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# A mechanism for accelerating Jovian auroral and polar electrons to high energies via whistler-mode wave-particle interactions

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Throughout Jupiter's polar cap region, up-going electrons over a range of energies (from tens of keV to above one MeV) have been observed by Juno's Jupiter Energetic-particle Detector Instrument (JEDI). Over the same region, intense up-going broadband whistler-mode waves have also been detected by Juno's Waves instrument. A strong correlation has been found between the electrons and the whistler-mode waves, indicative of wave-particle interaction. On Jovian auroral field lines, similar, but even more intense, waves and electrons are observed. However, in the auroral region, both are down-going. We propose that the mechanism for accelerating these electrons is a two-step process. First, a current-driven parallel electric field (inverted-V) drives an electron-beam instability, thereby generating whistler-mode waves with large amplitudes over a broad frequency range. Secondly, the resulting whistler-mode waves are then absorbed by the plasma through a stochastic process, therefore accelerating the resonant electrons. This acceleration results in a broad range of electron energies with an approximate power law energy distribution. The energy flux of the whistler-mode waves has been shown to be comparable to the energy flux of the energetic electrons (

in the auroral region, and up to

in the polar cap region), providing evidence that acceleration via whistler-mode interactions is a plausible mechanism. In this paper, we provide additional evidence supporting this wave acceleration process from observations made by the Juno spacecraft.