Spectral structures of energetic electrons in the inner magnetosphere

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Electron spectral structures in the energy-time flux spectrograms are the observational signatures of electron acceleration, transport, and loss in the global magnetosphere. Combining *in situ* measurements with backward particle drift path simulations, we studied electron spectral structures in the inner magnetosphere before and during the 1 June 2013 storm (min. *Dst* = -119 nT). For the purpose of comparison, proton results were also included. Electron spectral structures were less dynamic during storm time than quiet time, because deeper transport and more enhanced fluxes smeared the spectral structures. Electron injection depth and some spectral features were fairly well reproduced with the Weimer96 electric field and the dipole magnetic field. Although always drifting eastward, electrons could still display multiple spectral structures. Their formation was attributed to “drift resonance”, i.e., electrons with different energies drifting around the Earth by a different number of loops. Pitch angle scattering loss played an important role in the formation of electron spectral features.

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Formation of Multiple Electron "Noses"

- **Backward Drift Path Tracings** at 1850:48 UT:
  - Start at L = 3.0 & MLT = 18.6
  - End at L =10.0 or Drift Time (d_time) > 40 hrs
- **Drift Paths**:
  - 38.1 keV: (2, 3) loops
  - 28.1 keV: (1, 2) loops
  - 9.6 keV: < 1 loop
  - 1.1 keV: trapped, i.e., no access to the tailward source region