

相対論的電子マイクロバーストと脈動オーロラ

三好由純¹、齋藤慎司¹、栗田怜¹、大山伸一郎¹、平原聖文¹、浅村和史²、
坂野井健³、E. Turunen⁴、A. Kero⁴、P. Verronen⁵

¹名古屋大学

²ISAS/JAXA

³東北大学

⁴Sodankyla Geophysical Observatory, Finland

⁵Finnish Meteorological Institute, Finland

Relativistic electron microbursts and pulsating aurora

Y. Miyoshi¹, S. Saito¹, S. Kurita¹, S. Oyama¹, M. Hirahara¹, K. Asamura², T. Sakanoi³,
E. Turunen⁴, A. Kero⁴, and P. Verronen⁵

¹Nagoya University, Japan

²ISAS/JAXA, Japan

³Tohoku University, Japan

⁴Sodankyla Geophysical Observatory, Finland

⁵Finnish Meteorological Institute, Finland

We have proposed a model that whistler mode chorus waves propagating along the field line can cause wide energy range electron precipitations from a few keV to MeV [Miyoshi et al., 2010, Saito et al., 2012] and such wide energy electron precipitations are confirmed by simultaneous measurements from EISCAT and Van Allen Probes [Miyoshi et al., 2015a]. Taking into consideration of these studies, we investigate whether the pulsating aurora and relativistic electron microbursts are caused by a common process. Firstly, we simulate the pitch angle scattering of energetic electrons from ten keV to ~1 MeV, considering the propagation of whistler mode waves along the field line. As a result of the simulation, the pulsation and internal modulations of electrons are caused by the repetition of chorus bursts and rising tones, respectively [Miyoshi et al., 2015b], and those are commonly observed in both ten keV electrons (pulsating aurora) and relativistic electron microbursts. These characteristics are confirmed by the observations from Reimei and SAMPEX. Reimei satellite reveals that the pulsating aurora is caused by repetition of tens keV electrons and the internal modulations with a few Hz exist inside the precipitation. SAMPEX satellite confirmed the pulsation of relativistic electron microbursts and the internal modulations embedded in the microburst. The “burst train” structures are observed in both the pulsating aurora electrons (~keV) and relativistic electron microbursts (~MeV). The results indicate that the propagating whistler mode chorus waves are the common process to cause both pulsating aurora and relativistic electron microbursts along the field line

References:

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