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High Energy Heavy Ion Single Event Effects (HE HISEE): Planning for the Future of Microelectronics

Thursday 14 August 2025 16:00 (2 hours)

One unique accelerator application is the testing of microelectronics for utilization in space. In particular, space provides two environment challenges that provide exposure to energetic heavy ions: galactic cosmic rays (GCRs) and solar particle events (SPEs). These particles cause risk by depositing charge in microelectronics potentially causing operational errors or even destructive failure.
Testing electronics with a variety of ground-based accelerators is not new. What is new is the increasing need for high-energy (> 100 Mev/n) heavy ions with ˜40% of all testing predicted to require this high energy by 2030. This is primarily for two reasons:
- Mission-enabling advanced stacked microelectronics technologies such as 3D packaged devices that require higher energy to penetrate to the sensitive locations within these devices, and,
- Increase in demand to perform system-level testing using “large irradiation area”kinematics. This large area also allows for large sample sizes to be irradiated simultaneously for efficiency.
Presently, the is only one domestic accelerator that can achieve high energy heavy ions, that of Brookhaven National Laboratory’s NASA Space Radiation Laboratory. Here, we discuss the requirements needed by the test community and the domestic effort to close the gap in the number of test hours. A current government-funded study is underway to analyze options for the future.

Please consider my poster for contributed oral presentation

Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

Department of Defense

I have read and accept the Privacy Policy Statement

Yes

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