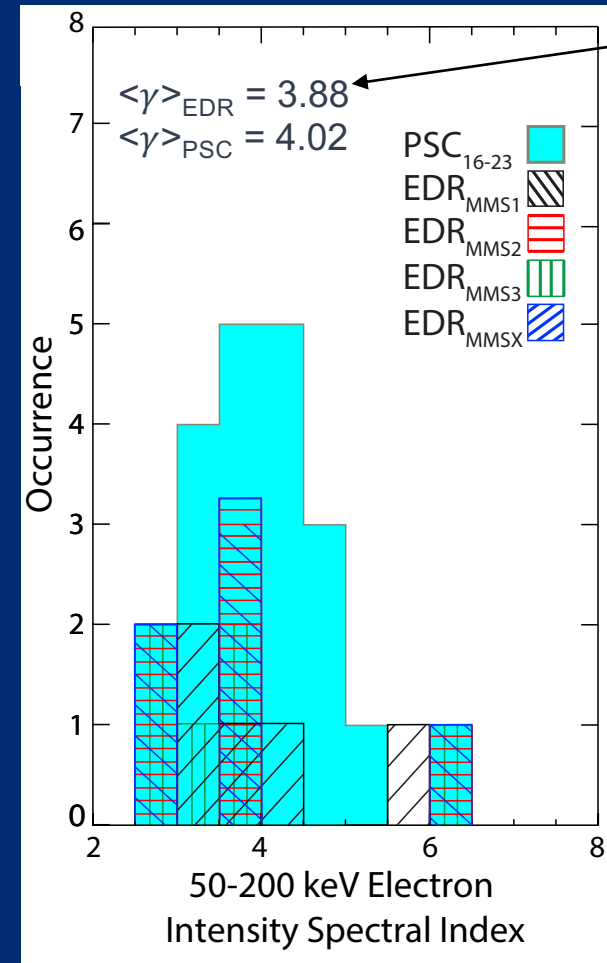


# Statistical Evidence that Magnetic Reconnection Creates High-Energy Electrons

- Magnetic reconnection is a fundamental and universal physical process that converts energy from magnetic fields to particles
- It's known that through this energy conversion particles can gain energy, but it's still unclear whether this directly energizes particles up to hundreds of keV
- Using observations from NASA's Magnetospheric Multiscale (MMS) mission, we were able to statistically compare the amount of energetic particles near active reconnection sites to the amount present when reconnection isn't occurring



The fact that this parameter, the “spectral index” is smaller for the EDR events means that the energy spectrum is less steep, which means more energetic particles are present.

Observations by multiple MMS spacecraft (“MMS#”) of regions where active reconnection is occurring (i.e., “EDRs”) were compared to a dataset of quiet-time “plasma sheet crossings” - this acts as a control group to test whether reconnection actually produces very energetic electrons.

**These MMS observations provide statistical evidence that active reconnection sites (i.e., “electron diffusion regions” or “EDRs”) in Earth’s magnetotail do produce very energetic particles**