



Do Electromagnetic Ion Cyclotron Waves Propagate as Bouncing Wave Packets?

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The proton cyclotron instability located in the equatorial region of the magnetosphere produces bursts of field aligned electromagnetic ion cyclotron (EMIC) wave energy. These wave packets travel between hemispheres along field-aligned paths and energy is reflected at the ionosphere, producing a bouncing wave packet. This argument has been supported by the observation that EMIC wave bursts in the Pc1 (0.2 - 5 Hz) band seen on the ground are 180° out of phase between hemispheres. However, bouncing wave packets have not been observed by spacecraft in the equatorial region and above the ionosphere, suggesting that energy propagation is primarily unidirectional and away from the equator. Recently, the non-stationary Ionospheric Alfvén Resonator (IAR) has been invoked to explain the observation of some Pc1 and IPDP (Intervals of Pulsations with Diminishing Period) wave events. Here a Pc5 (1 - 7 mHz) field line resonance stimulates ionospheric cavity oscillations providing the observed periodic frequency structure. This study will revisit the properties of EMIC wave packets using data from near-conjugate locations in Alaska and Macquarie Island and other data to assess the merits of these two propagation models. Other possible mechanisms will also be discussed.