3rd URSI AT-AP-RASC, Gran Canaria, 29 May – 3 June 2022

Wave Particle Interactions in the Inner Magnetosphere

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Gyroresonant wave particle interactions play major role in the non-adiabatic dynamics of energetic particles in the inner magnetosphere. These interactions break the first two adiabatic invariants leading to pitch angle scattering and energy diffusion. As such they play important roles in radiation belt dynamics and in the production of the diffuse aurora. At high energies (E > 500 keV), whistler mode chorus plays a dual role, contributing to both the acceleration and loss of radiation belt electrons (E > 500 keV). In contrast, plasmaspherc hiss and electromagnetic ion cyclotron waves contribute primarily to the loss of these so-called "killer" electrons. At low energies (E < 10 keV) wave particle interactions with whistler mode chorus and electron cyclotron harmonic waves contribute to electron pitch angle scattering leading to the production of the Earth's diffuse aurora. In this presentation I will review how our collaboration with the late Prof. Richard Thorne at UCLA led to increased understanding of the Earth's radiation belts and the Earth's diffuse aurora in the decade prior to the launch of the Van Allen probes using data from the Combined Release and Radiation Effects Satellite.