space-flight requires reliable, fault-tolerant equipment capable of providing real-time dose readings during a mission to alert crews of hazardous changes in the radiation environment.
- Existing radiation monitors used in space flight either are too bulky or do not provide real-time personal dosimetry.
- Tissue equivalent scintillator coupled to a CMOS solid-state photomultiplier will provide an active, light weight dosimeter within a small form factor.

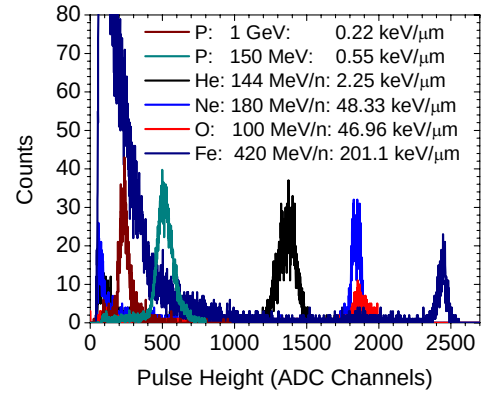
Technical Objectives

- Optimize detector parameters for space applications.
- Determine signal and data processing electronics suitable for space environments.
- Meet certification requirements for space operational use of the dosimeter.

Work Plan

1. Simulate detector response to space radiation environment.
2. Specify requirements and design DoseChip, radiation detector with digital readout.
3. Fabricate DoseChip using existing CMOS technology.
4. Evaluate radiation detector at NASA test facility.
5. Formalize DoseChip detector response functions.
6. Design and fabricate micro-data acquisition module within a small form factor.
7. Construct tissue equivalent dosimeter with compact, light weight design and evaluate at multiple test facilities.





NASA and Non-NASA Applications

For NASA, these lightweight, compact and inexpensive sensors can provide real-time rate and integrated dose information for area monitors, personal dosimeters, solar particle monitors, and radiation monitors on NASA satellites.

Non-NASA applications include personal dosimeters for waste monitoring, border monitoring for homeland security, protection protocol for satellites and ground based equipment from solar flares, and radiation monitors for high altitude flights and space tourism.

Contacts

Dr. James Christian, PI, RMD Inc.	617-926-1167
Dr. Eric Benton .Oklahoma State University	405-744-2508
Mr. Edward Semones, CORT, JSC	281-244-5107