Radiation measured with passive dosimeters in low Earth orbit

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Abstract

The linear energy transfer (LET) of particles in low Earth orbit (LEO) is extended from $\sim$ 0.1 to $\sim$ 1000 keV/μm water. The best passive dosimeters for the radiation measurement are thermoluminescence dosimeters (TLDs) or optically stimulated luminescence dosimeters (OSLDs) for low LET and CR-39 plastic nuclear track detectors (PNTDs) for high LET. Radiation quantities (fluence, absorbed dose, dose equivalent and quality factor) were measured with the passive dosimeters composed of TLDs/OSLDs and CR-39 PNTDs for STS-114 mission. This paper introduces the operation principles for TLDs/OSLDs and CR-39 PNTDs, describes the method to combine the results measured by TLDs/OSLDs and CR-39 PNTDs and presents the results measured by different dosimeters for different LET band and that combined for all LET.