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Abstract

The use of inexpensive microprocessors or commercial of the shelf (COTS) components is one of the most common cost-saving methods in the constructions of CubeSats. 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. 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 using 0.2 to 2.5 MeV beta radiation from a Sr^{90} source to determine 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. We also analyzed the type of error produced by radiation exposure to determine if it was a recoverable or a critical error and how much shielding the processor would need to work reliably over the mission lifetime. The results of these evaluations will be used in the USU-led *OPAL* CubeSat which plans to incorporate a *Raspberry Pi* as its basic processor unit and to determine if this inexpensive microcomputer will be able to survive the TID received during its mission in LEO lasting 1-2 years, up to a TID >200 krad.