Talk under "Azadi Ka Amrit Mahotsav"

Title: Modelling Of Coherent Wave Structures and Associated Particle Dynamics in the Earth's Magnetosphere

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Abstract:

Earth's magnetosphere is an excellent natural laboratory for understanding various space plasma phenomena. The charged particles of solar origin enter the Earth's magnetosphere and trap along the magnetic field lines. These particles perform three periodic motions: gyration, bounce, and azimuthal drift. The periodicity of these motions varies from milliseconds to days, depending on their location in the Earth's magnetosphere. Energies of trapped particles range from a few electron volts to hundreds of mega electron volts. Interaction of trapped particles with various magnetospheric waves can be responsible for their acceleration/deceleration or loss. In the thesis, I have focused on two aspects. One is understanding the dynamics of magnetospheric trapped particles, and another is their interaction with magnetospheric waves. Both of these analyses are carried out using test-particle simulation. I have developed a three-dimensional relativistic test-particle simulation model to investigate the dynamics of magnetospheric particles. Earth's magnetic field is approximated as the dipolar field model and International Geomagnetic Reference Field (IGRF) model. Using these models, magnetic mirror point latitude of trapped particles, changes in their pitch angle distribution with conserve or non-conserve adiabatic invariants, and the inner boundary of radiation belt particles in the South Atlantic Anomaly region, etc. are investigated. In addition, the interaction of these trapped particles with a series of double layers is investigated to quantify the acceleration with an increasing number of double layers. Important results from the thesis will be discussed during the talk.