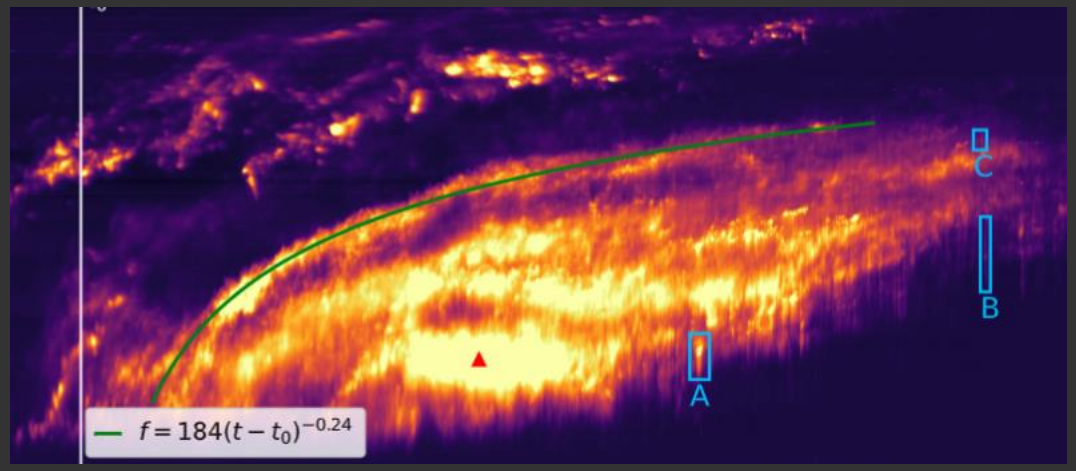
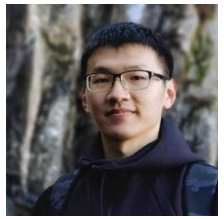
HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

Energetic electron beam traces in CME revealed by interferometric imaging of Herringbone structure in CME

Peijin Zhang, Diana Morosan,
Anshu Kumari, Emilia Kilpua

University of Helsinki





Peijin Zhang

pjzhang.cc

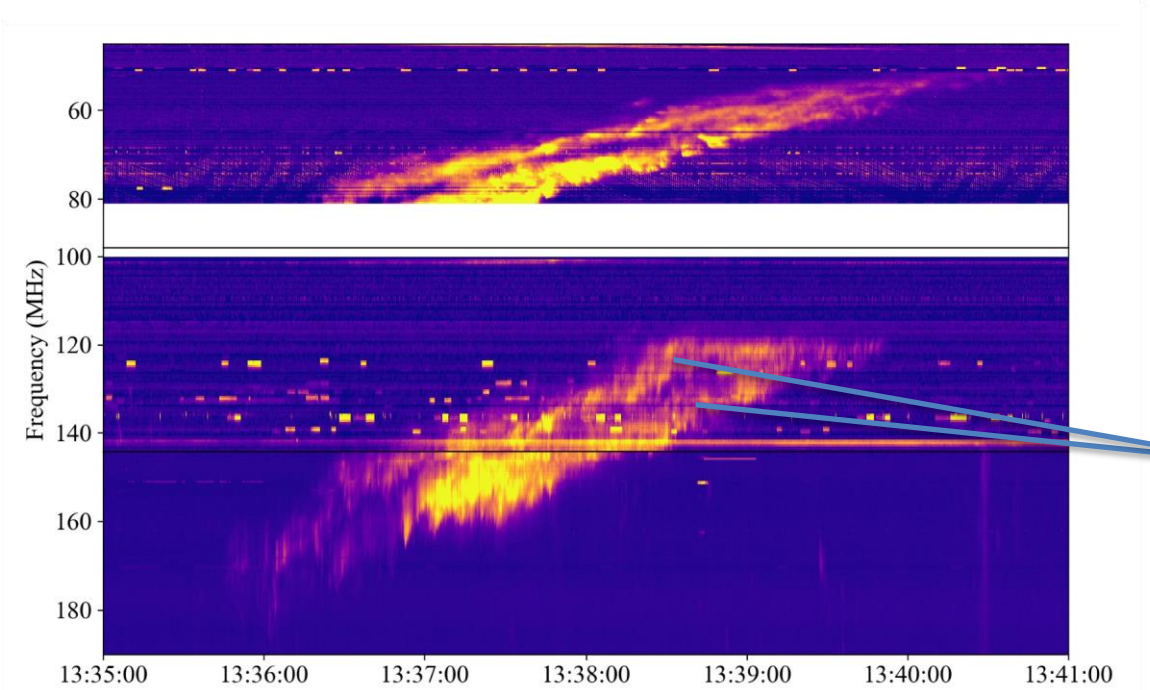
@peijin94

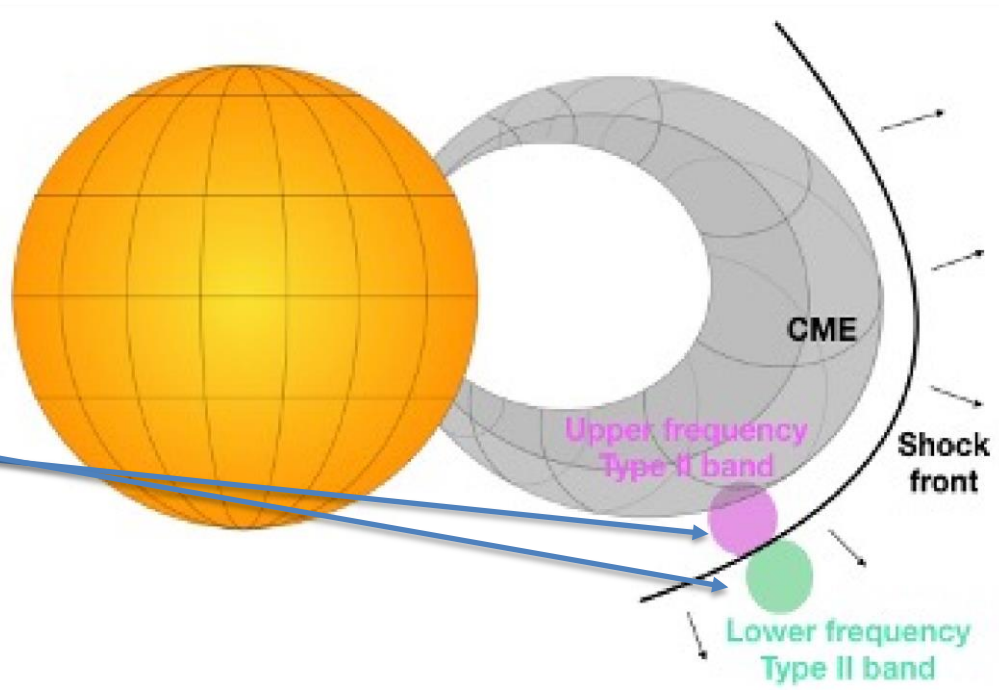
ACADEMY OF FINLAND

LOFAR
Solar and Space Weather
KSP

Coronal mass ejection and Type II radio burst

- Type II radio burst is usually generated by shocks driven by CME

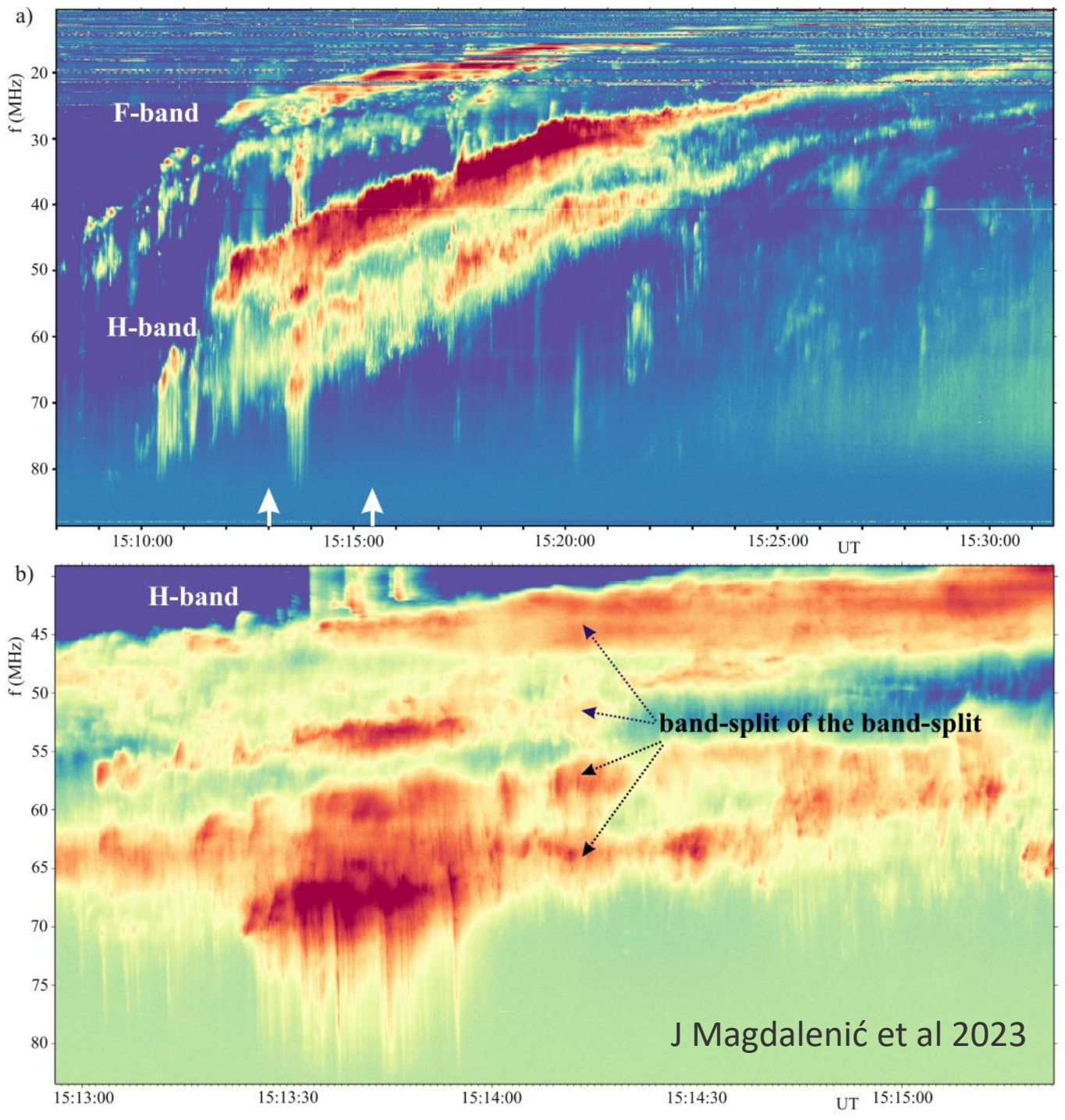




Fine structures in Type II solar radio burst

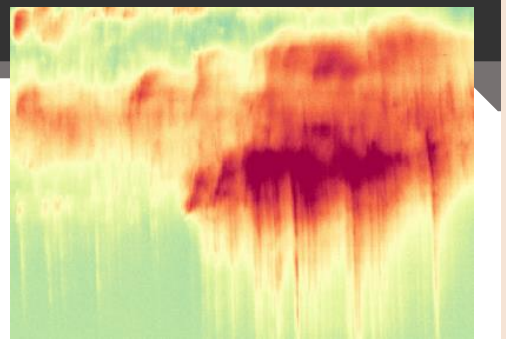
- Plasma emission intensity is strongly dependent on the plasma parameter and the beam electron
- Density structure, magnetic field and beam electron is complicated

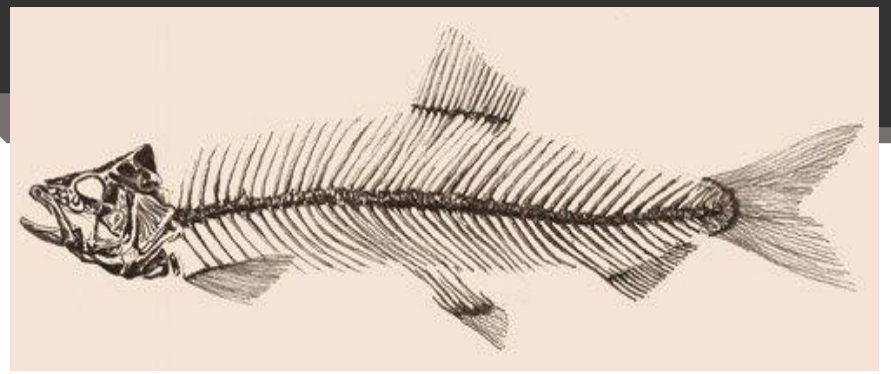
- Rich amount of fine structures in type II radio bursts



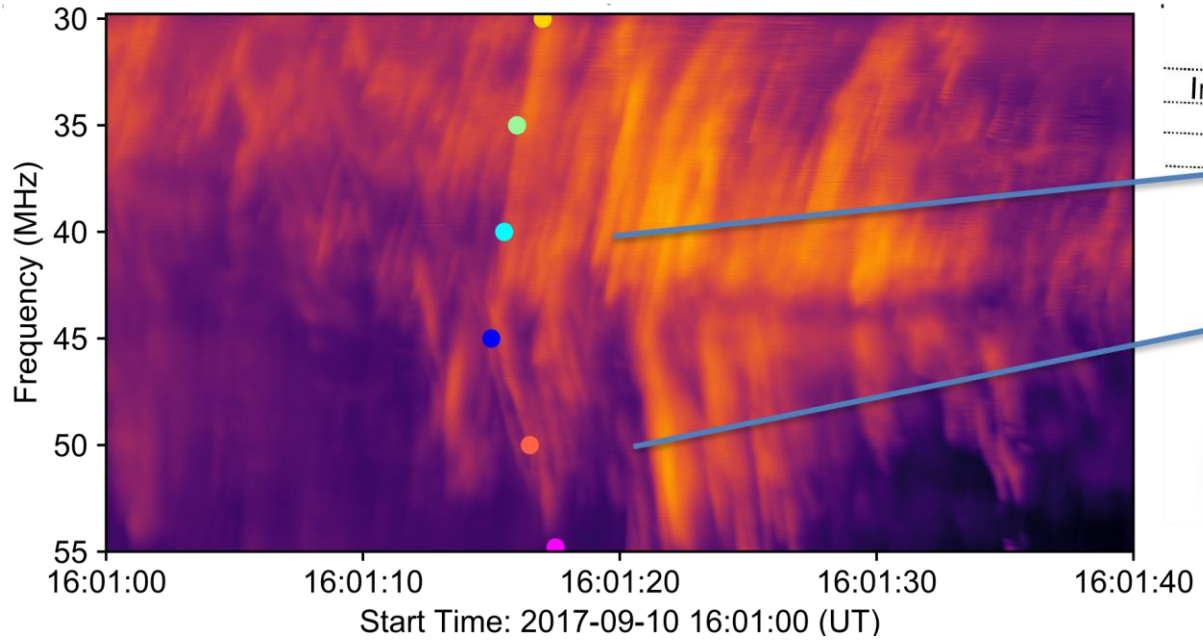
Herringbone structure

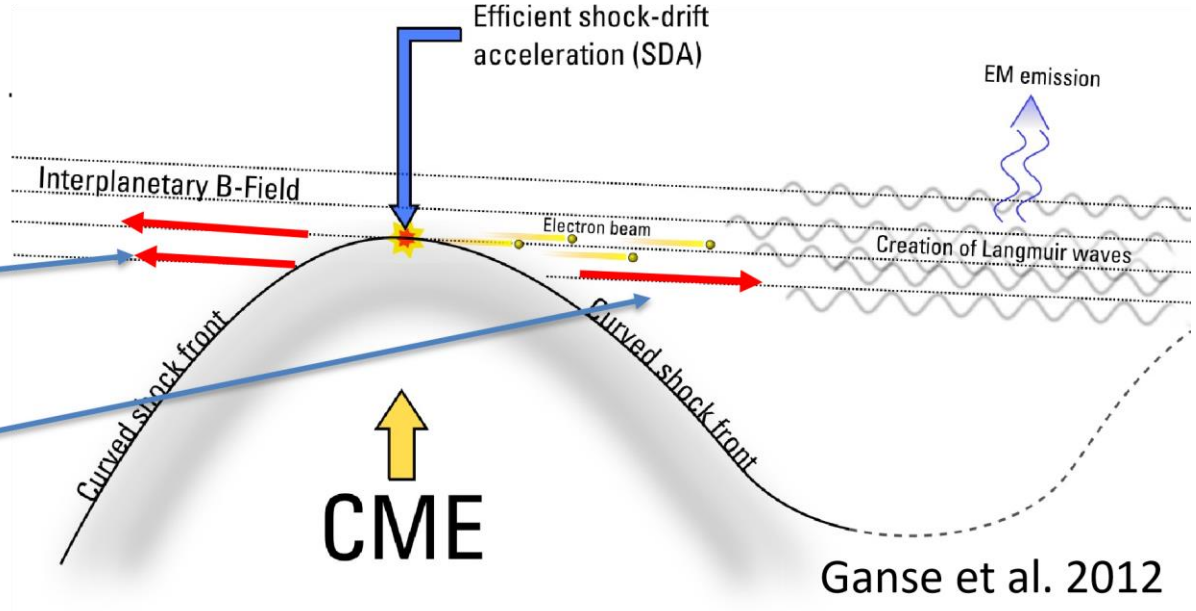
- Named after its shape





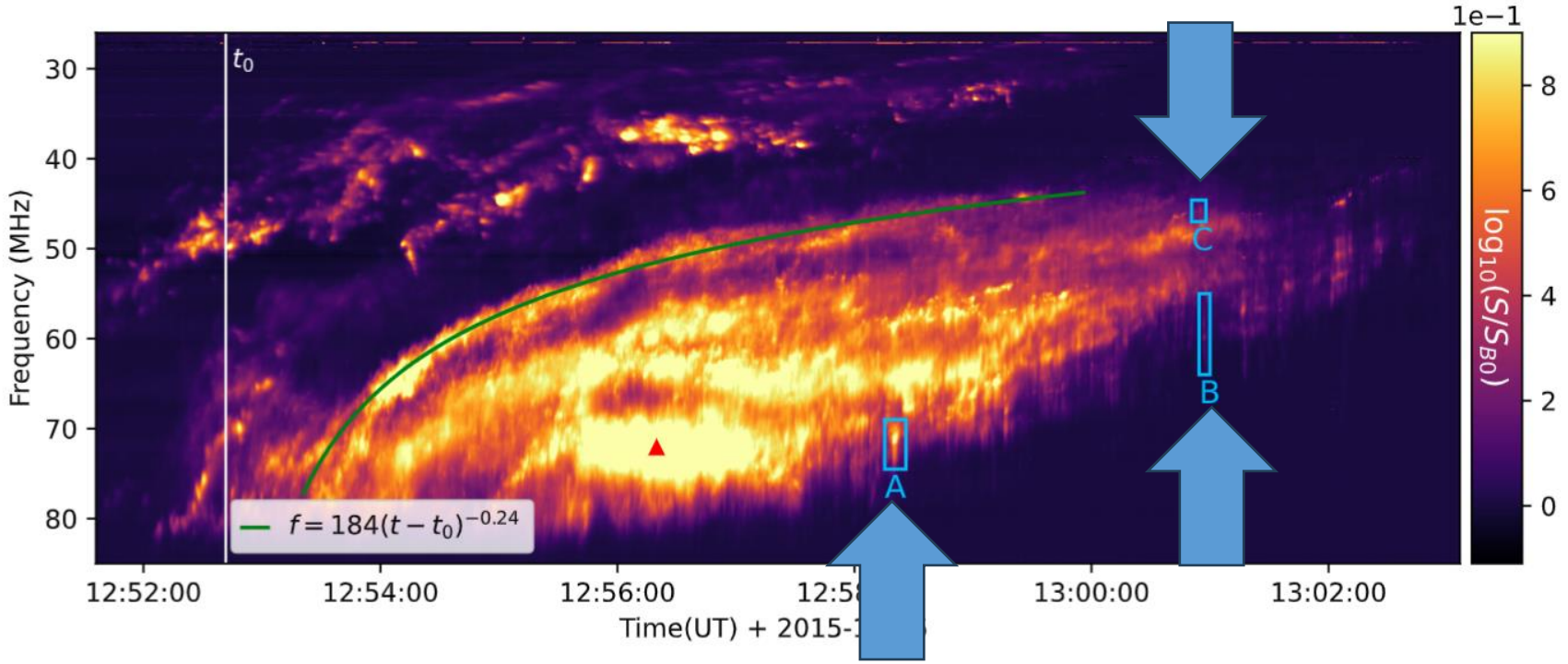
- From electrons accelerated in quasi perpendicular magnetic field

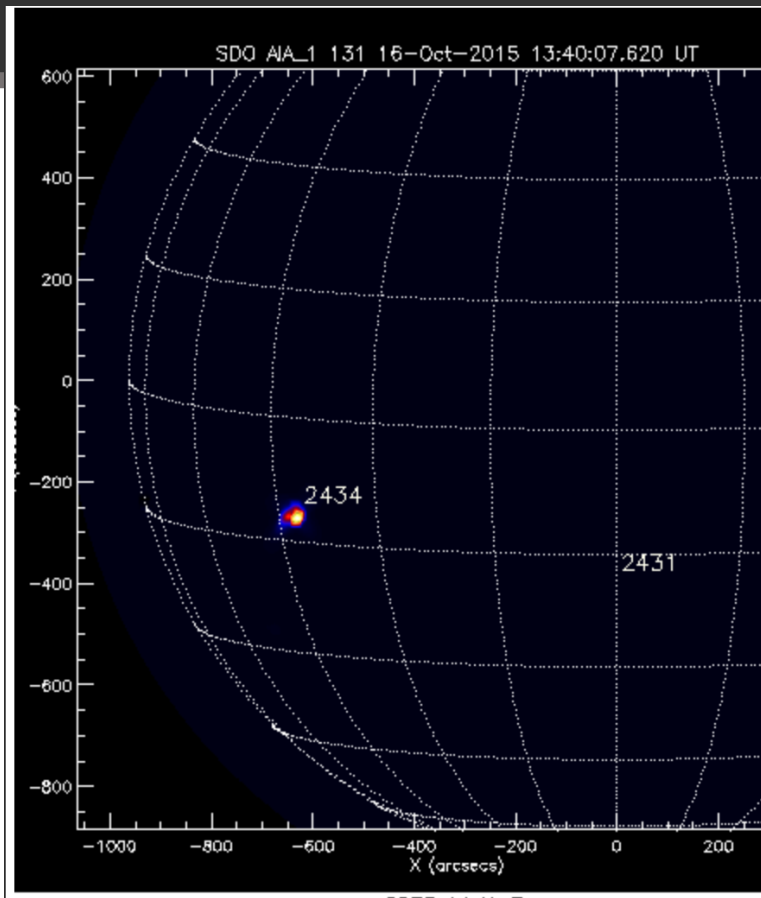




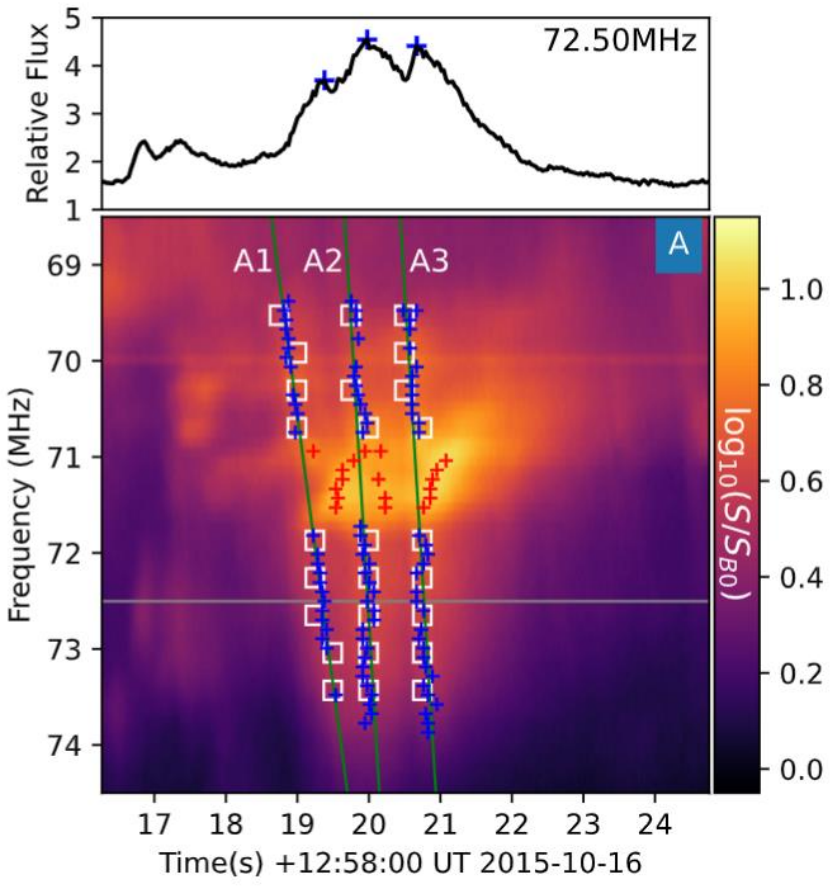
Event: 2015-Oct-16th

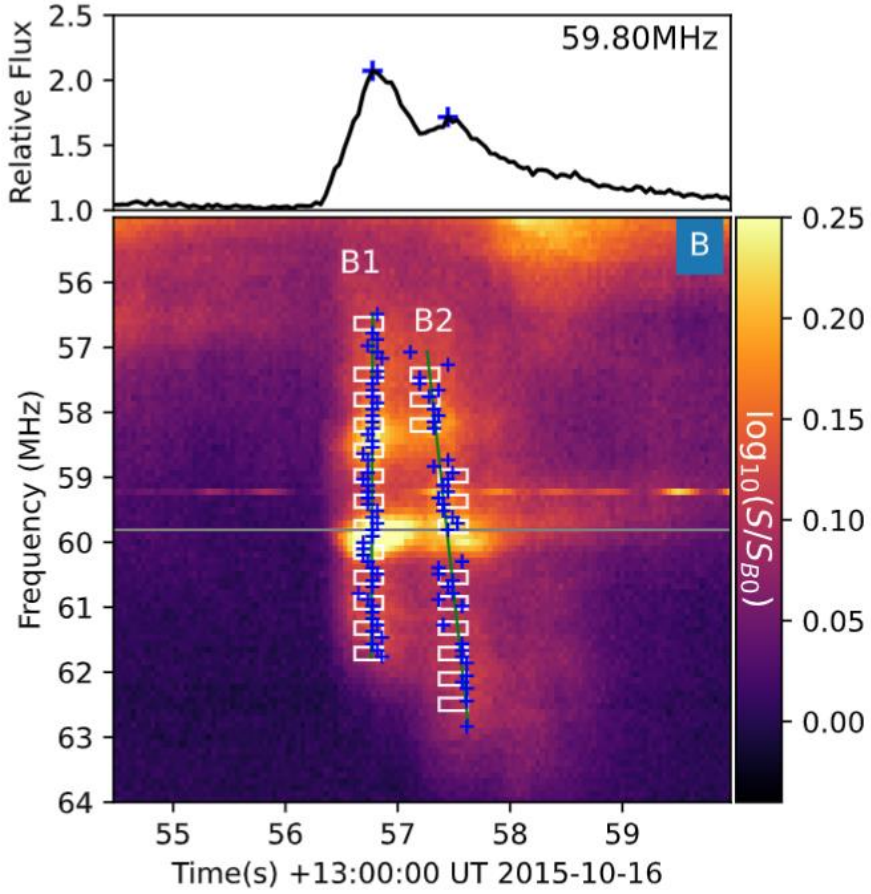
- Type II radio burst
- C3.8 level flare

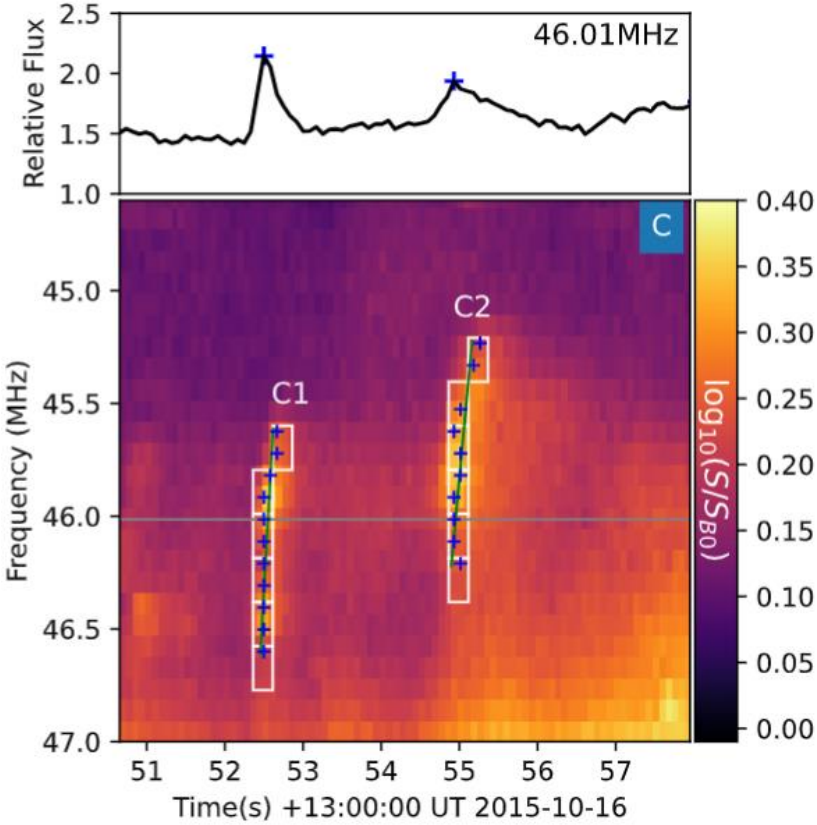




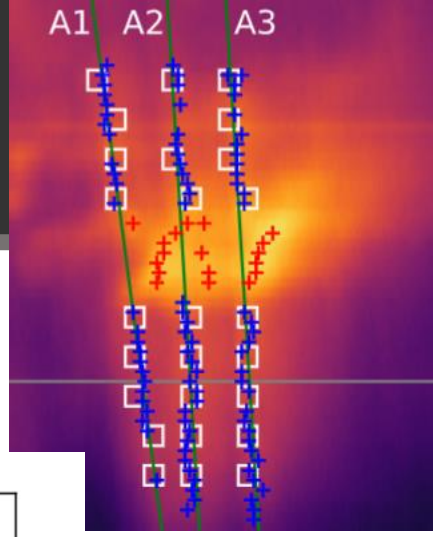
Herringbone structure groups

- 

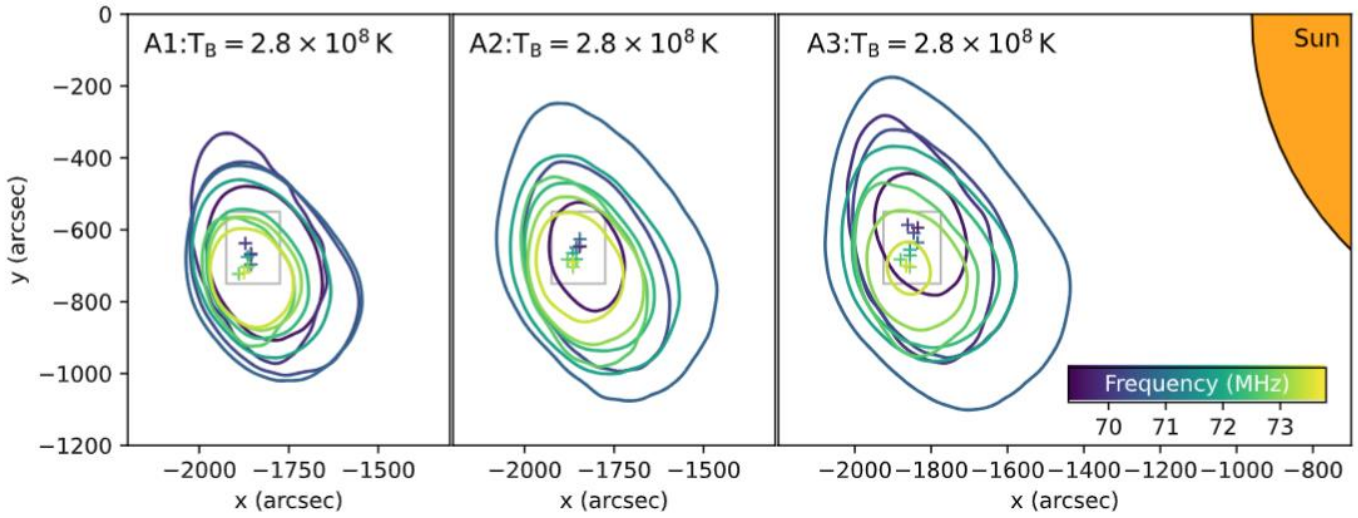


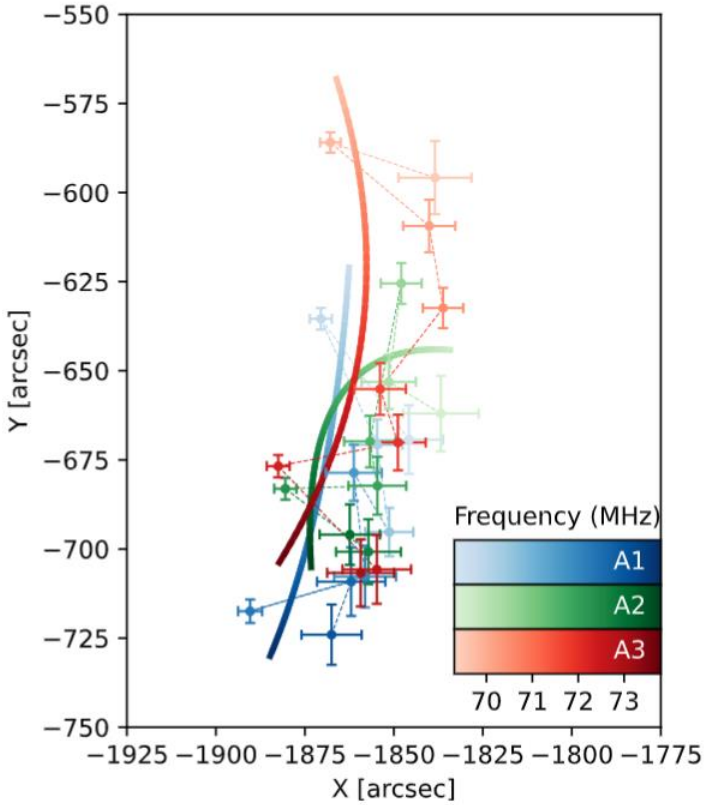


Herringbone structure group A



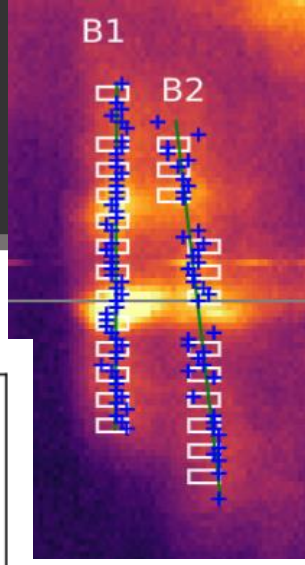
- Source shape and location



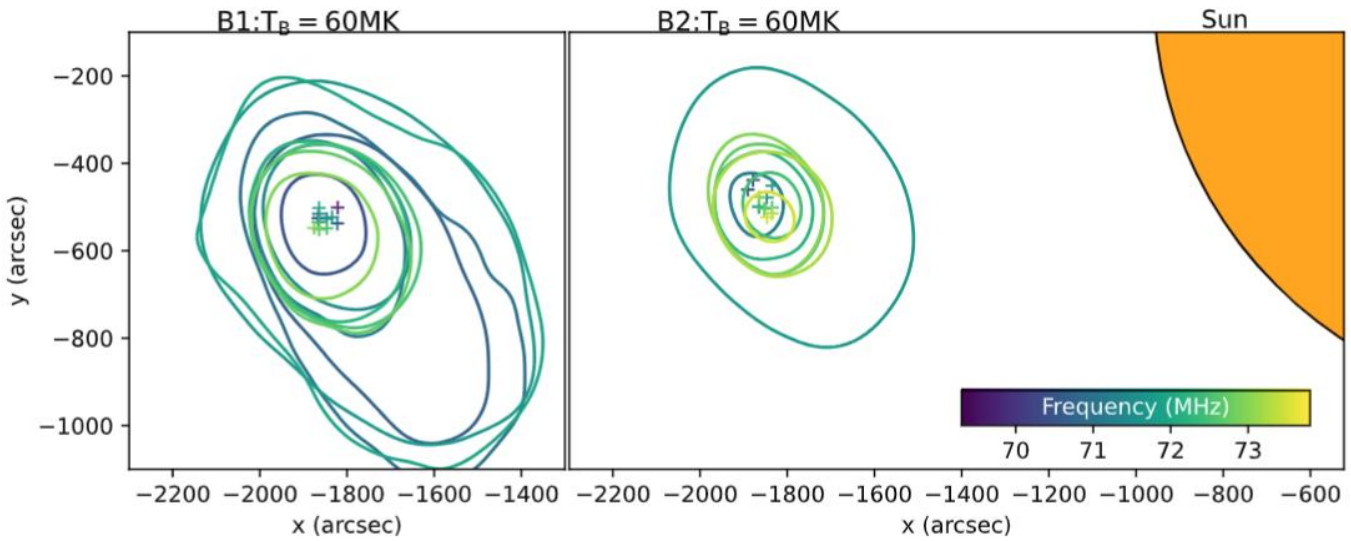


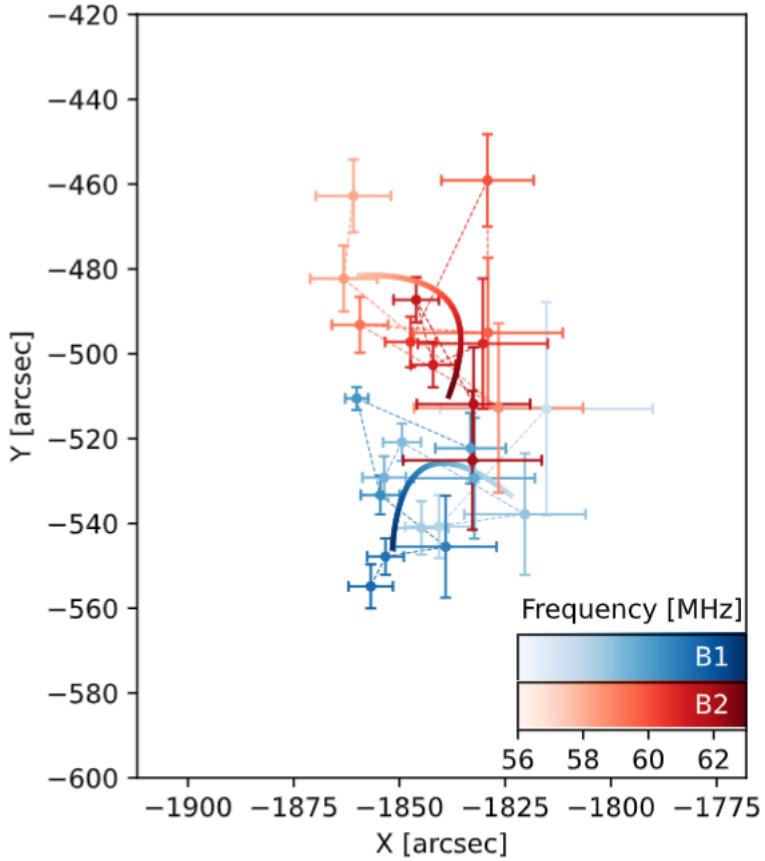
- Frequency drift rate: 5.6MHz/s, 12.3MHz/s, and 12.0MHz/s

Herringbone structure group B



- Source shape and location

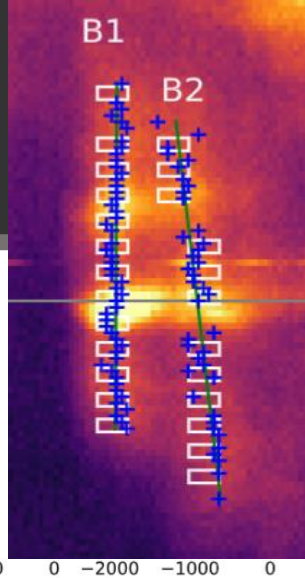


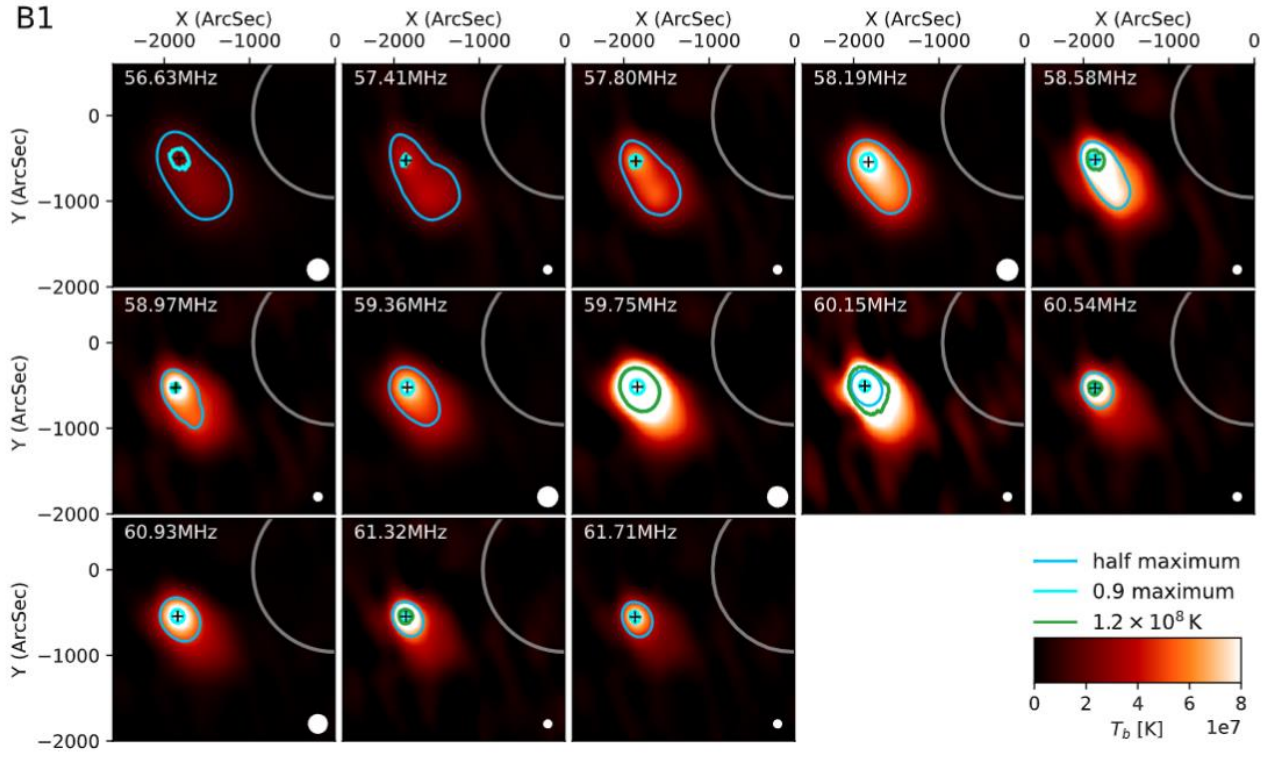


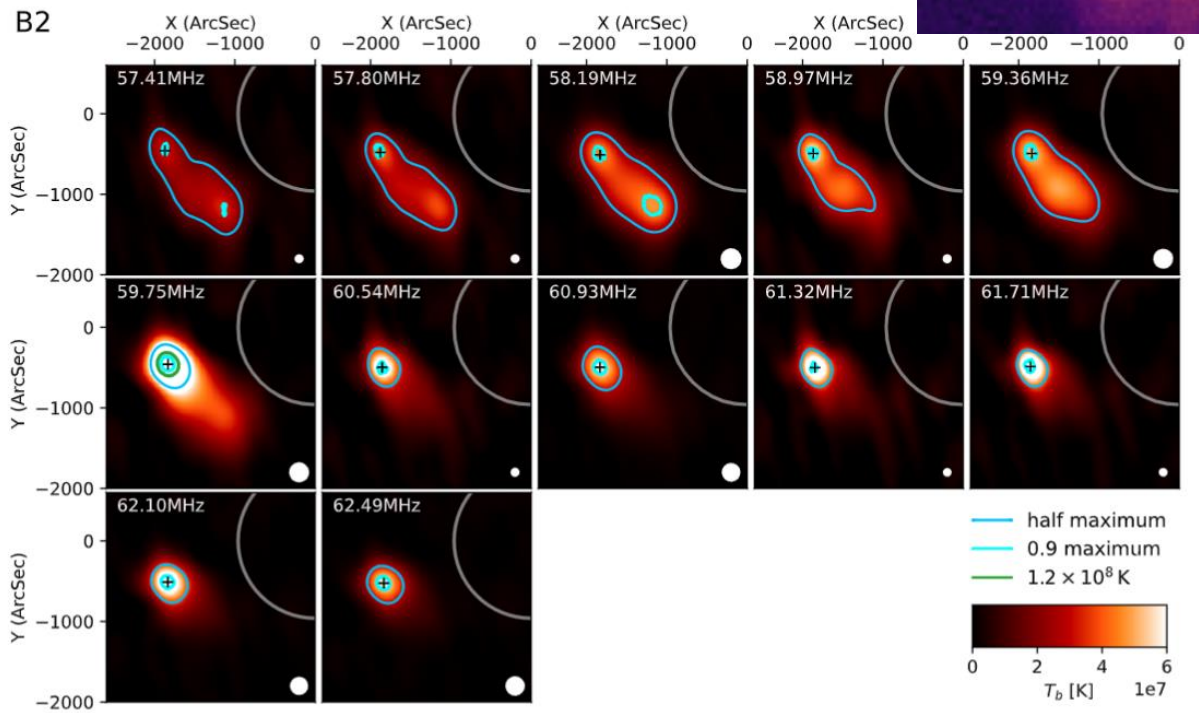
- Frequency drift rate: **-373.0MHz/s** 15.7 MHz/s

Complex spatial structure

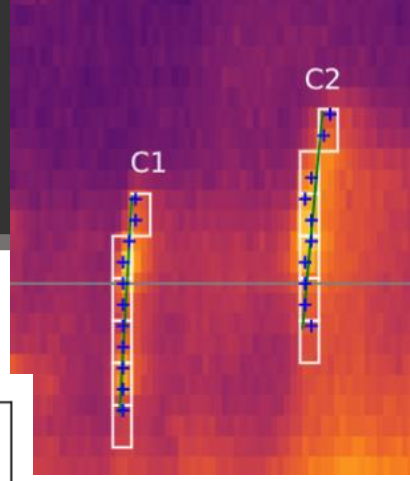
- Group B1 and B2



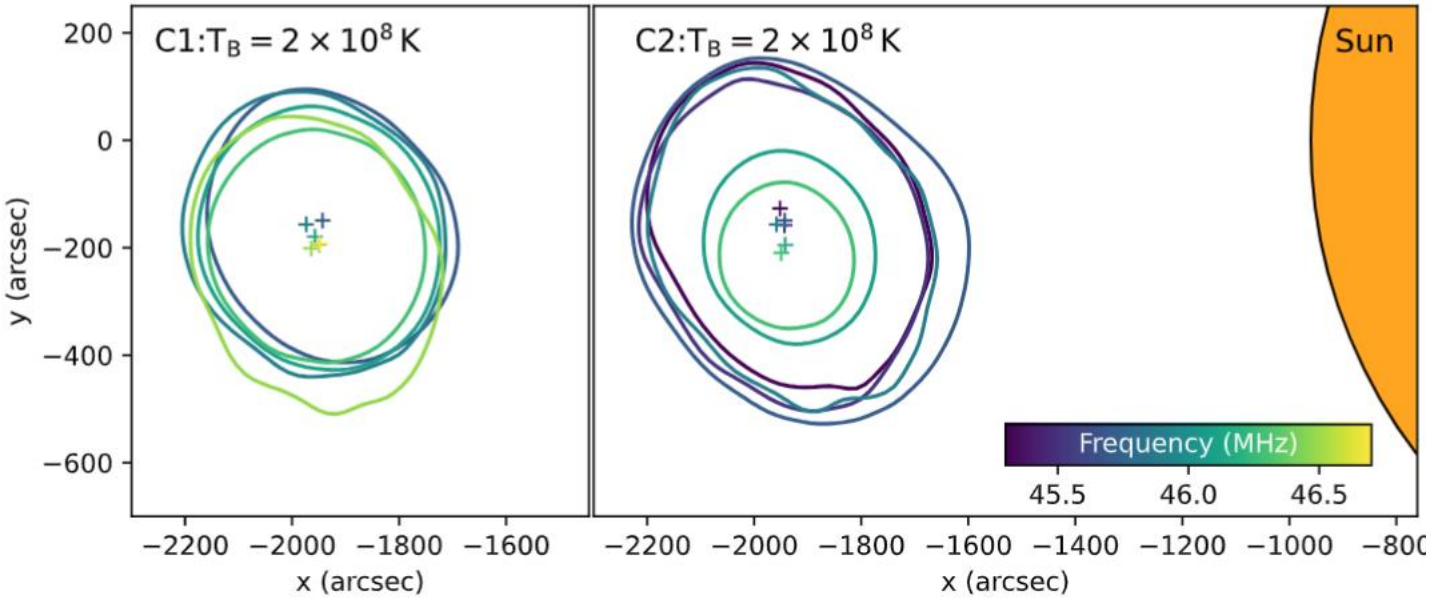


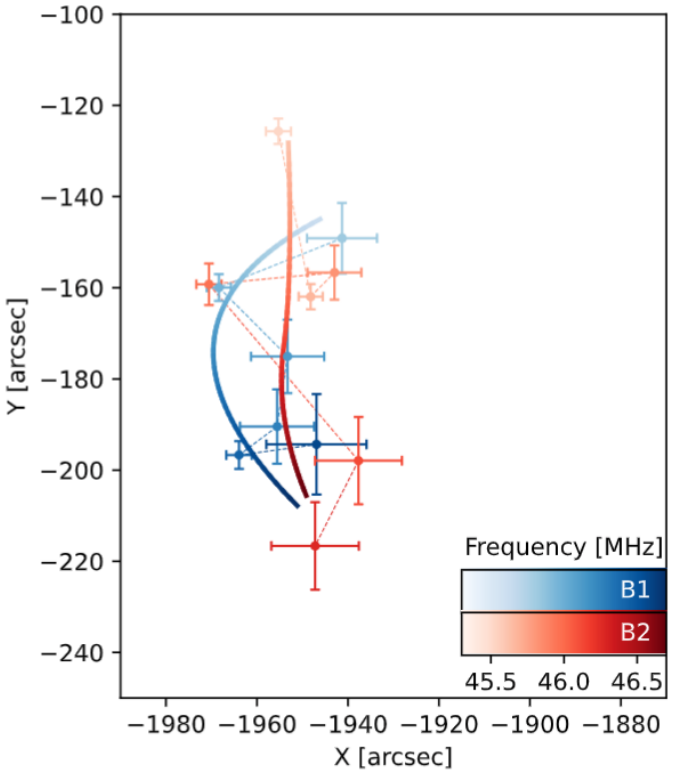


Herringbone structure group C



- Source shape and location

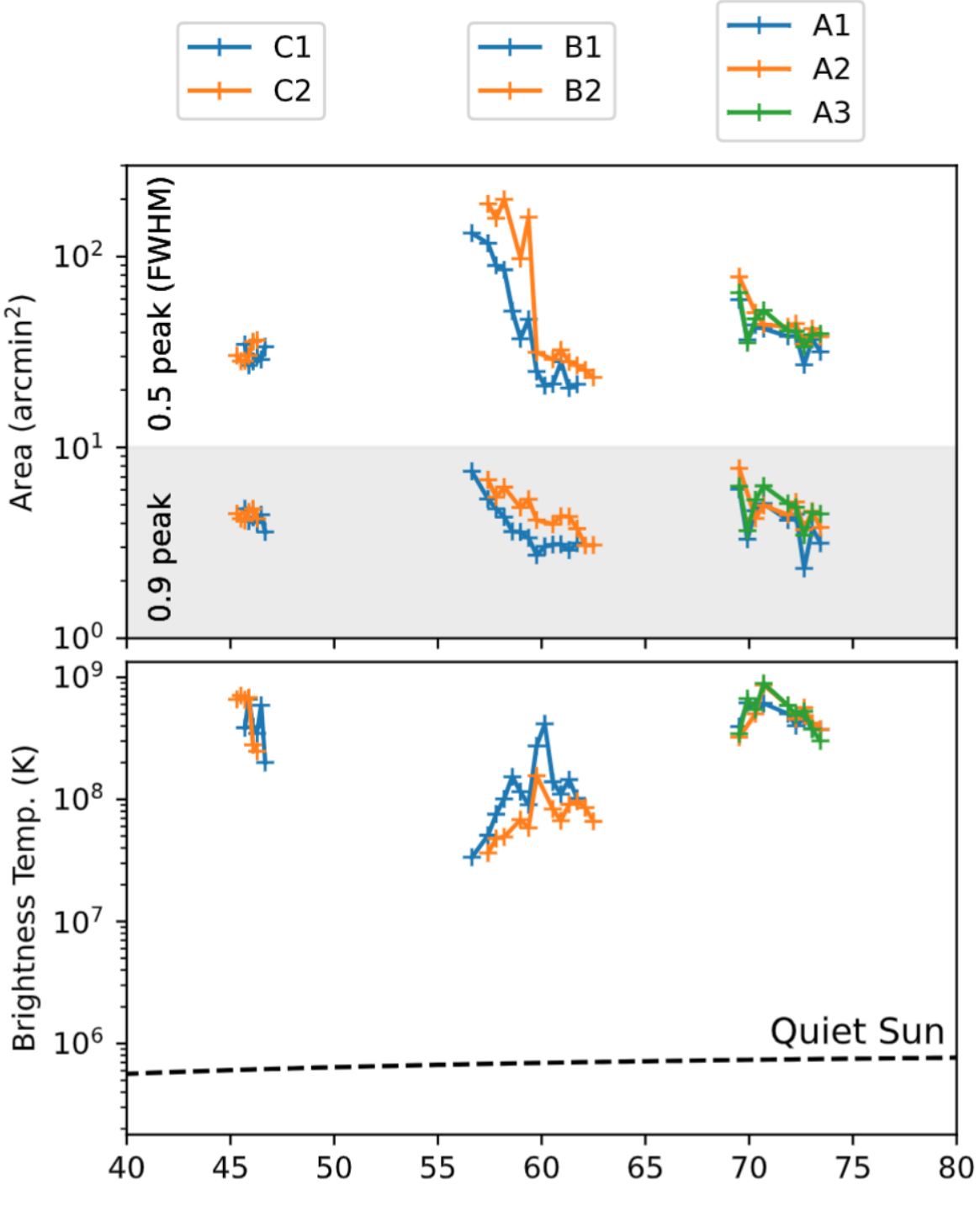




- Frequency drift rate: -6.1MHz/s, -3.7MHz/s

Summary

- Source size 2-20arcmin^2
- Brightness temperature 1e8-1e9 K
- Frequency drift (normally) 3-30 MHz/s
- Exception event : B2, frequency drift -373.0MHz/s , complex spatial structure
- B1 and B2 source are largely separated



Discussion

- How fine structure is generated? do we need new models or refine the current ones?

- Why super fast frequency drift?
- Why big separation in single herringbone group?
- Complex spatial structure indication of energetic electron distribution