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Measurements and modelling of the Jovian and Saturnian radiation belts

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The radiation belts regimes of the outer planets are the harshest environments in our solar system. In extremely strong internal closed magnetic field configurations energetic particles up to several hundred MeV energies are trapped and bounce back and forth along the magnetic field lines emitting waves in a whole variety of frequencies.

Unlike Earth, Jupiter's and Saturn's magnetospheres are rotation dominated. Charged particle drift paths close around the whole planet to substantial planetary distances, unlike in the case of Earth (Chen et al, 1970).

The combination of a strong internal magnet and quasi-stable trapping allows the fluxes of energetic ions and electrons to become very large.

In this study we will review the in-situ measurements obtained onboard various spacecraft that flew by or orbited Jupiter or Saturn and compare them with existing models of the radiation belts.