



## **The interaction between ULF waves and thermal plasma ions at the plasmaspheric boundary layer during substorm activity**

Qiugang Zong

Peking University, ISPAT, Beijing, China (qgzong@gmail.com)

During a substorm on 27 January 2004, energetic particle injections associated with ULF waves have been detected when Cluster fleet was traveling inbound in the Southern Hemisphere. Substorm-injected energetic particles are strong and clearly modulated by these ULF waves. The ULF waves with the period of 1 min are probably the third harmonic mode. The periodic pitch angle dispersion signatures at 5.2–6.9 keV energy channel were detected by Cluster satellite. These thermal plasma have high coherence with the electric field of the third harmonic poloidal mode and satisfy the drift-bounce resonant condition of  $N = 2$ . In addition, ion outflows from the Earth's ionosphere (tens to hundreds of eV) are also observed to be modulated by these ULF waves. To the best of our knowledge, this is the first report to show that ULF waves can simultaneously interact with both substorm-injected “hot” particles from the magnetotail and cold outflow ions from the Earth's ionosphere.