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Design of beam energy adjustment system for heavy ions testing of space electronics

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Electronic components in spacecrafts and satellites are subjected to impact of high energy particles and heavy ions. Radiation damage of semiconductor electronic devices depends on linear energy transfer (LET) of the particle in semiconductor material which the device is fabricated of. During radiation testing of electronic components for space applications in particle accelerators we have limited set of ions with fixed energies and LET values due to complexity of adjustment of accelerator systems. According to standard test methods it is necessary to perform tests for several LET values in range from 1 to 100 (MeVcm²)/mg. *It is possible to enhance available LET range using special screens with different thickness (degraders) to decrease initial energy of particles and adjust LET value without reset of the accelerator for another ion type or energy. It can significantly reduce complexity and duration of test processing. In this work by numerical calculations we have designed a set of degraders, which enable us to obtain almost any LET value from 1 to 100 (MeVcm²)/mg in silicon devices using only four ion types with fixed energies that is acceptable for all test procedures.*

Footnotes

Funding Agency

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Yes

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