



## **What have we learned about the energetic particle dynamics in the inner belt and slot region from Van Allen Probes and CSSWE missions?**

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Comprehensive measurements of energetic protons (10s of MeV) in the inner belt ( $L < 2$ ) and slot region ( $2 < L < 3$ ) from the Relativistic Electron-Proton Telescope (REPT) onboard Van Allen Probes, in a geo-transfer-like orbit, revealed new features of these energetic protons in terms of their spectrum distribution, spatial distribution, pitch angle distribution, and their different dynamic variations associated with their different source populations. Measurements from the Relativistic Electron-Proton Telescope integrated little experiment (REPTile) on board Colorado Student Space Weather Experiment (CSSWE) CubeSat, in a highly inclined low Earth orbit, demonstrated that there exist sub-MeV electrons in the inner belt and their flux level is orders of magnitude higher than the background associated with the inner belt protons, while higher energy electron ( $> 1.6$  MeV) measurements cannot be distinguished from the background. Analysis on sub-MeV electrons data in the inner belt and slot region from the Magnetic Electron Ion Spectrometer (MagEIS) on board Van Allen Probes revealed rather complex pitch angle distribution of these energetic electrons, with the 90 deg–minimum (butterfly) pitch angle distribution dominating near the magnetic equator, which has inspired a great deal of theoretical interest in an attempt to explain such a peculiar pitch angle distribution. These are part of a summary of the most recent measurements and understanding of the dynamics of energetic particles in the inner zone and slot region to be exhibited and discussed in this presentation.