

Parker Solar Probe

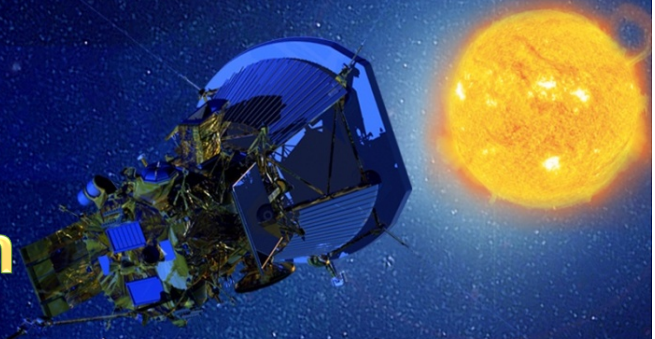
A NASA Mission to Touch the Sun

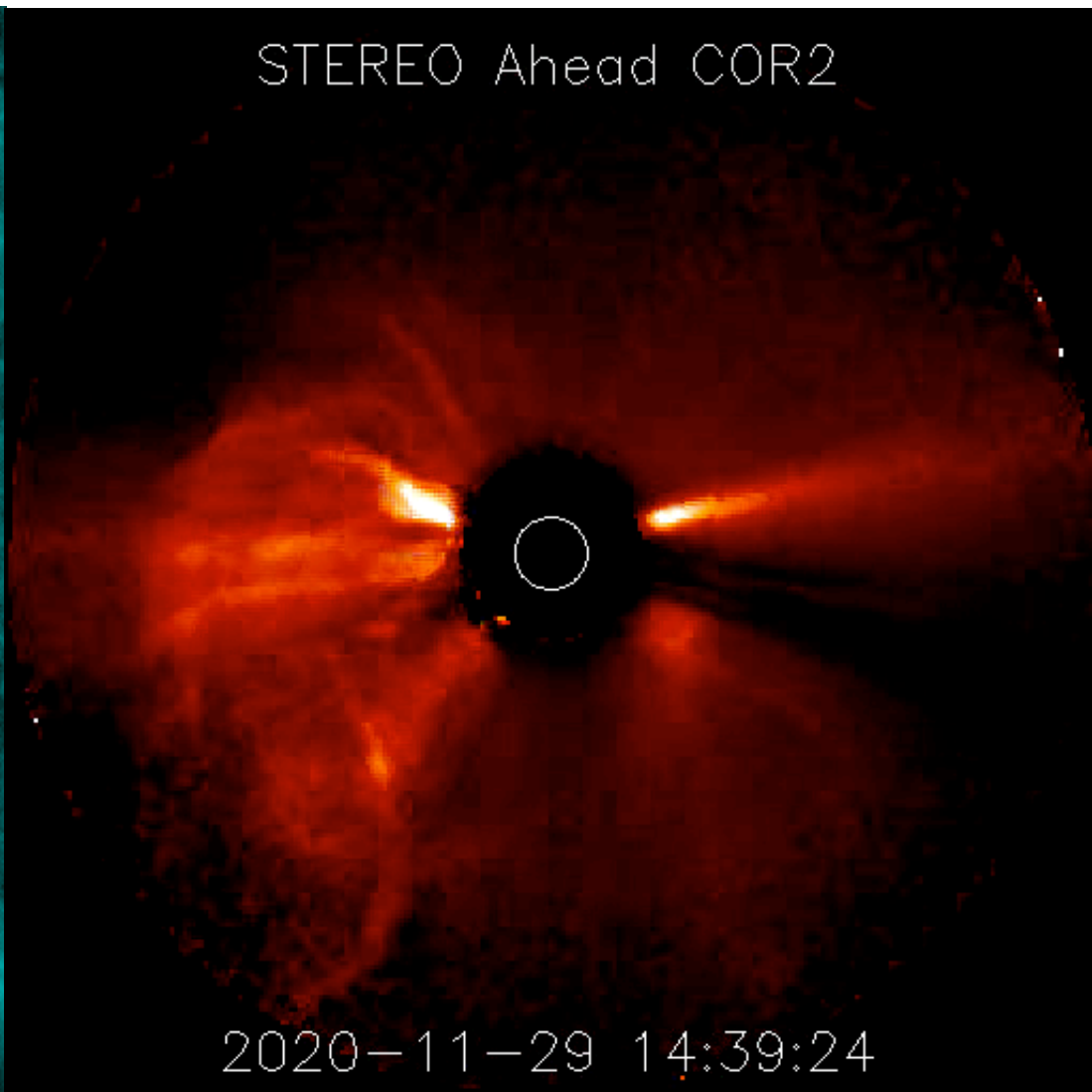
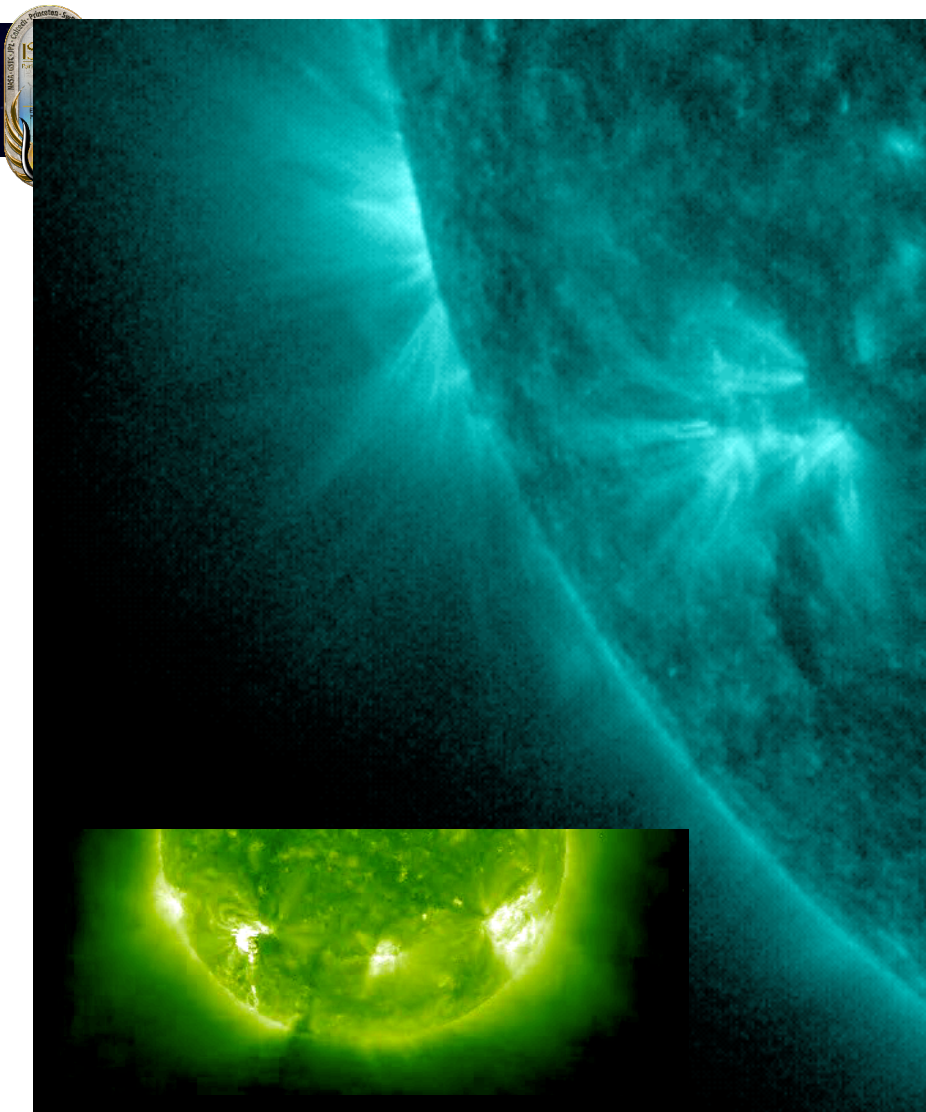
Integrated Science Investigation of the Sun

PSP's Measurements of the 29 November 2020 SEP Event

C.M.S. Cohen for the ISOIS team

(Caltech, Princeton, JHUAPL, GSFC, UNH,
SWRI, UArizona, UD)

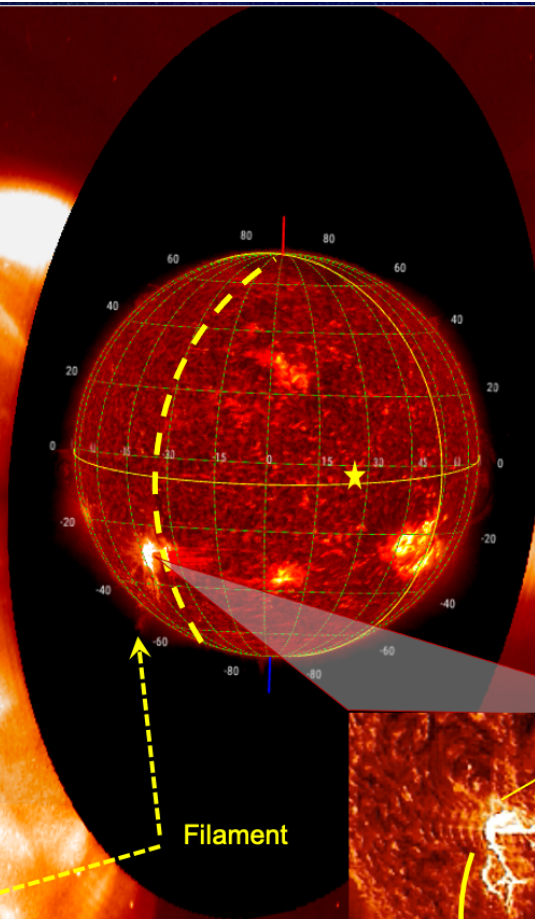




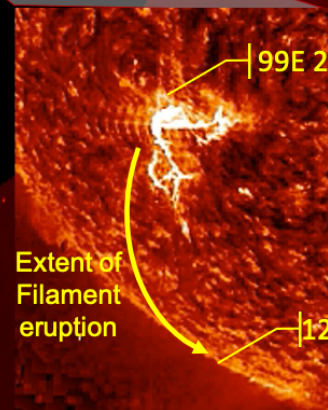


COR2-A 13:54UT Base
Diff.

$\sim 1700 \text{ km/s}$



Filament



99E 23S

Extent of
Filament
eruption

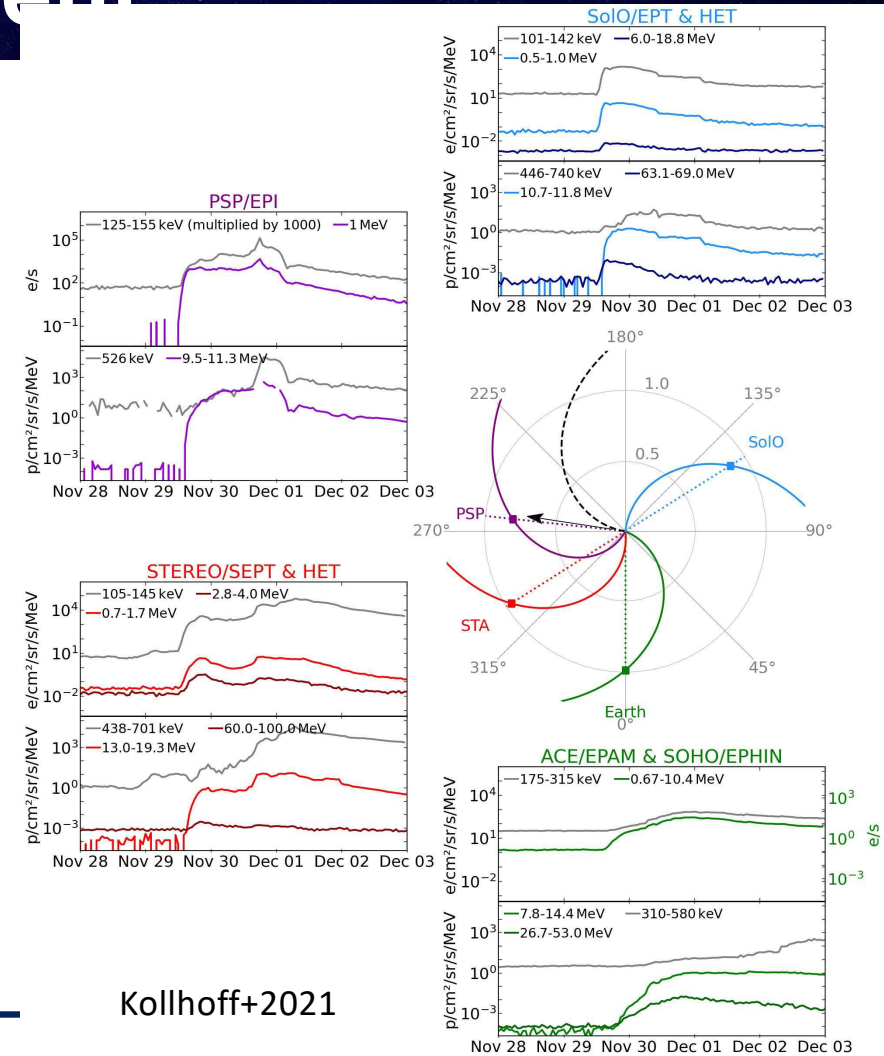
128E 57S

2020-11-29T13:13:45



Overview Nov 2020 Event

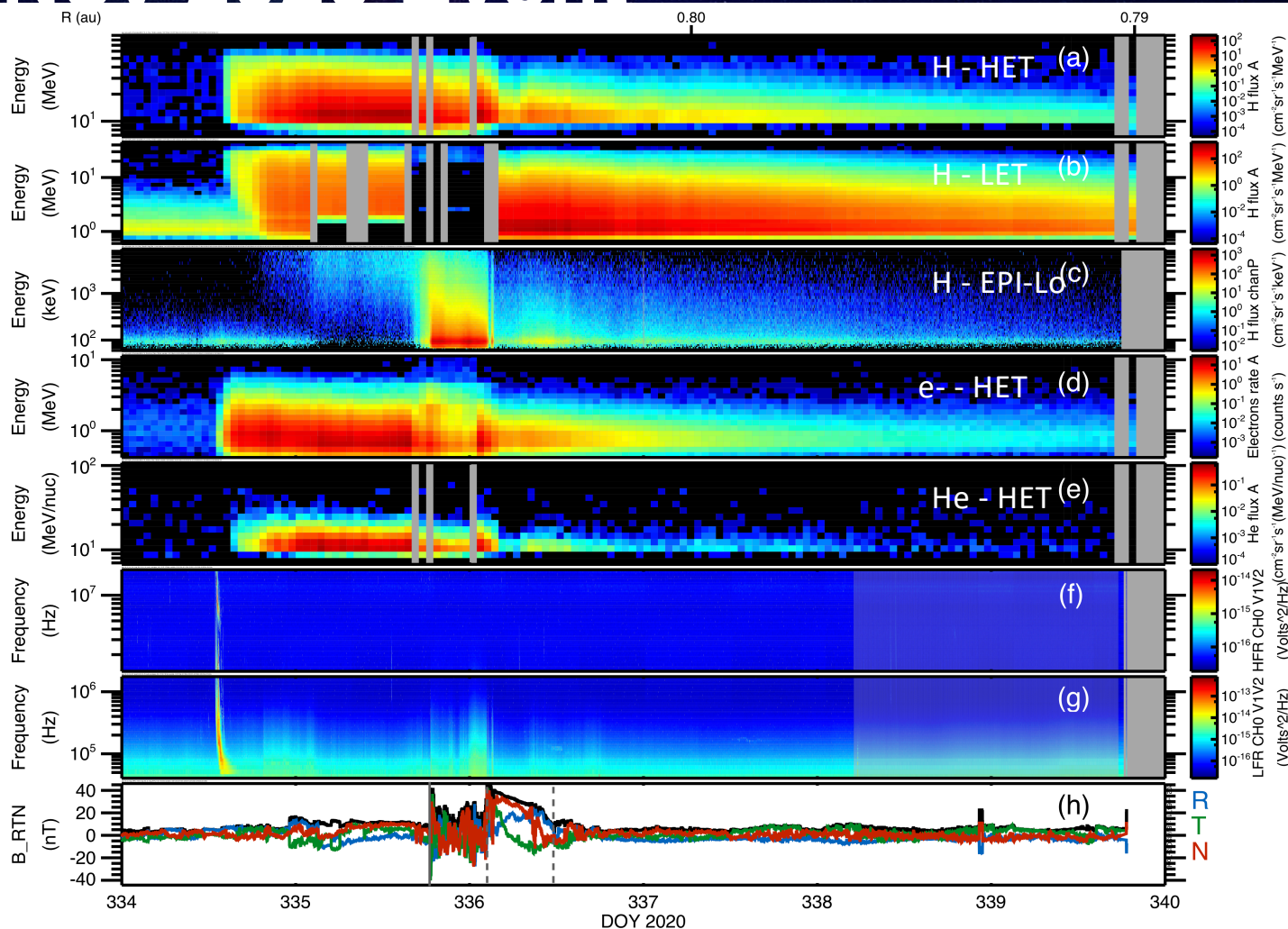
- Circumsolar event
 - Kollhoff+ 2021 e-, H onsets and profiles
 - Mason+ 2021 heavy ion characteristics
 - Lario+ 2021 pre-shock spectral evolution





Overview Nov 2020 Event

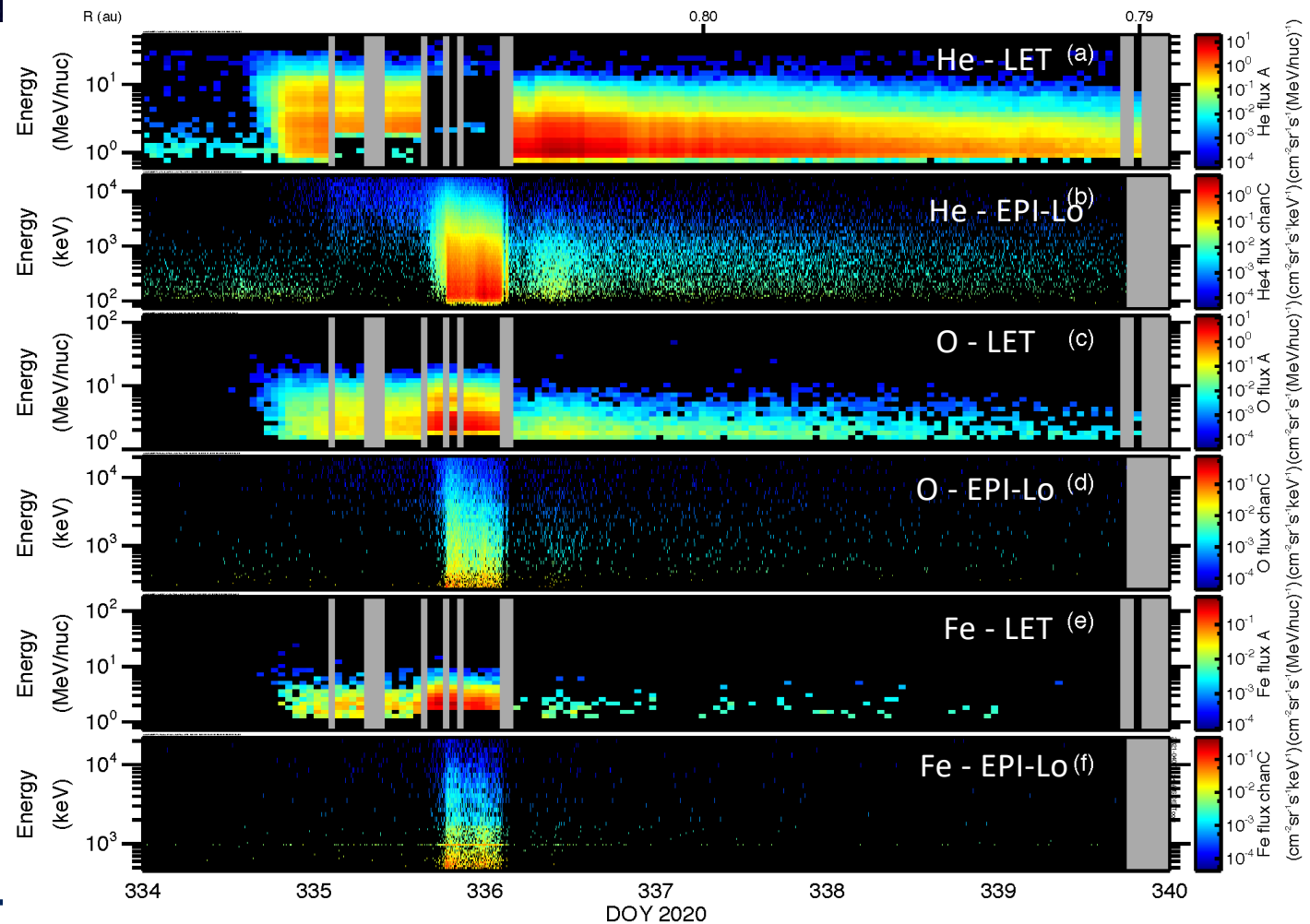
- Circumsolar event
 - Kollhoff+ 2021
 - Mason+ 2021
 - Lario+ 2021
- First mid-sized event
- EPI-Hi dynamic threshold system





Overview Nov 2020 Event

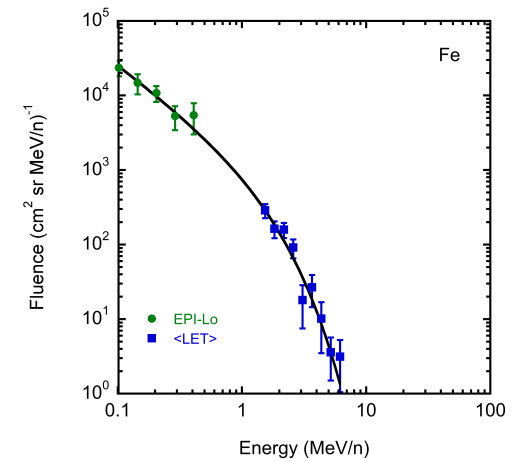
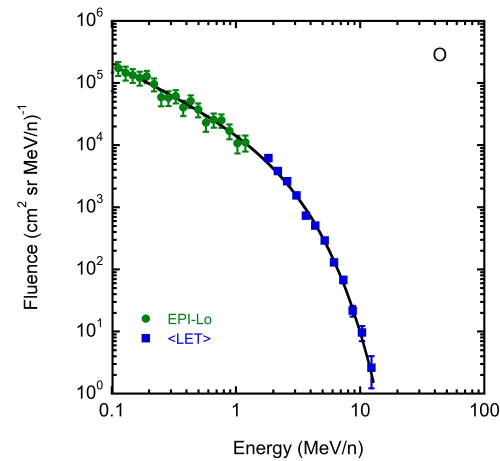
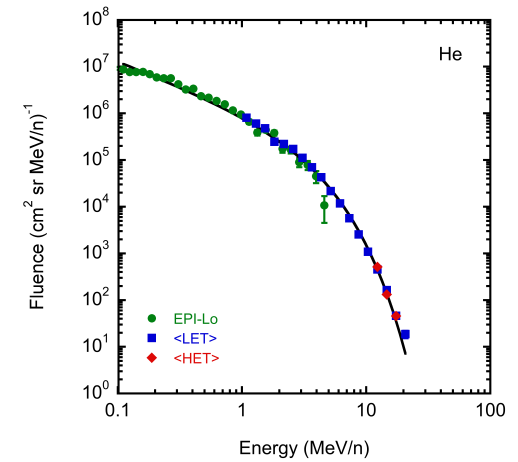
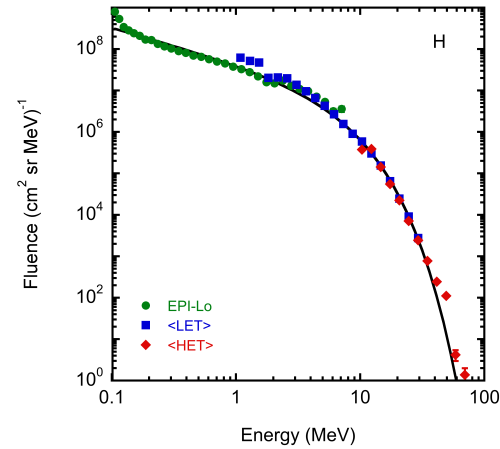
- Circumsolar event
 - Kollhoff+ 2021
 - Mason+ 2021
 - Lario+ 2021
- First mid-sized event
- EPI-Hi dynamic threshold system
- First heavy ions >few MeV/n





Decay spectra

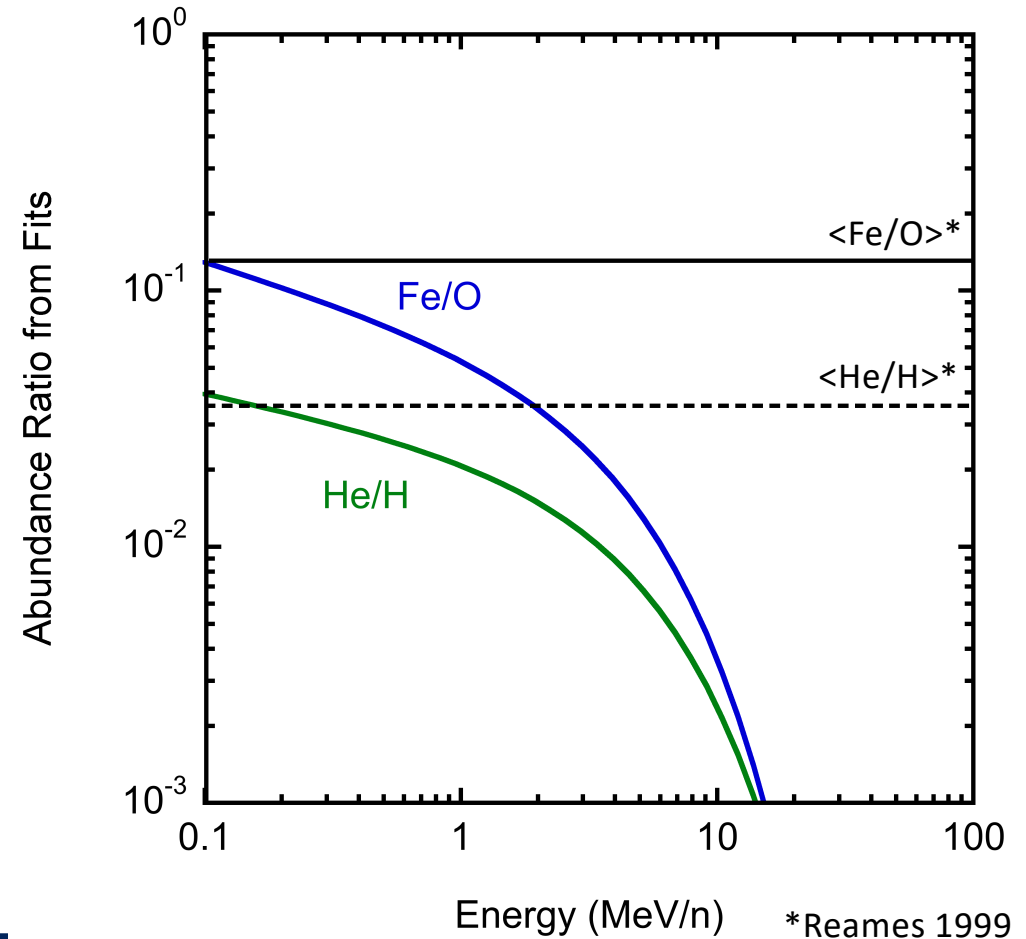
- Not simple power laws
- Ellison-Ramaty form
 - Low break energies





Decay spectra

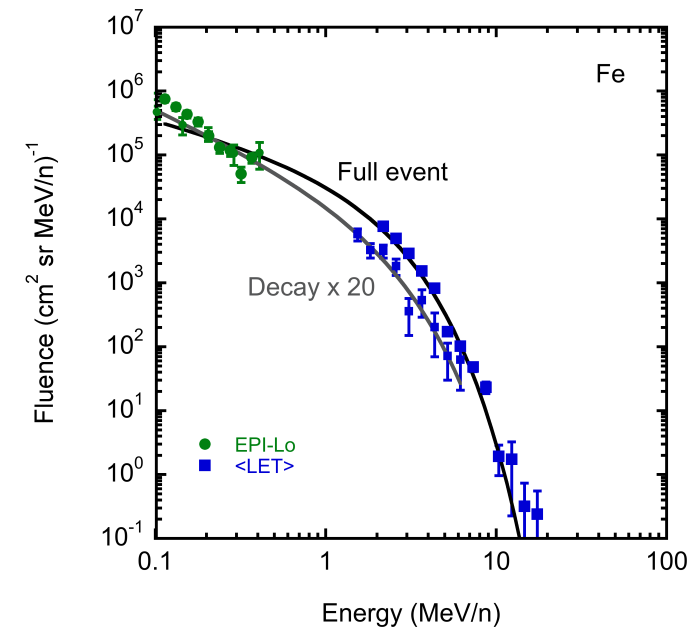
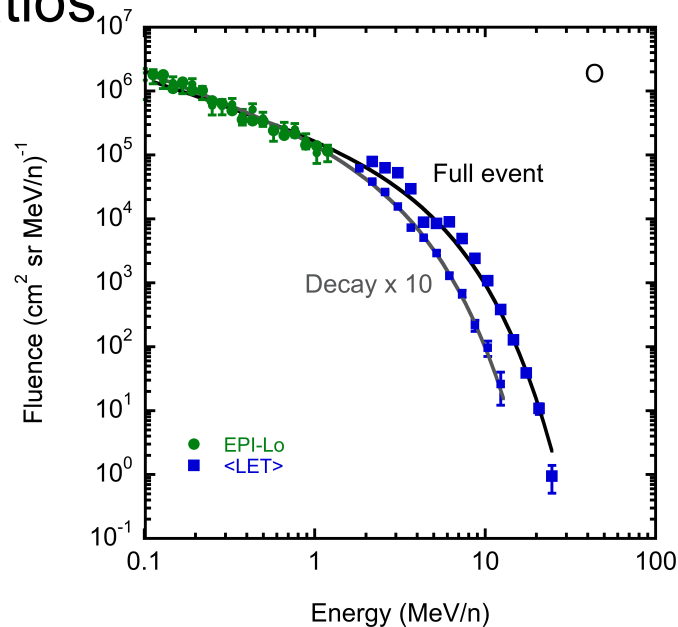
- Not simple power laws
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- Energy dependent ratios





Spectra

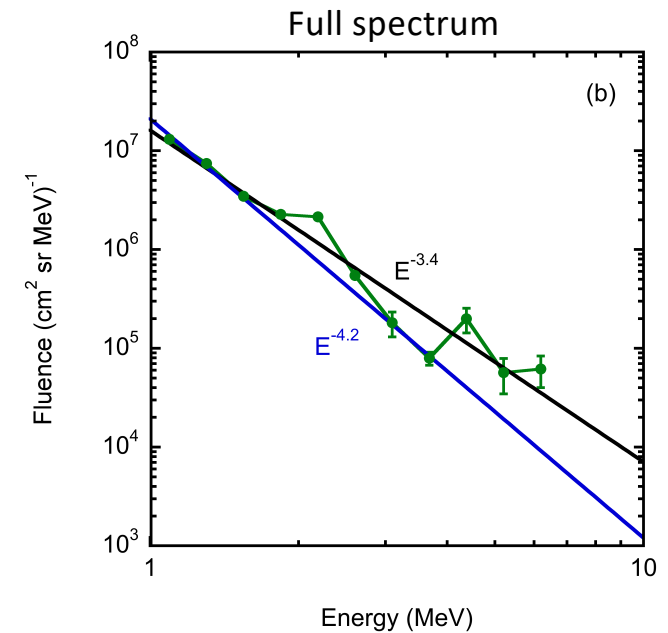
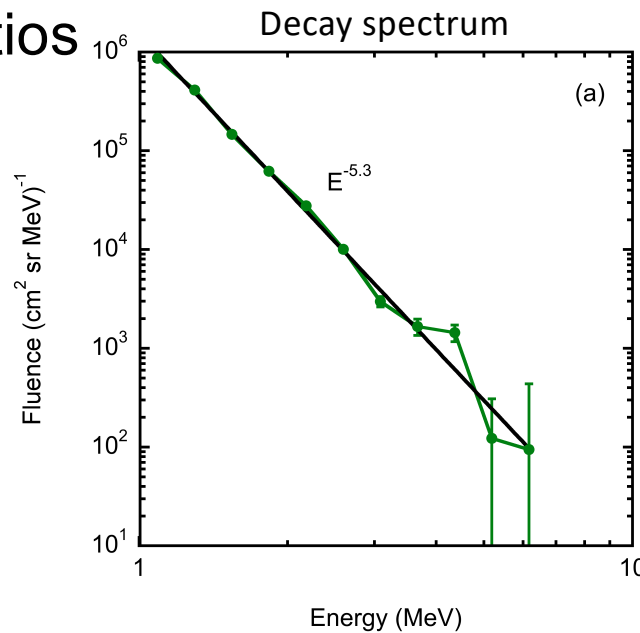
- Not simple power laws
- Ellison-Ramaty form
 - Low break energies
- Energy dependent ratios
- Can do full event for O and Fe





Spectra

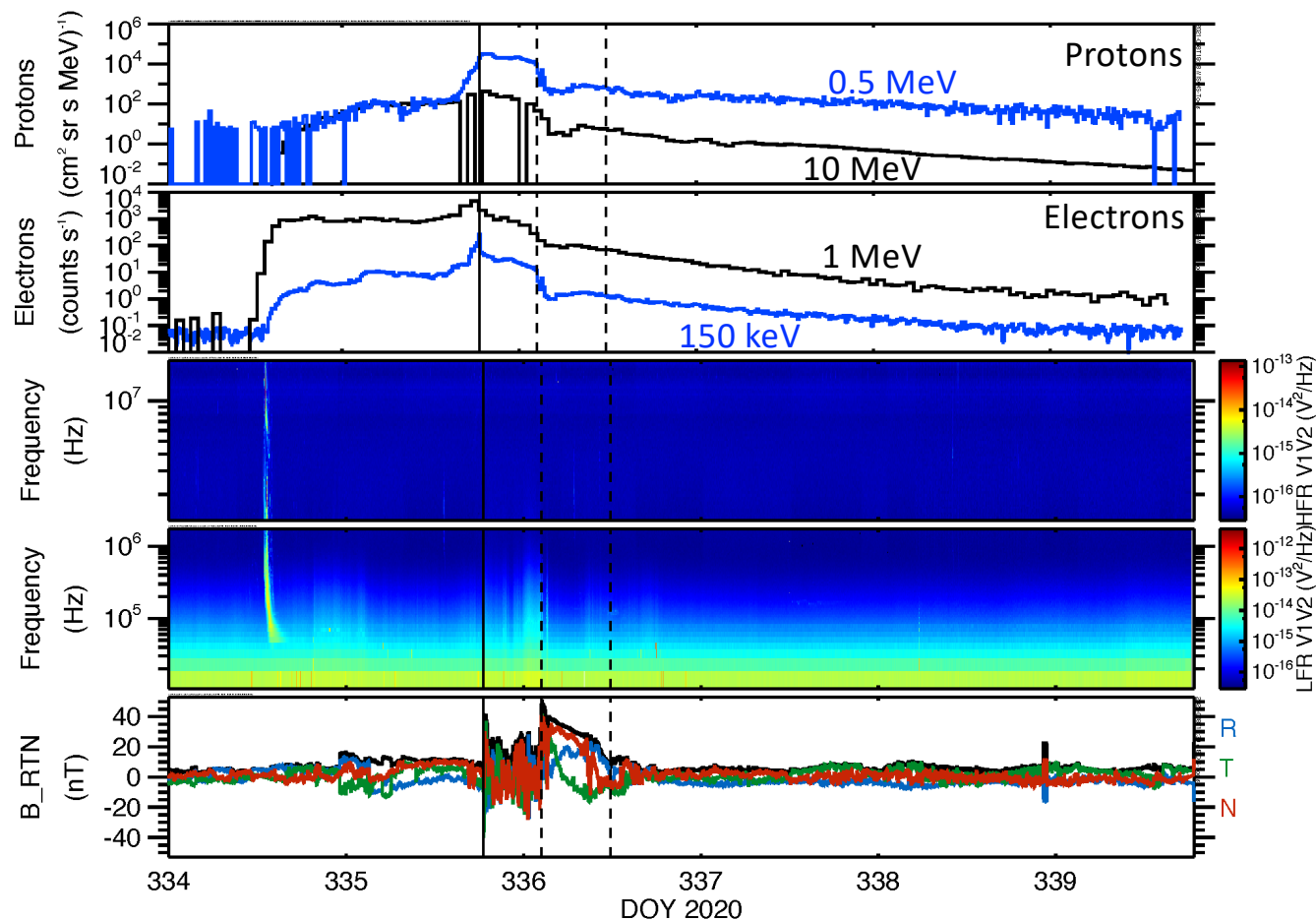
- Not simple power laws
- Ellison-Ramaty form
 - Low break energies
- Energy dependent ratios
- Can do full event for O and Fe
- And electrons





Temporal Variations

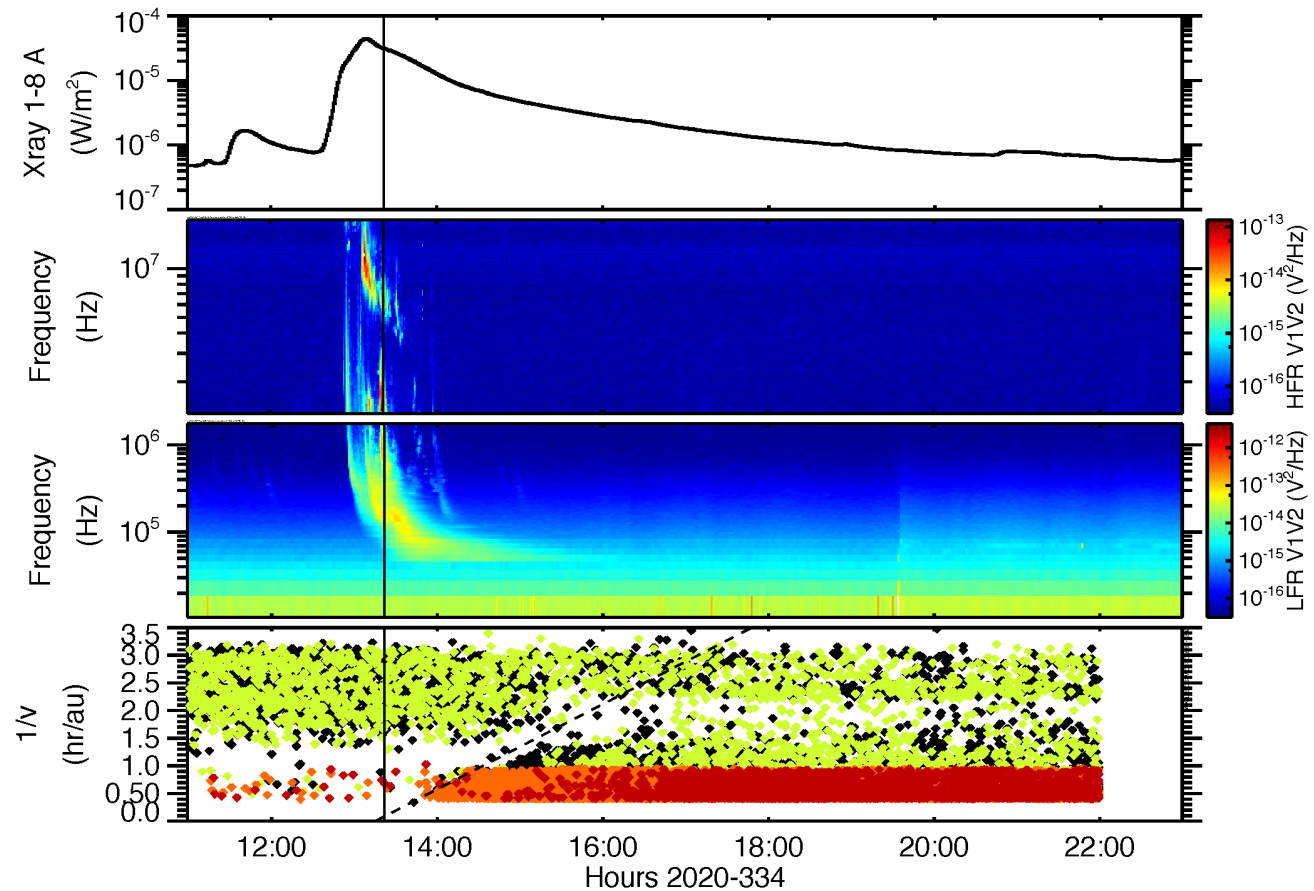
- Clear structures
 - Shock
 - Sheath
 - Magnetic cloud





Temporal Variations

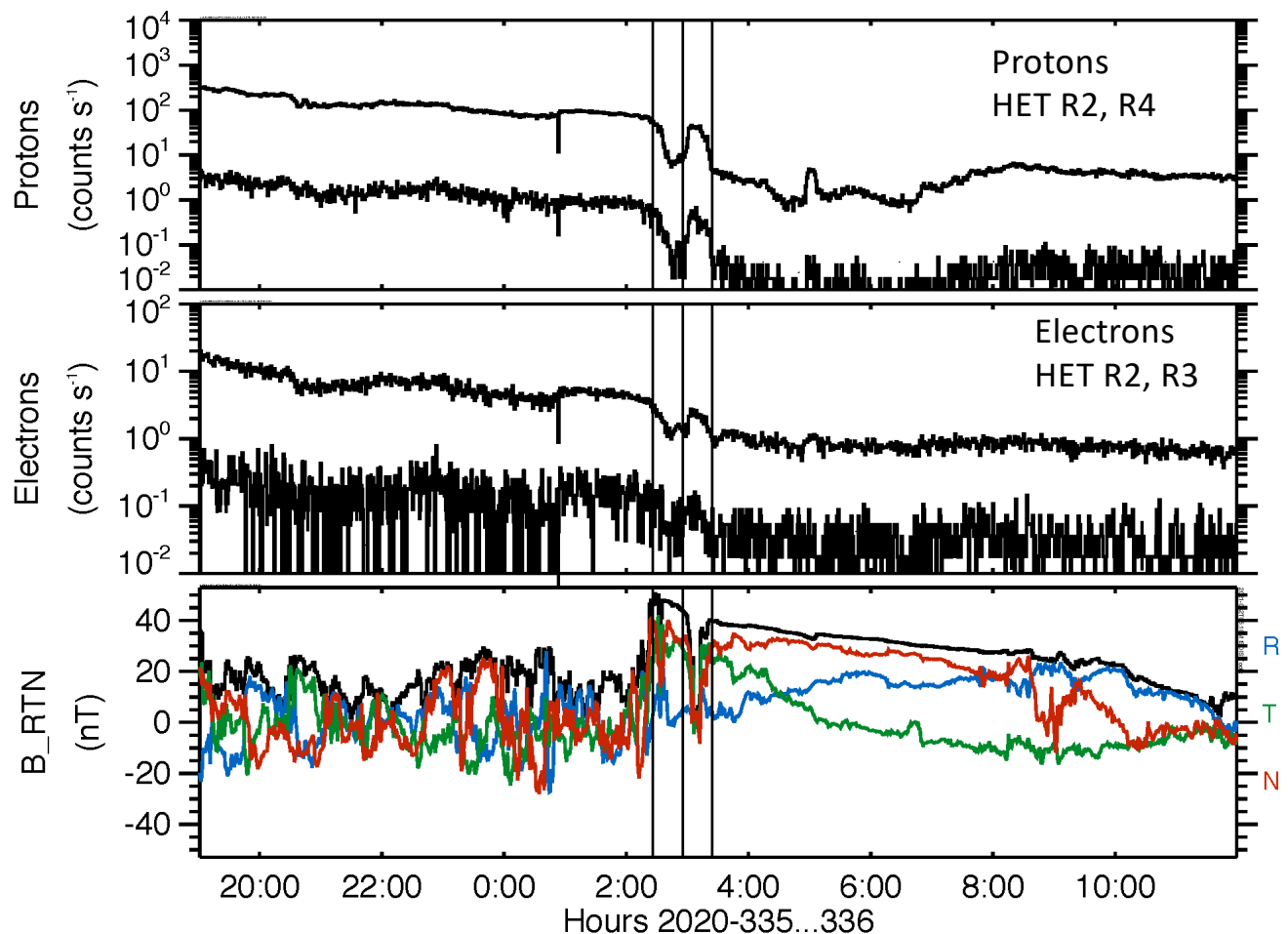
- Clear structures
 - Shock
 - Sheath
 - Magnetic cloud
- Onset shows particles following field
- Particle release time during type II & III





Temporal Variations

- Clear structures
 - Shock
 - Sheath
 - Magnetic cloud
- Onset shows particles following field
- Particle release time during type II & III
- Cloud suppresses SEPs
 - PSP has brief exit





Summary

- First mid-size event (circumsolar: STEREO-A, SoLO, SOHO/ACE)
 - Composition/spectra most complete for decay due to instrumental effects
 - Fairly 'standard'
 - Release time corresponds to type III & II bursts and near peak of x-rays
 - Cloud suppresses SEP intensity during decay
 - Brief exits shows SEP intensities still higher outside cloud
 - More circumsolar events: 17 April 2021, 28 May 2021...
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