

内部磁気圏におけるホイッスラーモード波相対論的共鳴電子加速

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Relativistic resonant acceleration of high energy electrons by a coherent whistler mode wave in the magnetosphere

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We report a very efficient acceleration process of high energy electrons by whistler mode waves in the Earth's magnetosphere. The acceleration process takes place only for weakly relativistic electrons of a few hundred KeV, and it is an irreversible process due to the resonant trapping by a coherent whistler mode wave propagating away from the equator. Through a single resonant trapping process, the energetic electrons are accelerated to a relativistic energy range of a few MeV. The relativistic resonant acceleration (RRA) is a promising mechanism for the formation process relativistic electron flux in the Van Allen Belt. The necessary condition for the RRA is a relatively large amplitude of the whistler mode wave in the range of a few hundred pT, which has been confirmed by recent in situ observation by Cluster satellites.