Homework #9

Justin Millsap

Due: Monday, April, 15 2024 at 7:00 pm

Problem 1: How high have we observed energy levels of GCR's?

Solution:

We have observed GCR energies levels of up to 30×10^{20} eV .

Problem 2: SPE's are usually associated with what?

SPE's are usually associated with a CME or a Solar Flare.

Problem 3: What is the difference between MMRTG and an RHU?

The MMRTG (Multi-mission radioisotope Thermoelectric Generator) generates electric energy through heat while the RHU generates heat through electric energy.

Problem 4: Name and define five types of Single Event Effects. WHich ones are possibly destructive?

- SEB S̃ingle Event Burnout causes major power draws due to ionization path that creates a path between drain and spike
- SEU S̃ingle Event Upset flips a bit of digital memory from ionizing a particle.
- SET S̃ingle Transient is a voltage spike at the IC node due to the charge of an ion passing.
- SEBE S̃ingle Event Burst Error is when two or more errors in a single memory due to energy from ionizing particles.
- SEFI S̃ingle Event Functional Interrupt is when there is a temporary loss of functionality due to a spike.

The most destructive Single Event effect is the SEB, as this results in the destruction of the device.

Problem 5: Define the concepts of ALARA and how it is applied.

ALARA refers to the term "As low as reasonably possible" and it is the concept of practicing the limit of radiation exposure. This can be applied to space missions where astronauts can be exposed to radiation and it can be limited using ALARA.