Contribution ID: **30** Type: **Poster**

Electron energy spectra during the different phases of magnetotail reconnection

Wednesday, 26 May 2021 13:00 (40 minutes)

Particles are accelerated to very high, non-thermal energies during explosive energy-release phenomena in the solar corona and Earth's magnetotail. While some similarities and differences of the particle acceleration in these environments have been discussed in the literature, it remains unclear exactly how the particle energy spectrum evolves during the energy-release process. Here we show that the electron energy spectrum can be mostly represented by the kappa distribution throughout an event in which NASA's MMS spacecraft observed the entire sequence of a substorm (i.e., the explosive energy-release phenomena in Earth's magnetotail). We present electron spectra from the different phases of magnetotail reconnection for this event, including energy build-up, slow energy release, and explosive energy release. We demonstrate that the power-law index δ (~3.5) is strikingly constant throughout these phases and is similar to the power-law indices derived from the hard X-ray measurements of solar flares (both coronal and chromospheric sources). We envision that such a detailed analysis of Earth's magnetotail data will be helpful for a better understanding of possible scaling laws in particle acceleration as well as how universal they are.

Primary author: OKA, Mitsuo (University of California Berkeley)

Co-authors: Dr ØIEROSET, Marit (University of California Berkeley); Dr PHAN, Tai (University of California Berkeley); Dr ARNOLD, Harry (University of Maryland); Dr DRAKE, James (University of Maryland College Park); ZHANG, Qile (Los Alamos National Lab); GUO, Fan (Los Alamos National Lab); CHEN, Bin (New Jersey Institute Of Technology)

Presenter: OKA, Mitsuo (University of California Berkeley)

Session Classification: Poster session: SQ3 and SQ6

Track Classification: Electron Energization