CRESSE
PRAIRIE VIEW A&M UNIVERSITY

Center for Radiation Engineering and Science for Space Exploration

Space Radiation Shielding Studies for Astronaut and Electronic Component Risk Assessment

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COSPAR 2010
07-24-10

National Aeronautics and Space Administration

Acknowledgements

CREESE –

Grant #: NNX08BA46A

NASA 2010 COSPAR sponsors
Ellen Chadwick – NASA
Althia Harris – NASA
Mabel Matthews - NASA

Outline

1. The space radiation environment
2. Components of the space radiation environment
3. Developing and testing materials
4. Developing and maintaining a database
5. The categorization process
6. Density thickness measurements
7. Tissue Equivalent Proportional Counter
8. Silicon Equivalent Proportional Counter

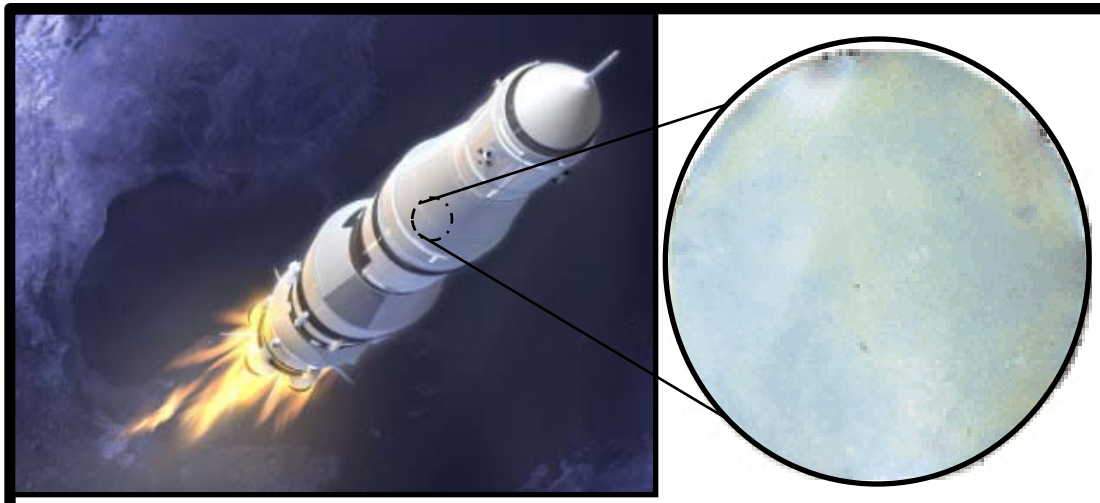
CRESSE

The dosimetry component of the Center for Radiation Engineering and Science for Space Exploration (CRESSE) will design, develop and characterize the response of a suite of radiation detectors and supporting instrumentation and electronics with three primary goals that will:

(1) Use established space radiation detection systems to characterize the primary and secondary radiation fields existing in the experimental test-bed zones during exposures at particle accelerator facilities.
(2) Characterize the responses of newly developed space radiation detection systems in the experimental test-bed zones during exposures at particle accelerator facilities, and…
(3) Provide CRESSE collaborators with detailed dosimetry information in experimental test-bed zones.

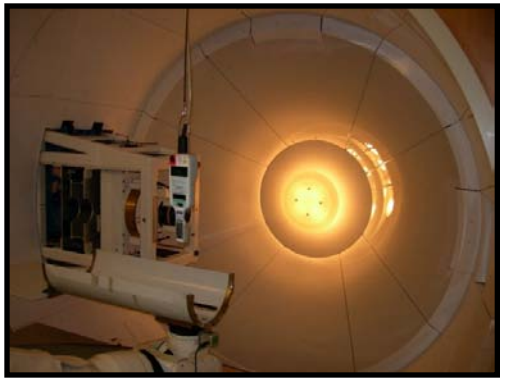
T.P.E.C. -Tissue Equivalent Proportional Counter

Radiation Shielding



Space Radiation Shielding

Space radiation can be highly penetrating, so optimized shielding is essential for crew health and safety.



Immediate Plan . . .

Organize Shielding

Organize, verify, and catalog the wide variety of existing shielding materials that have been used in previous space radiation shielding research studies. Prepare these materials for future experiments.

Organizing CRESSE Shielding Materials

Excel Catalog Sheet

My studies and familiarity of each shielding material is essential for me to create a database to keep record of each shield both past and present, it's current location, and density thickness of each.

Types of Shields

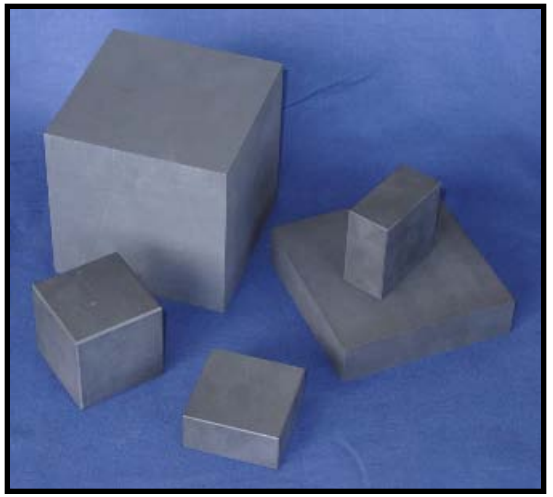
Verifying Materials
at CRESSE Lab

Categories of Shielding Materials

Standard Materials
- Aluminum
- Titanium
- Polyethylene

Multi-Functional Materials:
- Carbon Composite
- Spectra Fiber Composites
- Epoxy Composites

“Exotic” Materials:
- Carbon Nanotube Composites
- Protein matrix Gel Blocks



Carbon Shields

In the future…..

Begin to apply practical knowledge of space radiation physics and dosimetry to shielding experiment planning.

Participate in space radiation shielding experiment at particle accelerator facility such as the NASA Space Radiation Laboratory (NSRL) at Brookhaven National Laboratory.

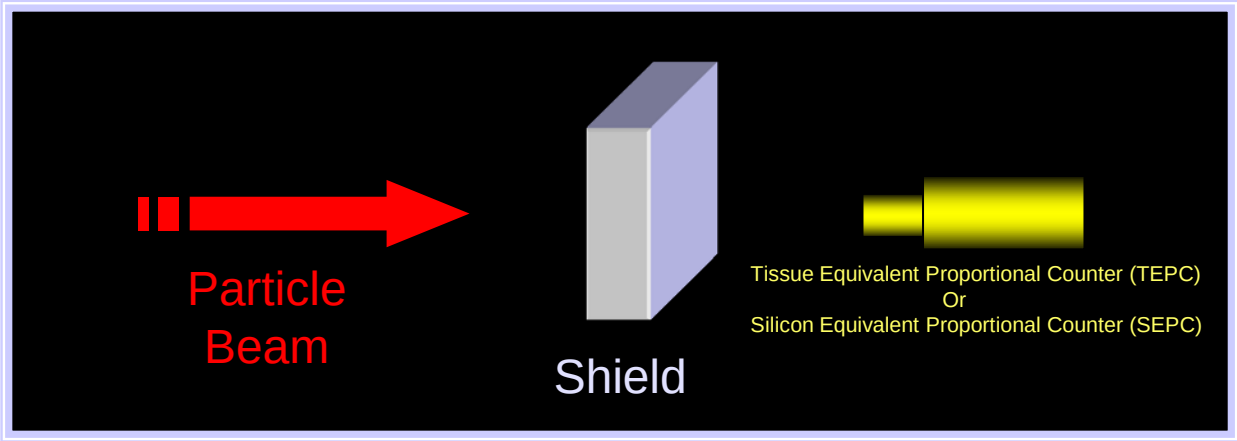
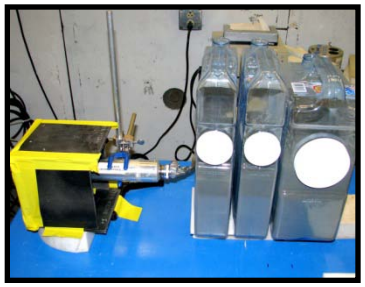


Diagram of (above) and photos of (below) the primary components of a space radiation shielding experiment.



Past Experiments I have Participated In

Loma Linda Medical University

On this experiment we tested different density thicknesses of Regolith composites as well as the “moon mud” test.

NASA Space Radiation Laboratory

On this experiment we had 14 runs testing Regolith composites as well as the first run of our new test-bed design.

Summary

In summary, I hope to have a deliverable highly specific, cataloged, record of all shields both new and previously used in experimentation as to insure that all materials can be easily recalled for future use.

Thank You

The End