Inverse Energy Dispersion of Energetic Ions Observed in the Magnetosheath

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We present a case study of energetic ions observed by the Energetic Particle Detector (EPD) on the Magnetospheric Multiscale (MMS) spacecraft in the magnetosheath just outside the subsolar magnetopause that occurred at 1000 UT on December 8, 2015. As the magnetopause receded inward, the EPD observed a burst of energetic (~50-1000 keV) proton, helium, and oxygen ions that exhibited an inverse dispersion, with the lowest energy ions appearing first.
The prolonged interval of fast antisunward flow observed in the magnetosheath and transient increases in the *H* components of global ground magnetograms demonstrate that the burst appeared at a time when the magnetosphere was rapidly compressed.
We attribute the inverse energy dispersion to the leakage along reconnected magnetic field lines of betatron-accelerated energetic ions in the magnetosheath and a burst of reconnection has an extent of about 1.5 R_E using combined Super Dual Auroral Radar Network (SuperDARN) radar and EPD observations.

