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Jonh Mojica Decena
Utah State University

JR Dennison
Utah State Univesity

Brian Wood
Utah State University

Ryan J. Martineau
Utah State University

Michael J. Taylor
Utah State University

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Jonh Carlos Mojica Decena,[1] JR Dennison,[1] Brian Wood,[1] Ryan Martineau,[2] Michael J. Taylor[3]

[1]*Materials Physics Group, Physics Department, Utah State University*

[2] *Utah State University Space Dynamics Laboratory*

[3] *Physics Department, Utah State University*

Abstract

The use of CubeSats for space research has become of great interest in part due to the use of inexpensive microprocessors or commercial of the shelf (COTS) components. Design of electronics that can maintain full functionality over the duration of the mission requires careful determination of the space radiation environment and total ionizing dose (TID) delivered to the components in different orbits. Larger, more expensive, or longer mission satellites tend to use more expensive components than the ones used in CubeSat to assure reliability. Radiation survivability of a *Raspberry Pi Zero* was studied with the USU Space Survivability Test Chamber to simulate the space radiation using 0.2 to 2.5 MeV beta radiation from a Sr^{90} source. These tests determined the amount of ionizing radiation that the memory and processor units can be exposed to before they exhibit radiation-induced damage or stop working altogether. The results were used to determine how much shielding the processor would need to work reliably over the mission lifetime. These results will be used for the USU-led OPAL CubeSat, which will incorporate a *Raspberry Pi* as its basic processor unit and data collector, to determine if this inexpensive microcomputer will survive the TID received during its 1-2 years mission in LEO, or up to >200 krad TID.

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