

## Van Allen Probes Observations of Particle Injections and ULF Waves During Lapping Events

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The twin Van Allen Probes mission provides unique data sets for the studies of radiation belt and ring current dynamics thanks to their orbit configuration and coverage, and state of the art instrumentation with high energy and time resolutions. This study presents mid- to high-energy particle injection and wave events associated with storm and substorm activities when the twin spacecraft were very close to each other (called “lapping event”). The lapping events enable us to investigate the wave-particle interaction on an unprecedented spatial and temporal scale. The events presented here show that mid-energy (a few to hundreds of keV) injected particles provide energy to generate electromagnetic ion cyclotron (EMIC) and ultra low frequency (ULF) waves, resulting in scattering of high-energy (a few MeV) electrons in the radiation belt. Clear one-to-one correspondence between waves and particles with high energy and time resolution is demonstrated. Because of the spacecraft’s lapping during multiple consecutive fly-bys, detailed spatial and temporal structures of the wave-particle interaction are revealed.

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