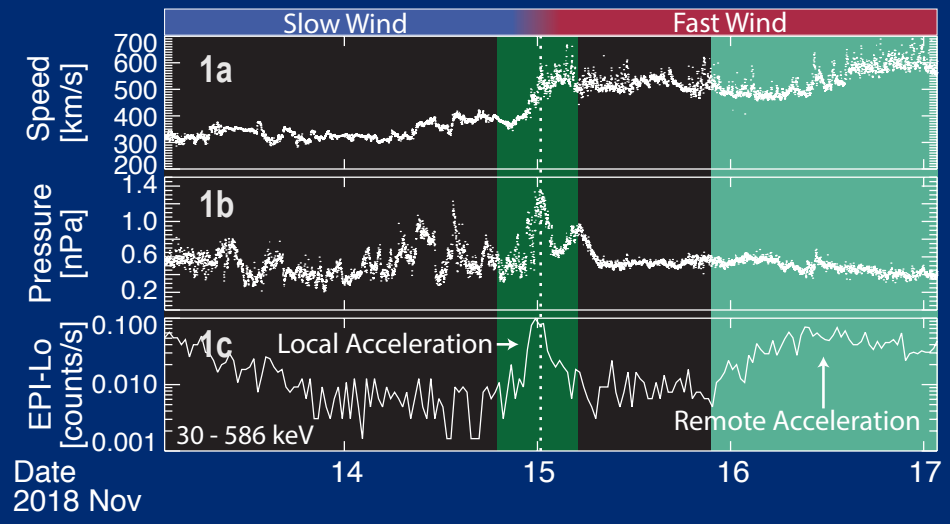
Ion acceleration at stream interaction regions (SIRs) observed by the extraordinary measurements of Parker Solar Probe (PSP)

How do SIRs form, evolve, and accelerate ions as they propagate away from the Sun?

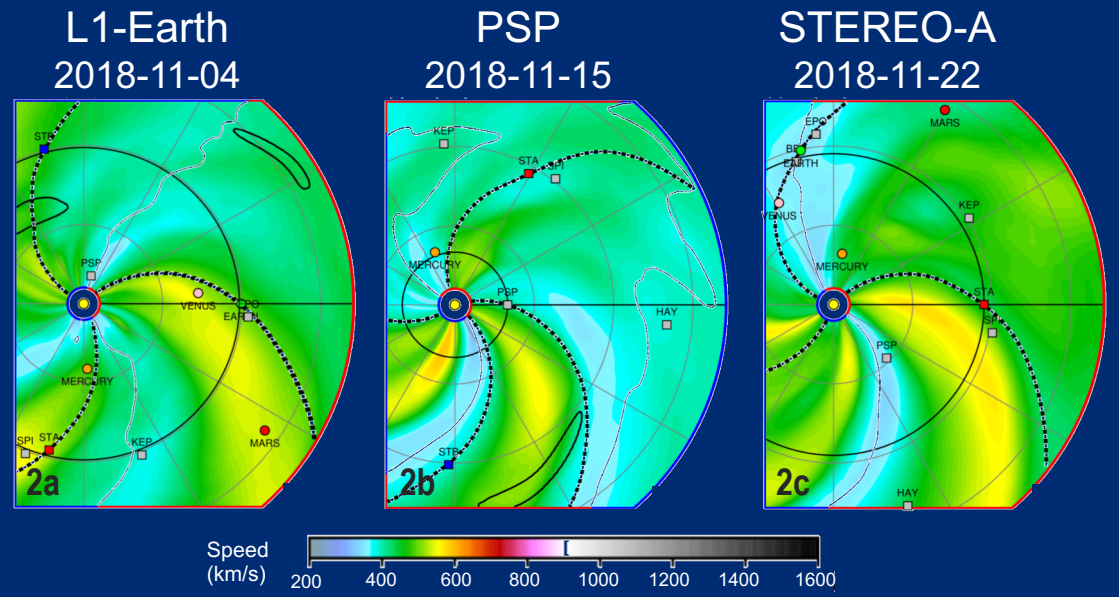
- To study this, we compare observations of SIRs observed by PSP at different radial distances to observations of the same structure at Earth distances *(bottom right figure)*.
- When at 1/3 of the distance from the Sun as the Earth, PSP observed an SIR *(top right figure)*.
- The isolated enhancement of suprathermal particles *(panel 1c)* at the stream interface (dotted vertical line) is from compression-related local acceleration, while the enhancement following the SIR (Nov 16th – 17th), is instead accelerated at a shock located beyond the Earth's orbit. In observations at the Earth's orbit, these populations are co-located and can't be detangled.
- This suggests that, unlike at Earth, the locally accelerated particles become spatially separated from those propagating from distant shocks allowing for unambiguous analysis of both populations for the first time.

Parker Solar Probe is unlocking the mysteries of particle acceleration within the inner heliosphere!

Parker Solar Probe observes an SIR:



Tracking an evolving SIR:



R. C. Allen (2020), *ApJS*, doi:10.3847/1538-4365/ab578f