# Energetic Electron Transport Driven by Drift-Orbit Bifurcation

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Radial transport of energetic electrons is an important process responsible for the global variability of the outer radiation belt, resulting from a violation of the third adiabatic invariant and allowing electron motion between different drift orbits. Classical models typically invoke interactions with Ultra-Low Frequency (ULF) waves, which scatter electrons in the third adiabatic invariant, leading to their slow radial diffusion. While this classical diffusive framework captures key aspects of radiation belt dynamics, event-specific modeling often necessitates going beyond classical diffusion. The Drift-Orbit Bifurcation mechanism, also referred to as the Shabansky effect, has recently gained attention as a prospective driver of electron transport in the outer radiation belt and near the dayside magnetopause. It arises from the compression of dayside magnetic field lines by the impinging solar wind, leading to the formation of an equatorial maximum in the magnetic field strength. Electrons with sufficiently small equatorial pitch angles cannot overcome this maximum and become trapped northward or southward of the magnetic equator, violating the second adiabatic invariant and rendering the third adiabatic invariant undefined, thus opening the drift orbit and allowing for radial transport. The classical picture of drift-orbit bifurcation assumes a North-South and East-West symmetric magnetic field configuration; however, recent studies have shown that breaking these symmetries—through a nonzero dipole tilt and a nonzero IMF $B_y$ - allows for much more efficient scattering and transport In this work, an event study observed by NASA's THEMIS spacecraft is performed, where the formation of an isolated energetic (>30 keV) electron peak is observed near the magnetopause. Test-particle simulation in the guiding center approximation demonstrates that drift-orbit bifurcation under asymmetric magnetospheric conditions—i.e., a nonzero dipole tilt and significant IMF $B_y$ —can result in the formation of isolated maxima in the radial profiles of >30 keV electrons, providing valuable insight into the longstanding problem of energetic electron enhancement events observed near the magnetopause.