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Quasiperiodic emissions and related particle precipitation bursts observed by the DEMETER spacecraft

Frantisek Nemec¹, Mychajlo Hajoš², Barbora Bezděková¹, Ondřej Santolík^{2,1}, and Michel Parrot³

¹Faculty of Mathematics and Physics, Charles University, Prague, Czechia (frantisek.nemec@gmail.com)

²Department of Space Physics, Institute of Atmospheric Physics of the Czech Academy of Sciences, Prague, Czech Republic

³LPC2E/CNRS Orléans, Orléans, France

Electromagnetic waves observed in the inner magnetosphere at frequencies between about 0.5 and 4 kHz sometimes exhibit a quasiperiodic (QP) time modulation of the wave intensity with modulation periods from tens of seconds up to a few minutes. Such waves are typically termed “QP emissions” and their origin is still not fully understood. We use a large set of more than 2,000 of these events identified in the low-altitude DEMETER spacecraft data to analyze how the wave properties (modulation period, intensity) depend on relevant controlling factors. Moreover, in-situ measurements of energetic electron precipitation are used to check for precipitation peaks matching the individual QP elements. We successfully identified several such events and we perform their detailed analysis. Most importantly, while the waves may propagate unducted across L-shells, the precipitating particles follow magnetic field lines from the interaction region down to the observation point. They can thus be used to deduce important information about the location and spatial extent of the anticipated generation region of the emissions.