**Investigating Large-Scale Electric Structures During Geomagnetic Storms in Earth's Radiation Belts Using Electric Field and Potential Difference Data from RBSP Satellites**

Mohammad Reza Shafizadeh 1, Behnam Babaeian2

1M.Sc. Formerly at University of Zanjan, Physics Faculty, Iran

2Friedrich-Alexander-Universität-Erlangen-Nürnberg, Germany

This study investigates large-scale electric structures within Earth's radiation belts during geomagnetic storms. The primary objective is to identify and characterize large-scale electric double layers in the near-Earth space environment. We hypothesize that such structures may persistently exist around Earth, and this research serves as a critical step toward understanding their formation and behavior under extreme solar activity. Using electric field and potential difference data from the EFW (Electric Field and Waves) instrument aboard the RBSP (Van Allen Probes) satellites, we analyzed periods of intense geomagnetic storms. The data were processed using Fast Fourier Transform (FFT) techniques to reduce noise and identify large-scale double-layer structures. Our results demonstrate the presence of large-scale electric double layers in the radiation belts during geomagnetic storms. These findings provide a foundation for future investigations, where we aim to explore whether these structures exist consistently in the near-Earth space environment, even during quiet periods. This research contributes to a deeper understanding of electric structures in space and their implications for space weather dynamics.