

Roseland
Centre
for Solar
Physics

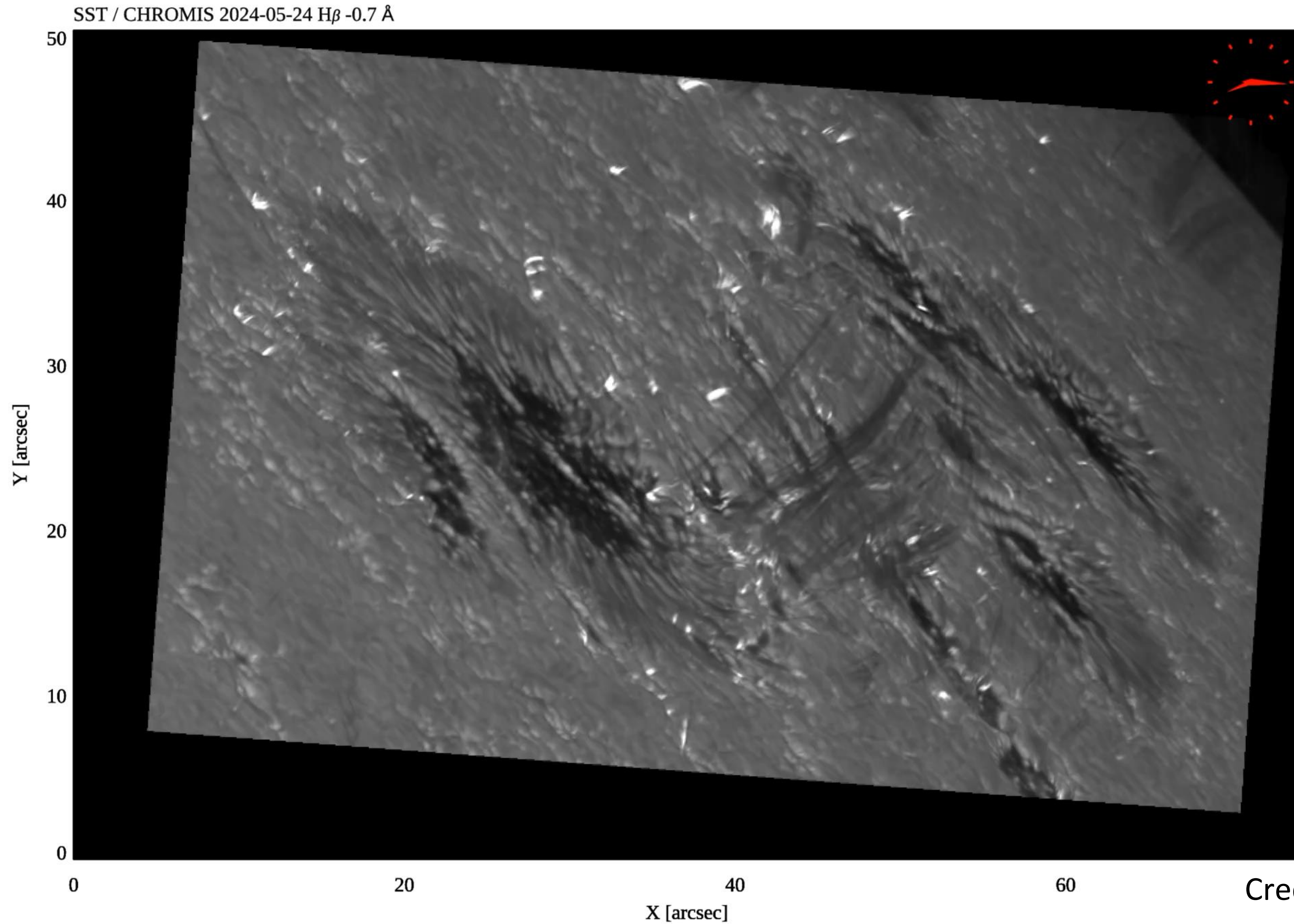
Detection of Ellerman bombs in SST observations

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Nordic-Baltic Astronomy Days 2026

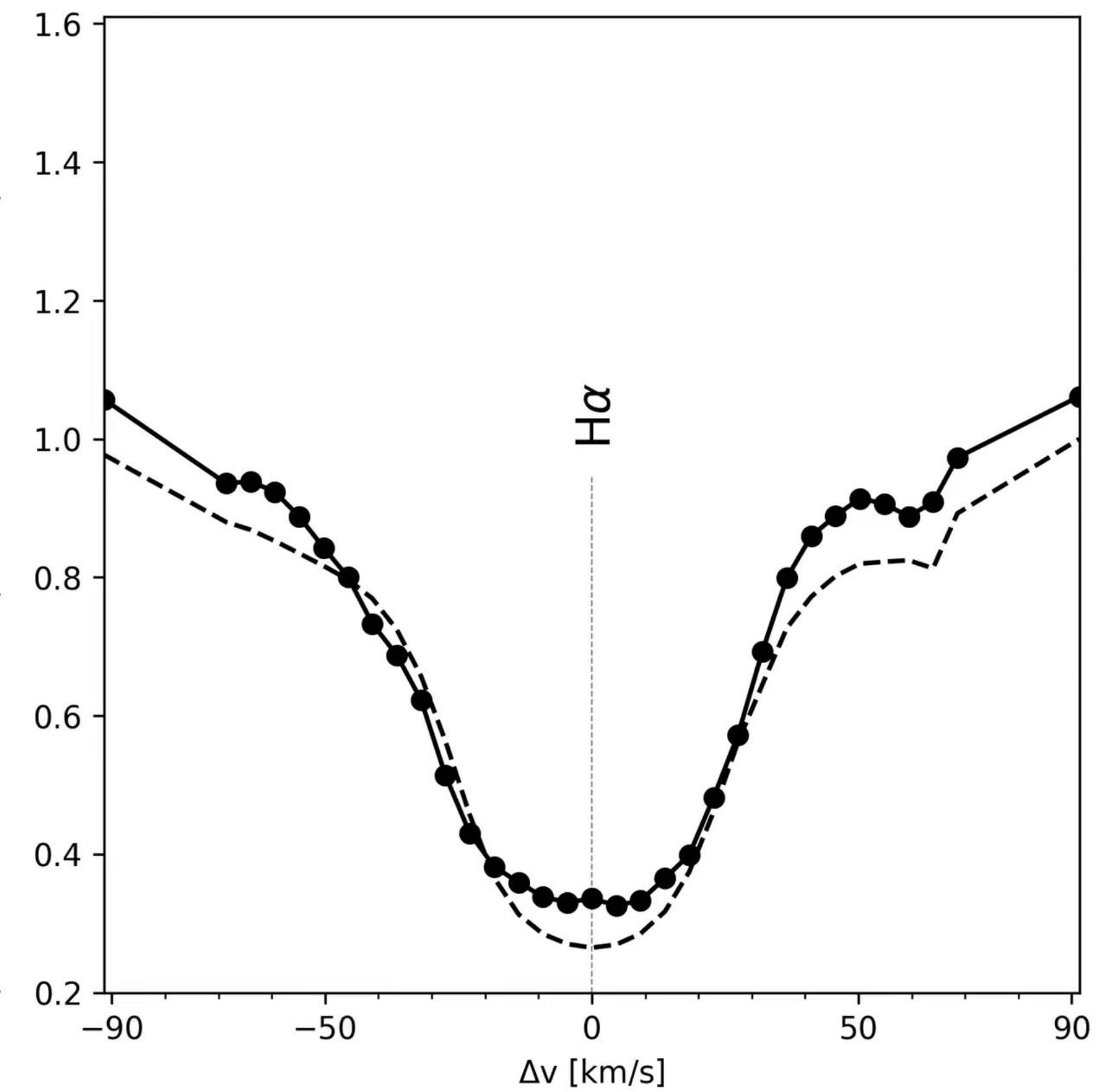
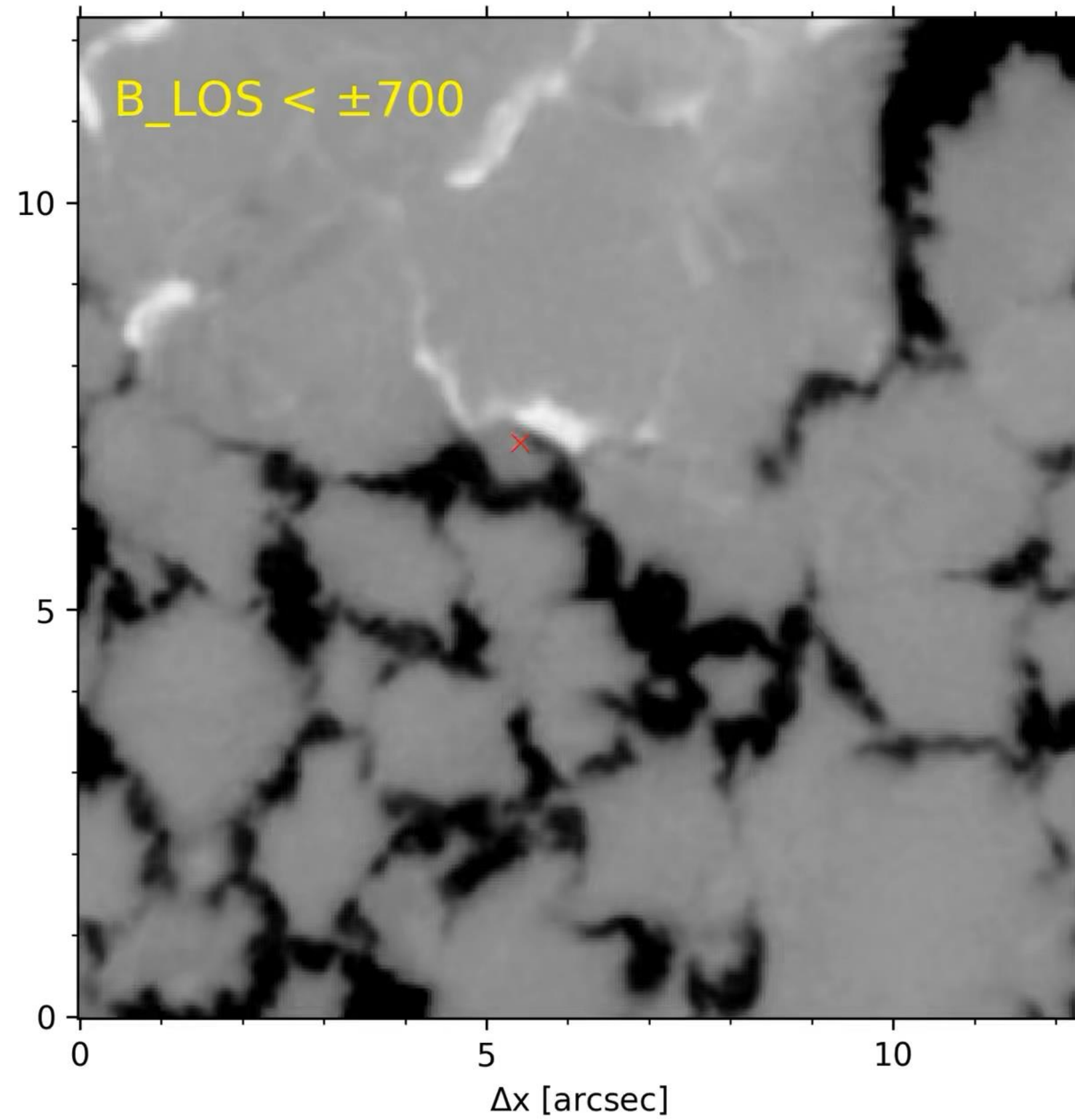
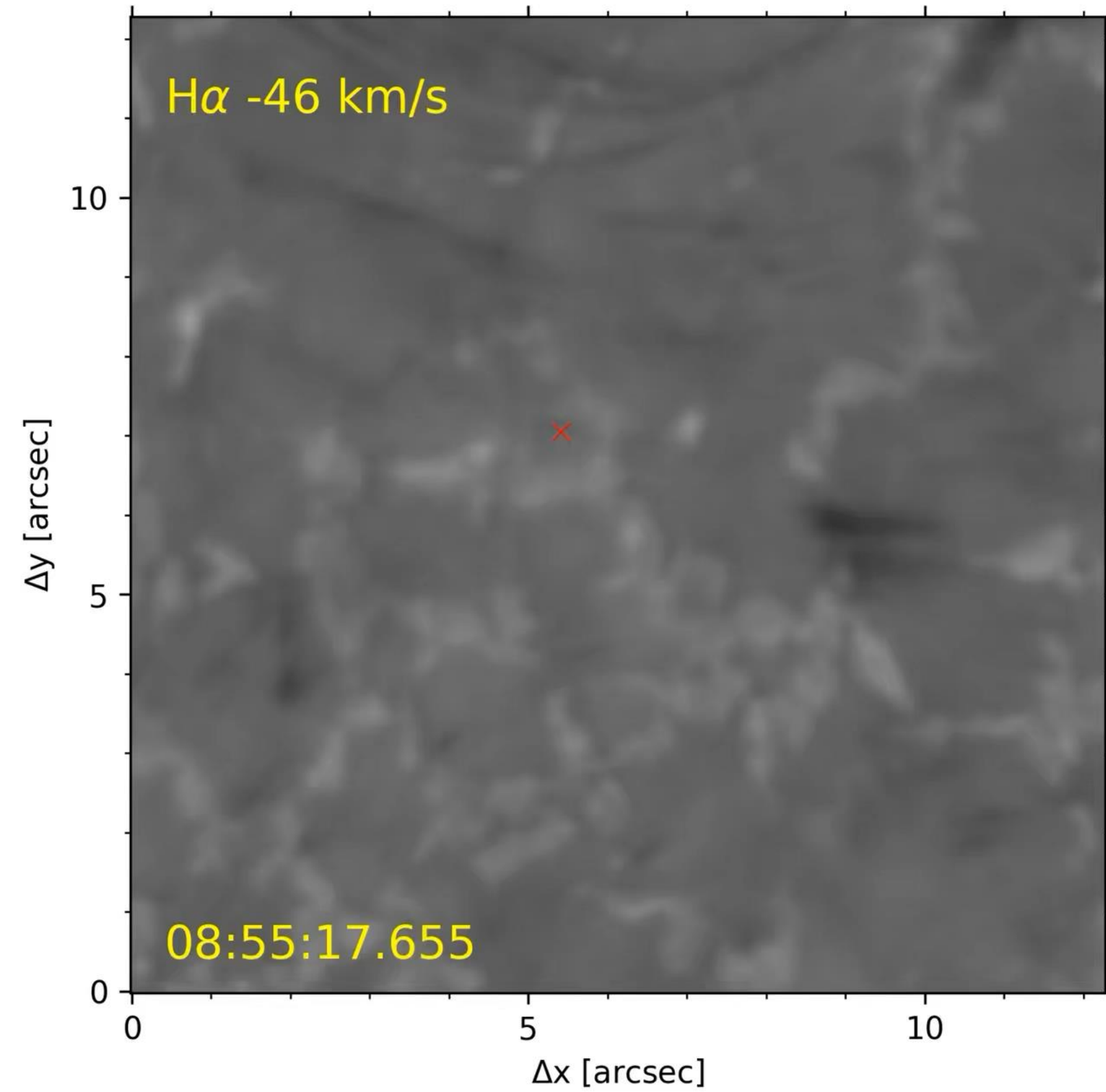
Ellerman bombs (EBs)



R ● C S

Credit: SST/RoCS/UiO

Ellerman bombs (EBs)



SST/CRISP 21-May-2024 AR 13685 by RoCS

R ● C S

Courtesy of Ignasi Josep Solar Poquet

Swedish 1-m Solar Telescope



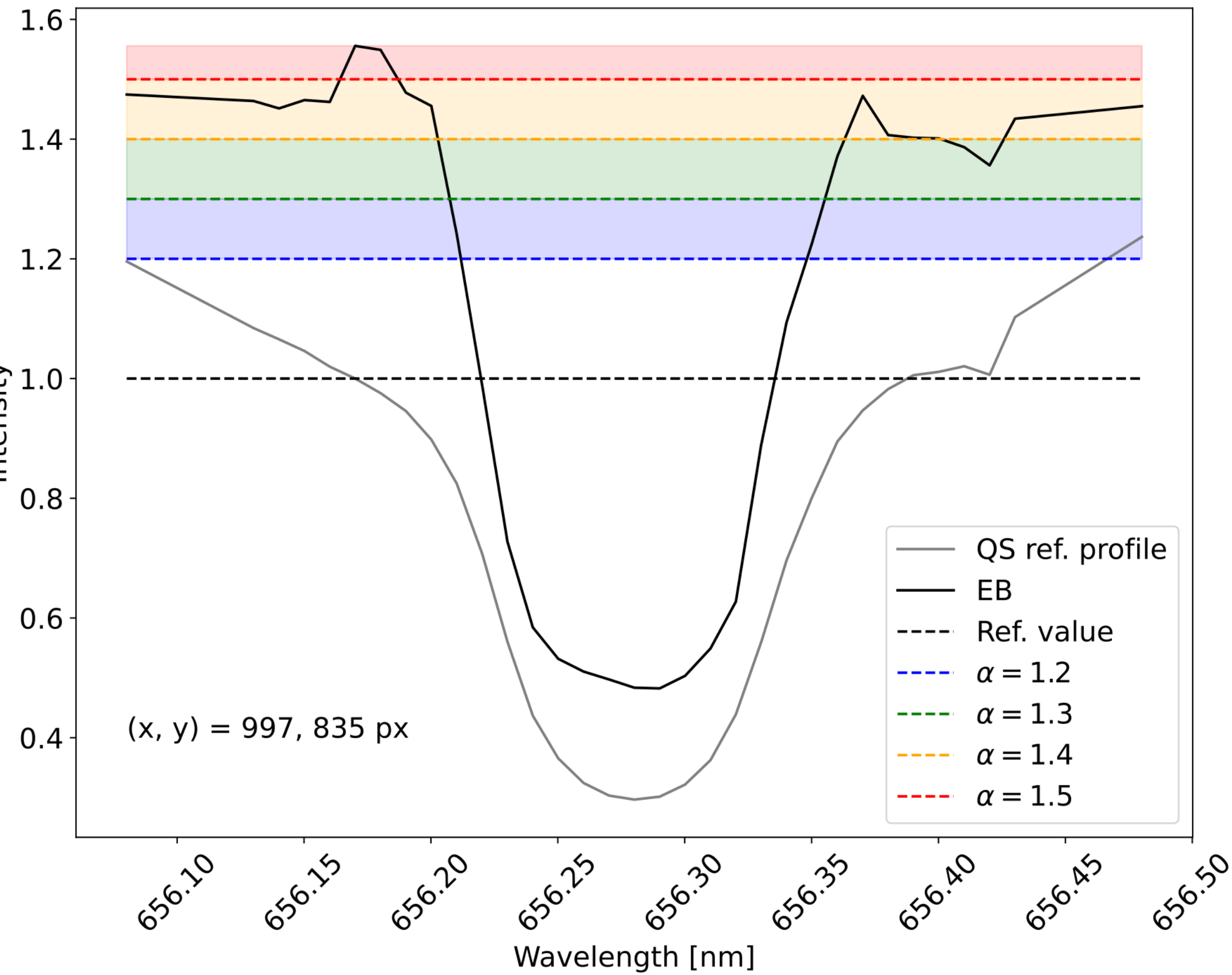
Credit: Tiago Pereira

Motivation

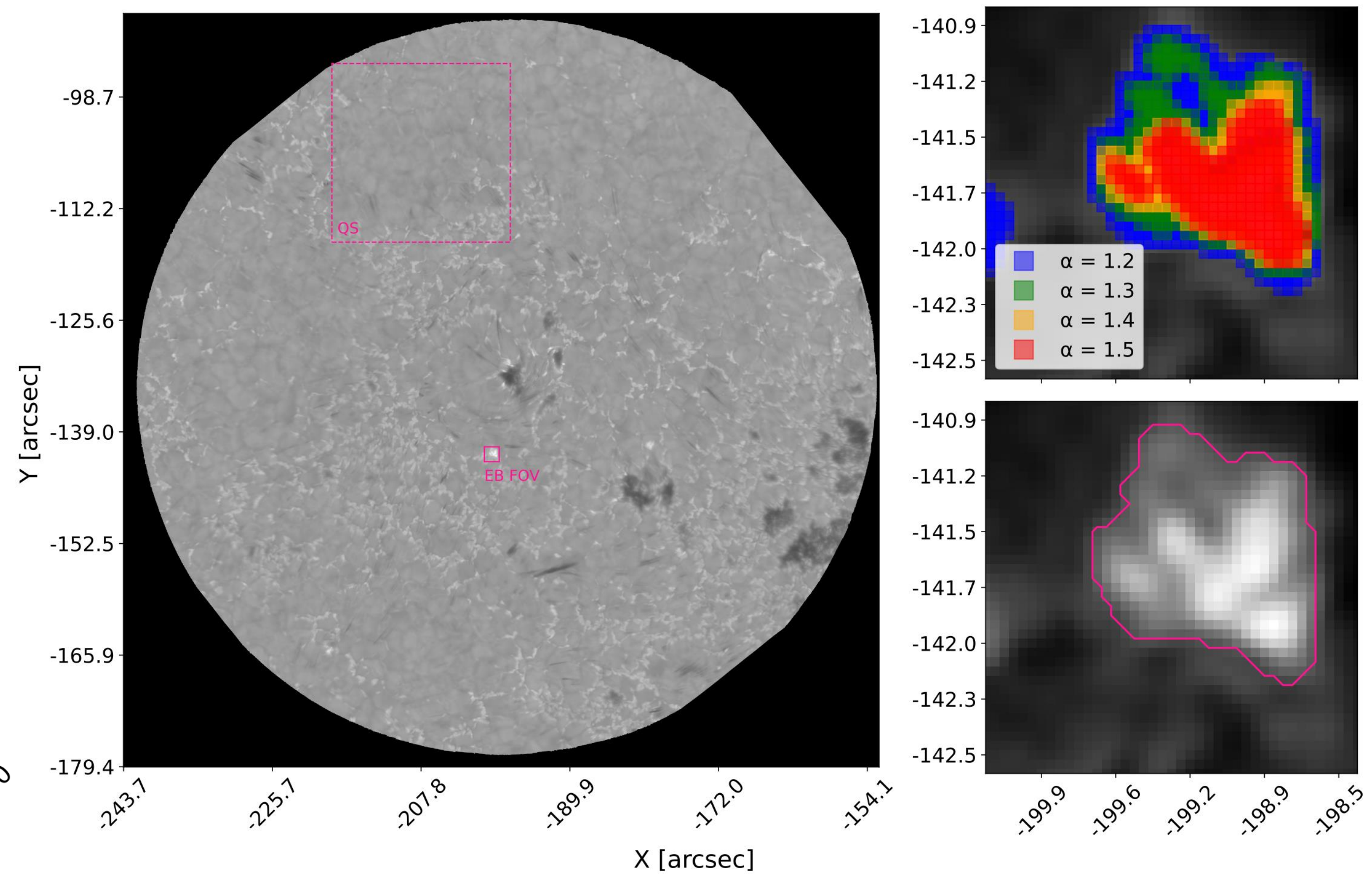
Develop a detection and tracking algorithm for EBs, in order to characterize their properties and magnetic field configuration.

Detection of EBs

SST/CRISP 2024-05-21 H α 09:03:26

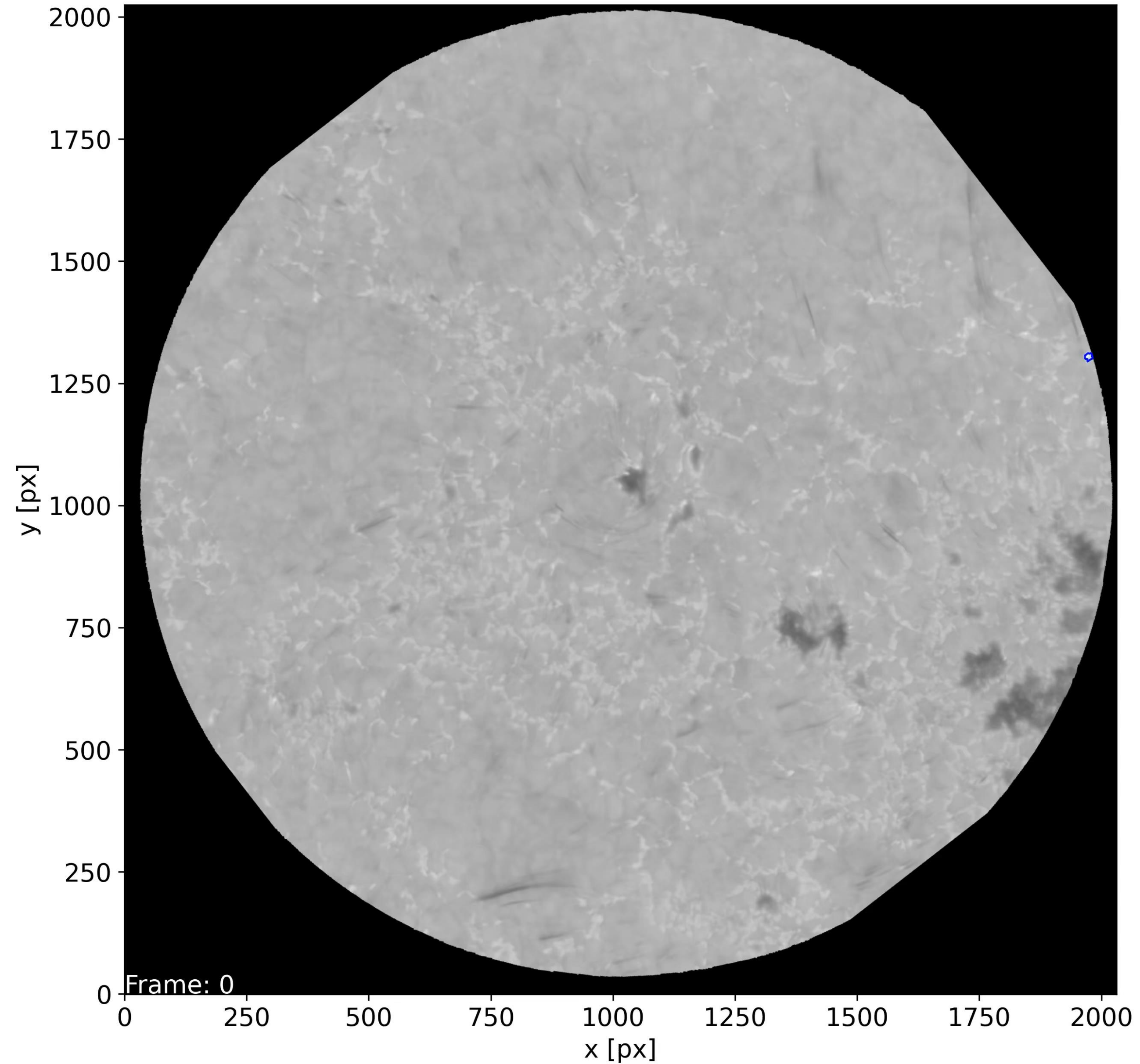


SST/CRISP 2024-05-21 H α 09:02:48 -1.00 Å



Tracking of EBs

SST/CRISP 2024-05-21 H α 6163 -1.00 Å



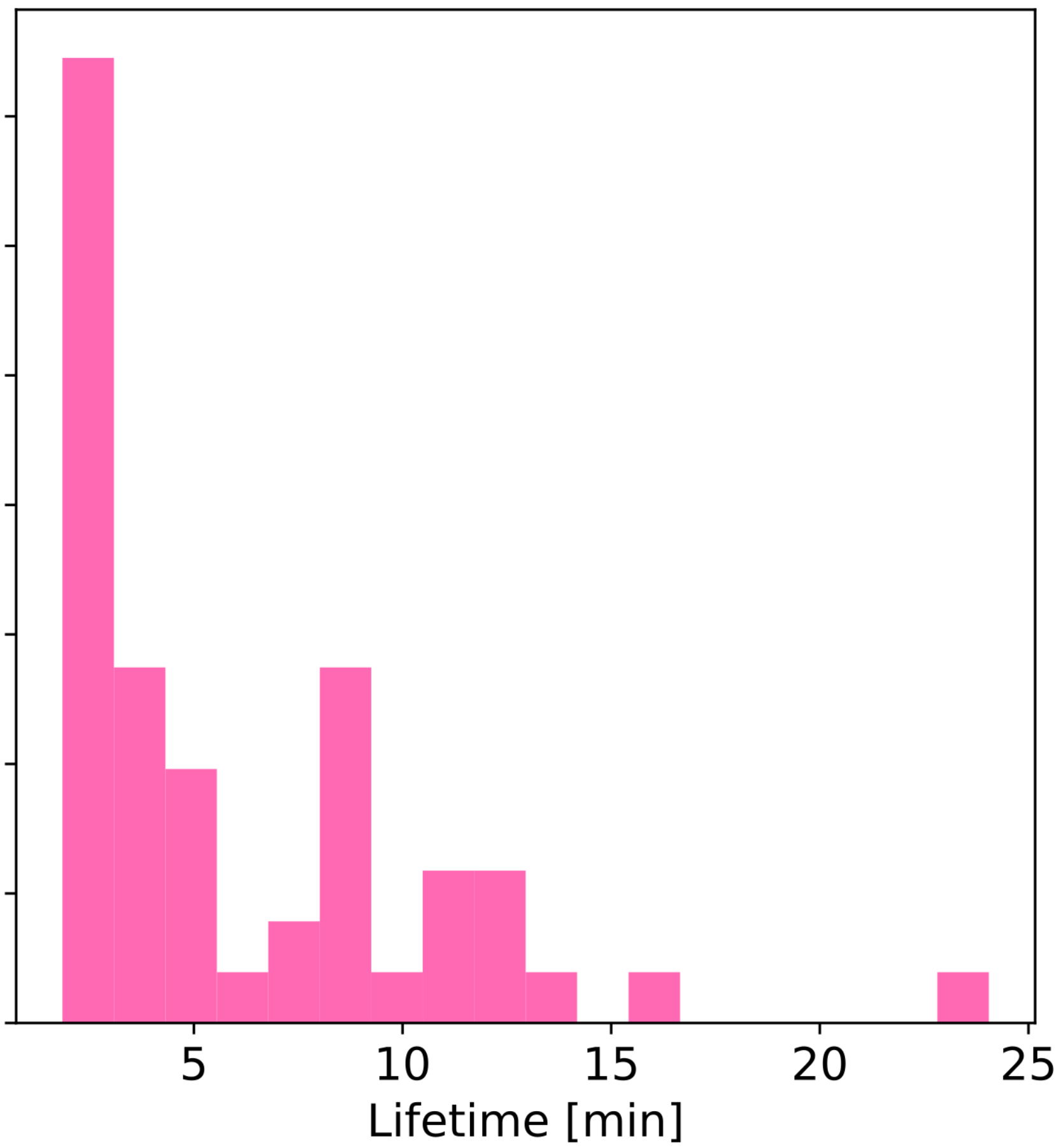
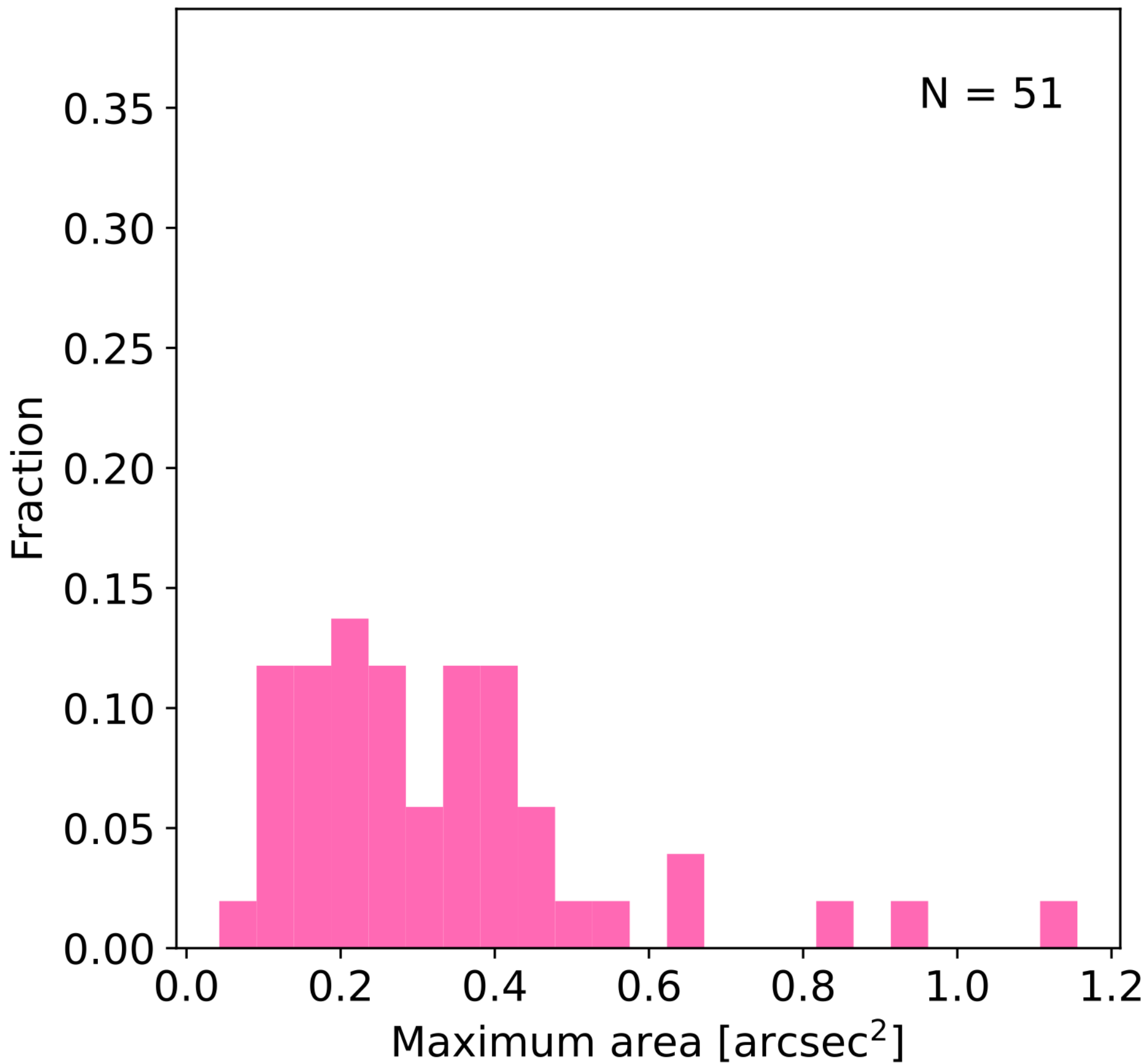
Minimum area:

0.035 arcsec^2

Minimum lifetime:

74 s (2 frames)

General EB statistics



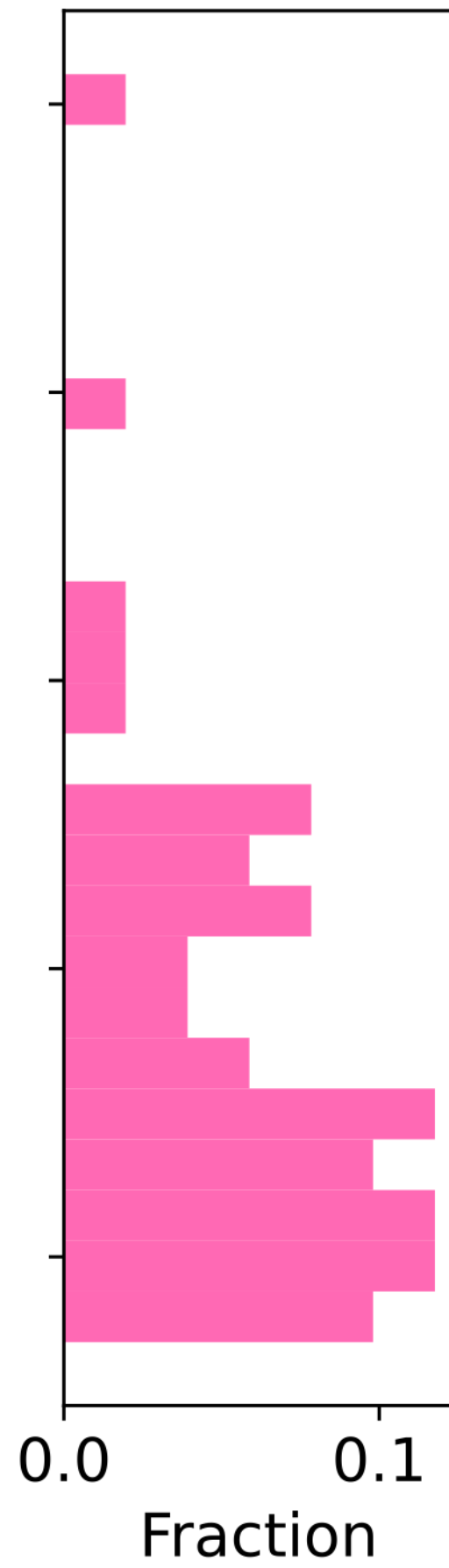
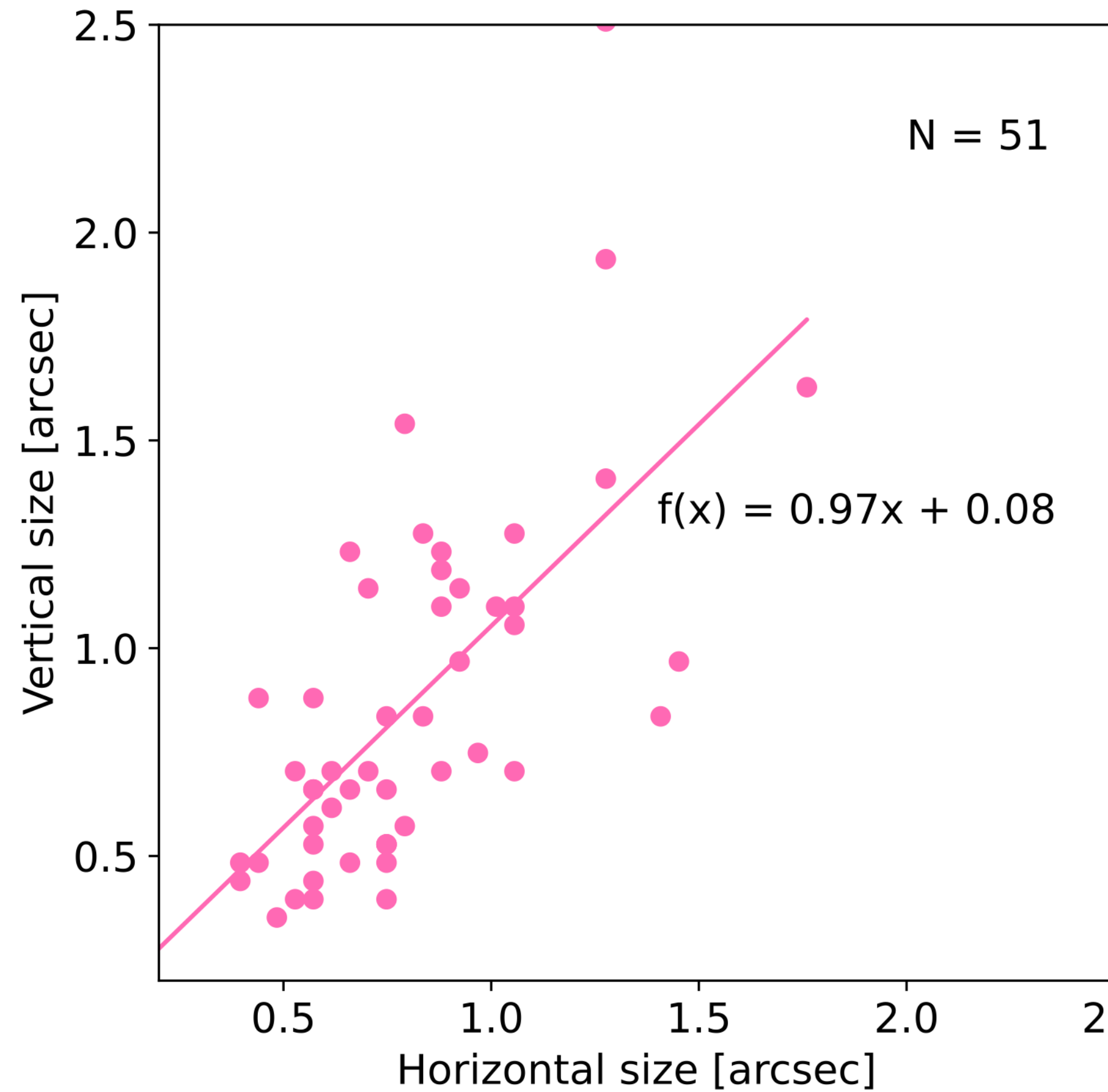
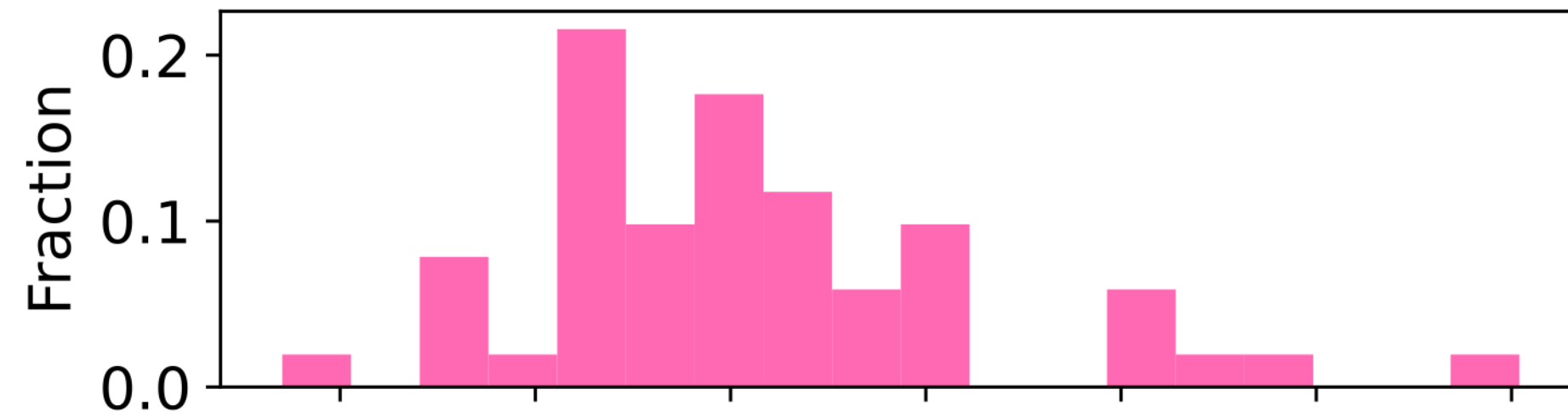
Median maximum area:

0.275 arcsec^2

Median lifetime:

3.0 min

General EB statistics

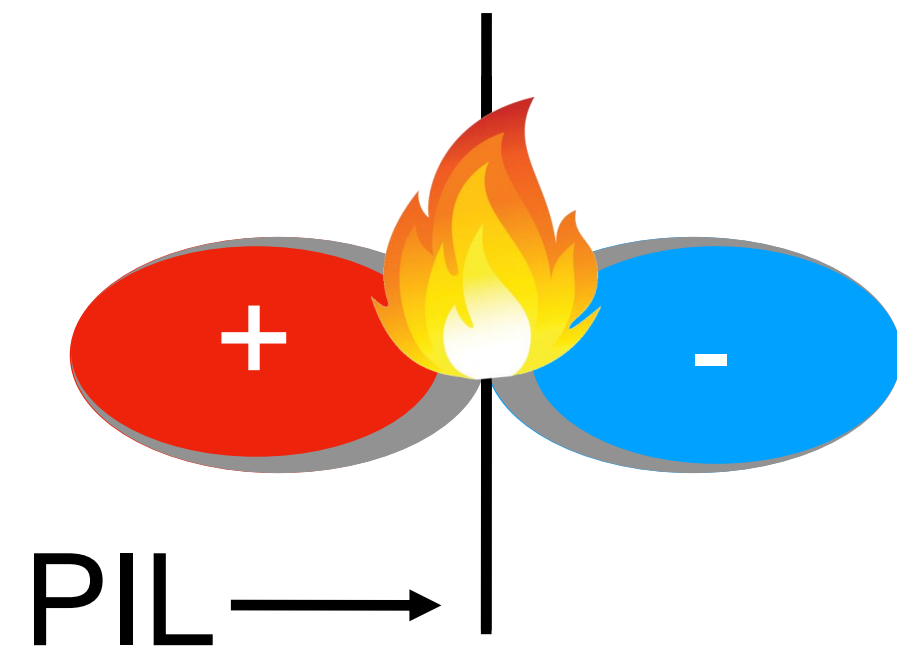


Median maximum vertical extent:
0.704 arcsec

Median maximum horizontal extent:
0.748 arcsec

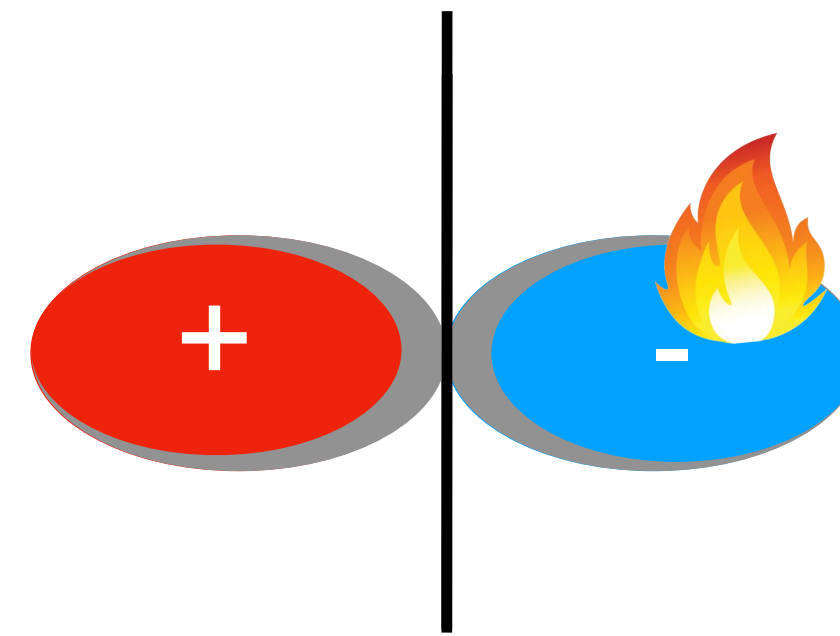
Classification of magnetic field configuration

Group A



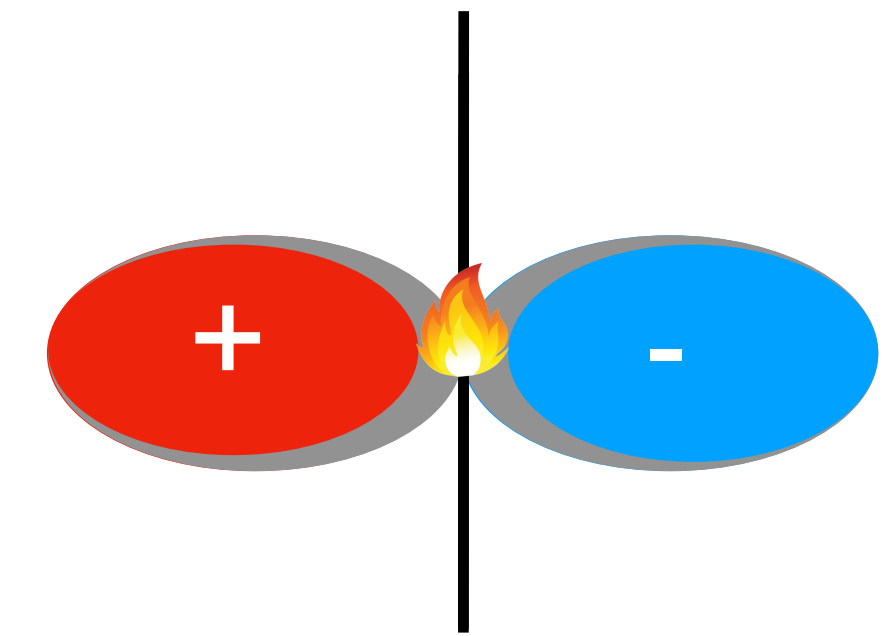
Dipolar EBs

Group B



Unipolar EBs

Group C



Noise level of B_{LOS} : $\sigma = 9.5 G$

Classification of magnetic field configuration

Group A



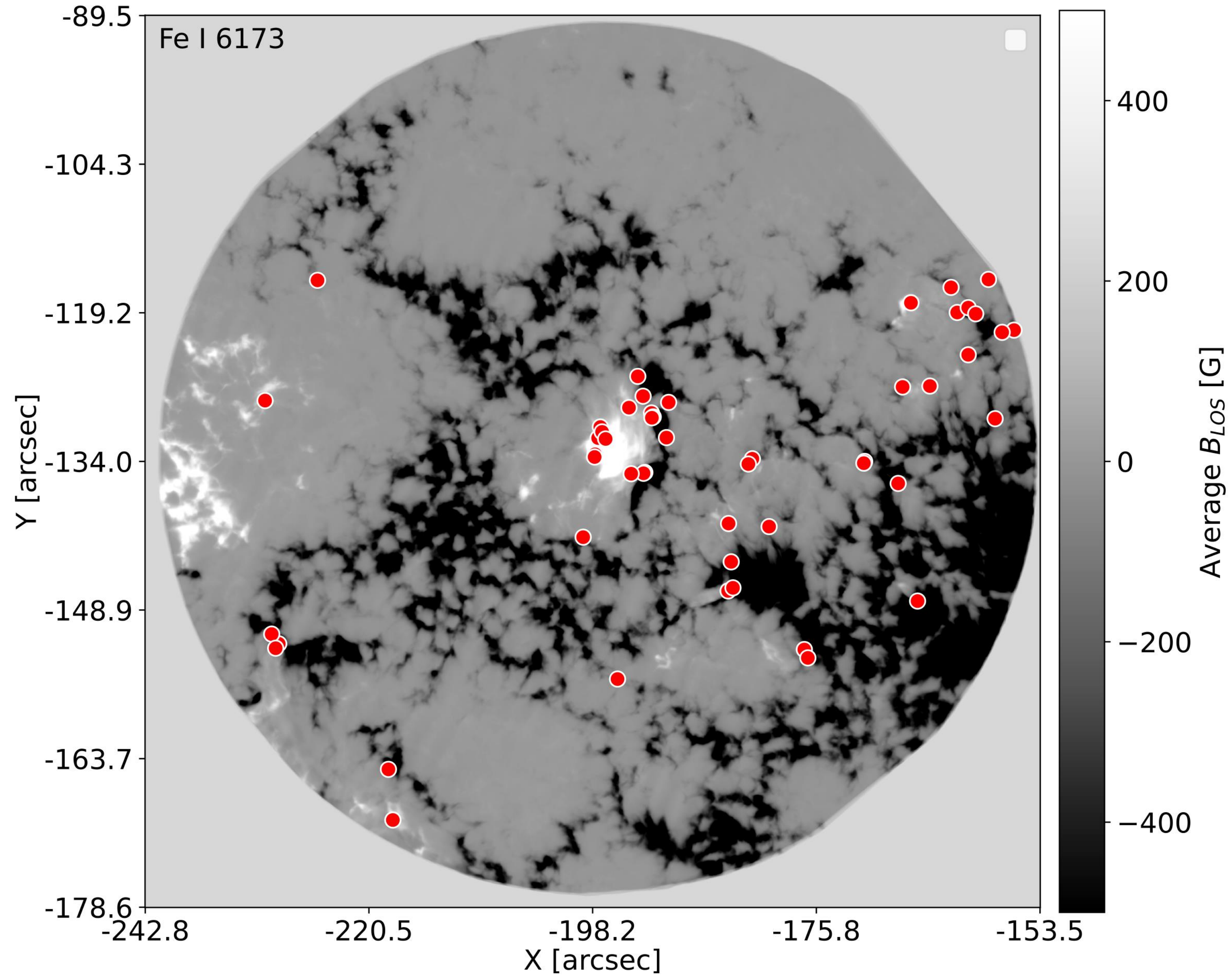
Group B



Group C

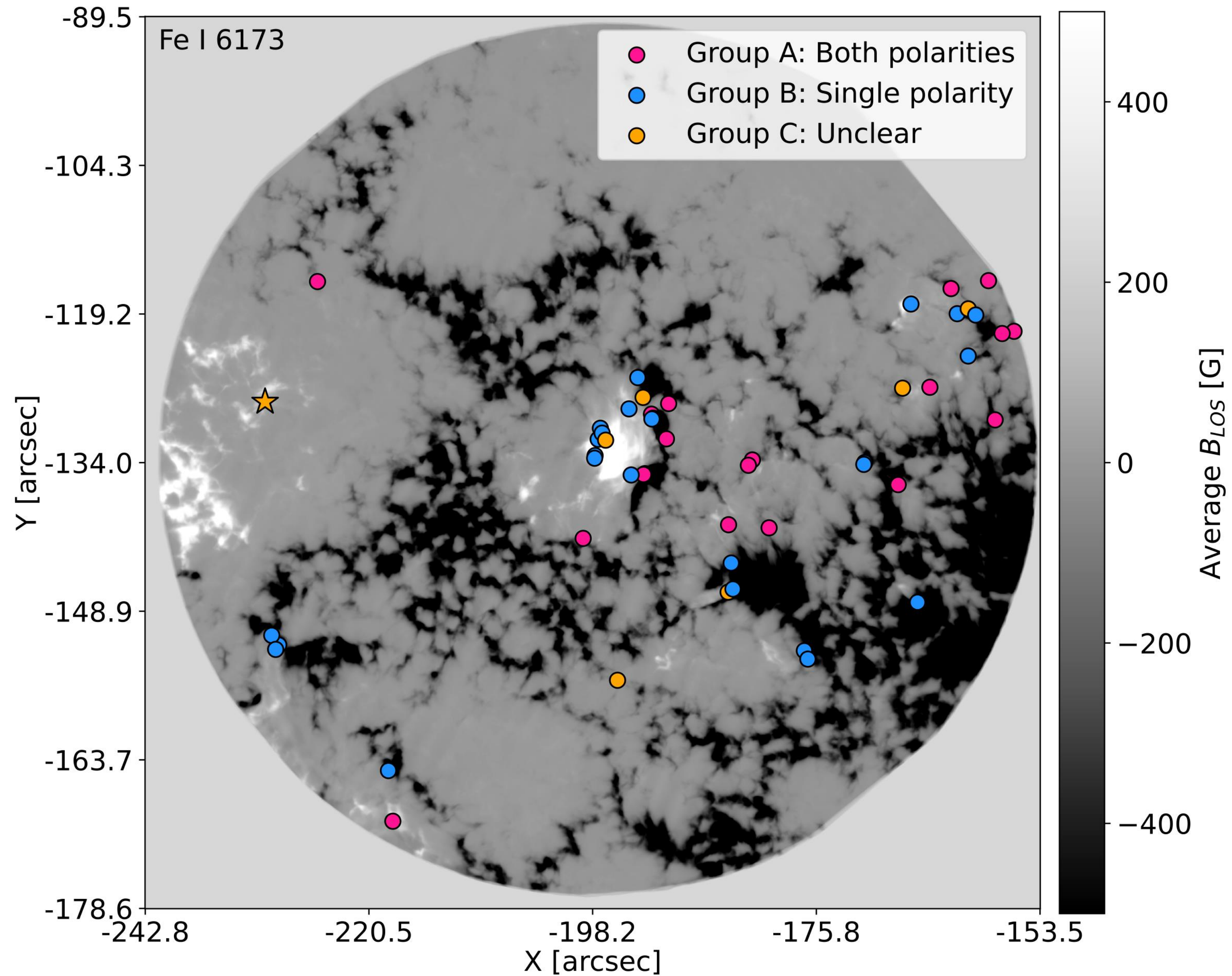


Spatial distribution of EBs

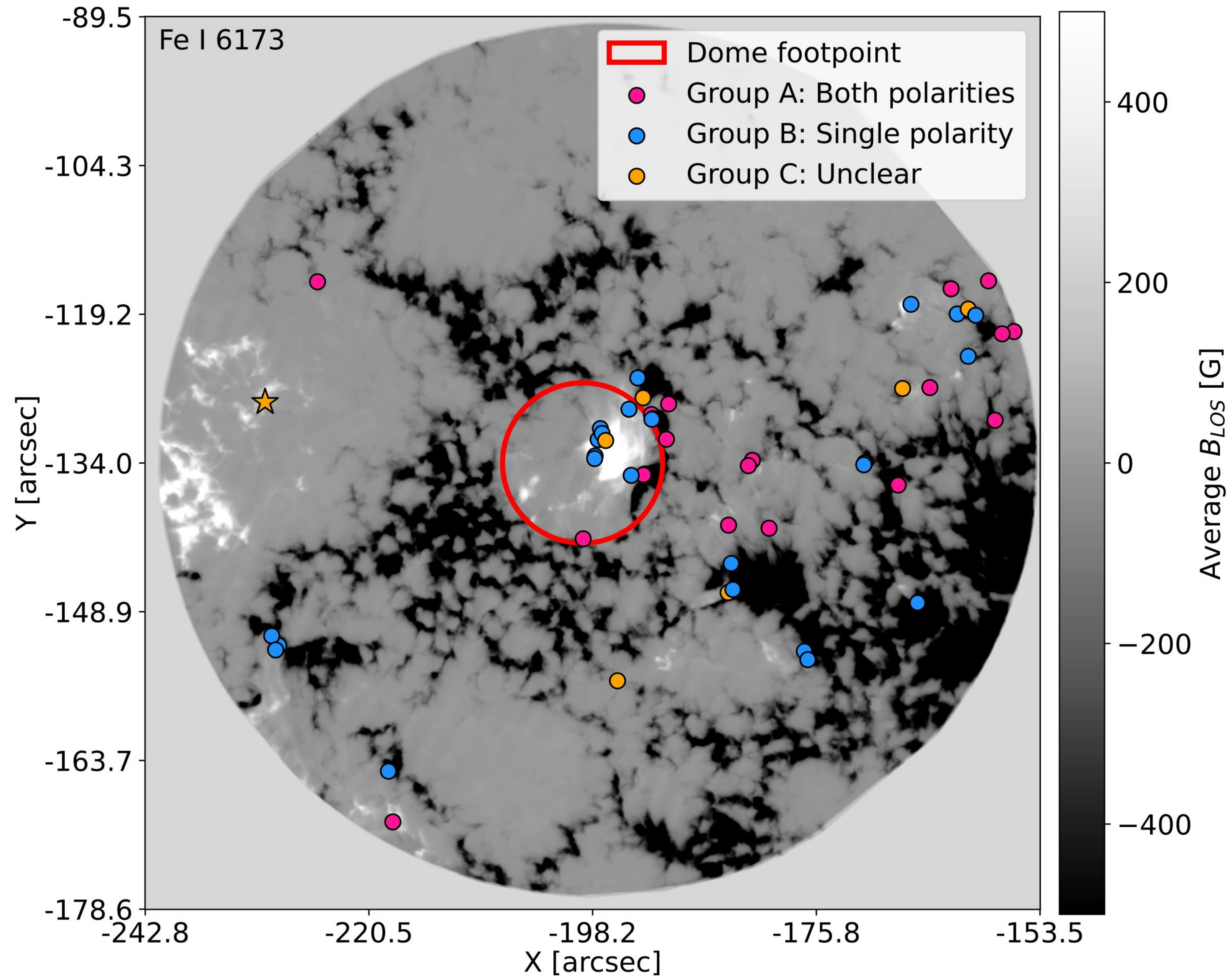


R ● C S

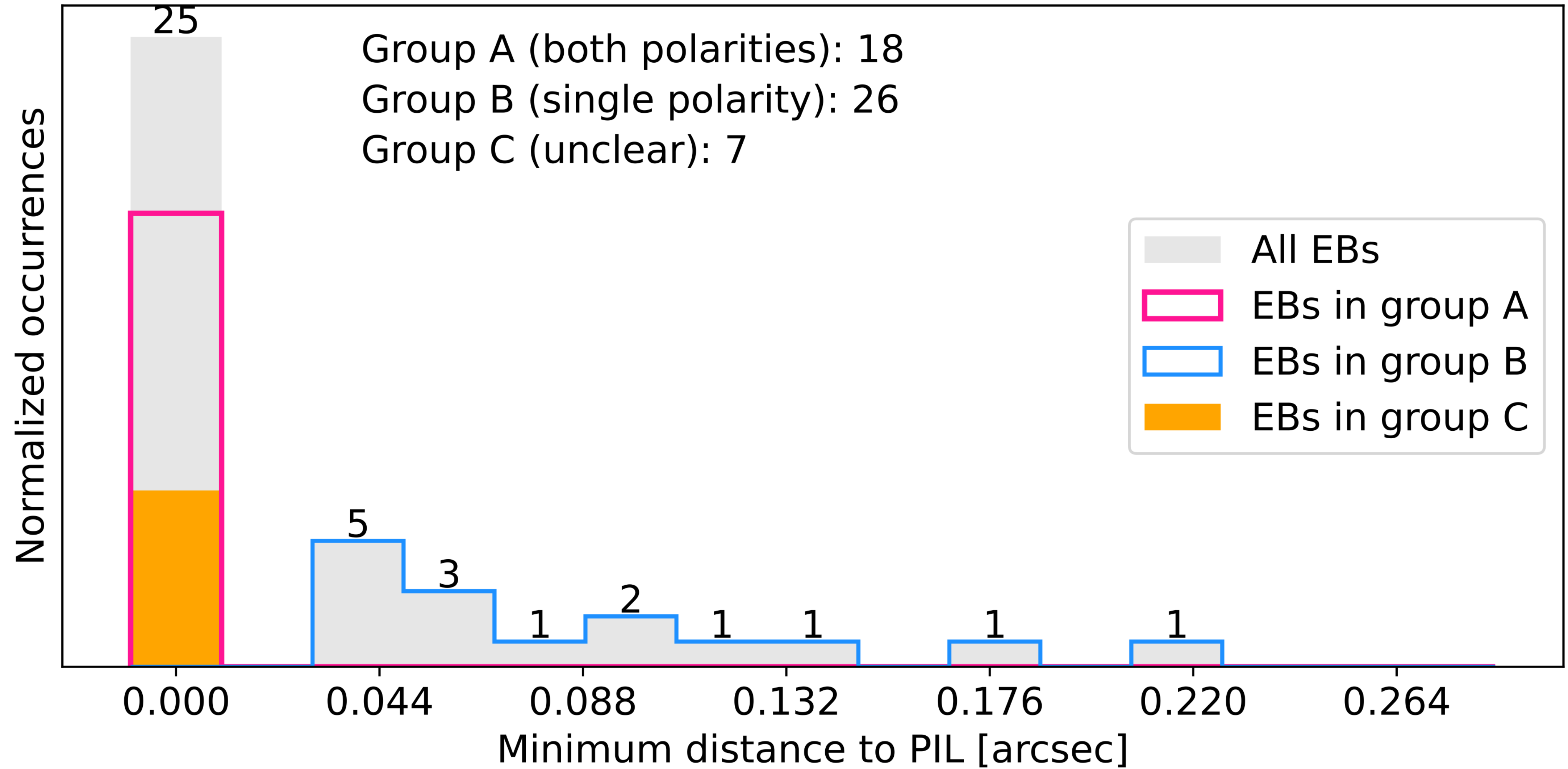
Spatial distribution of EBs



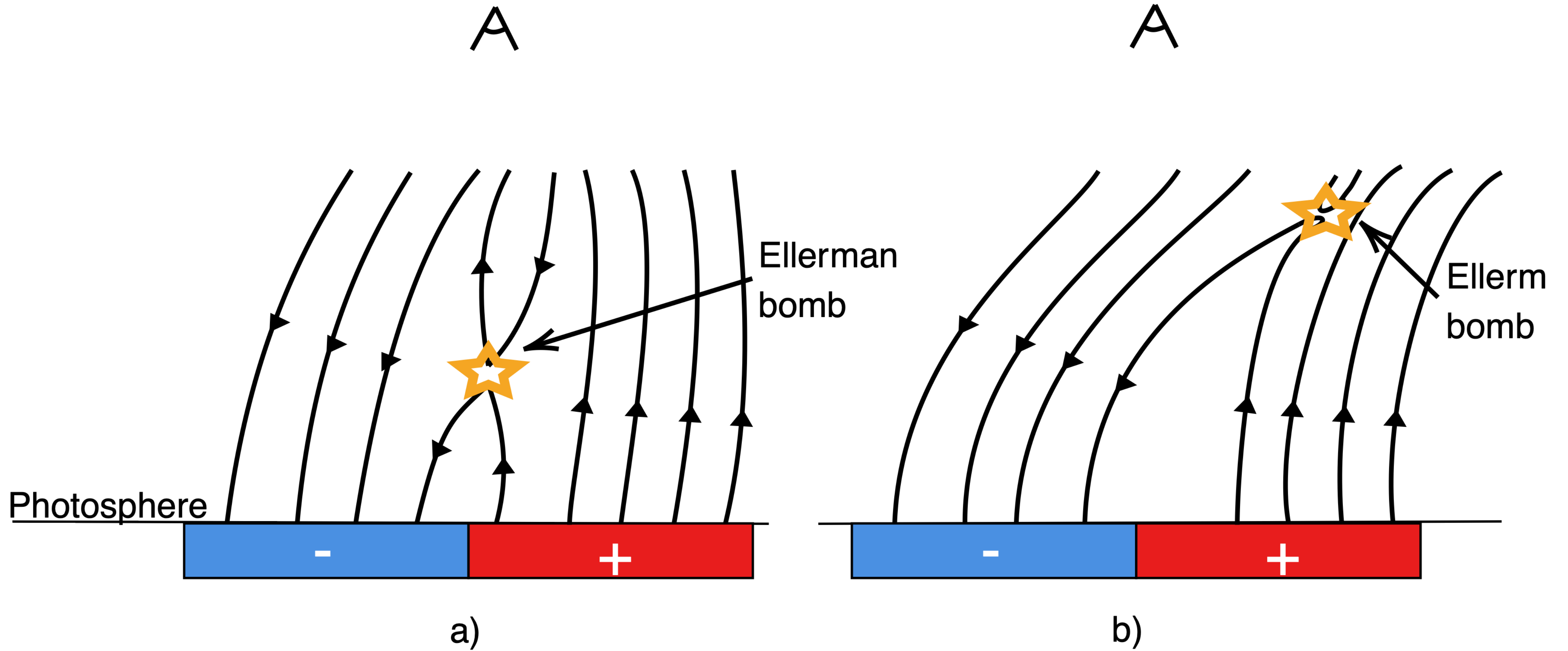
Spatial distribution of EBs



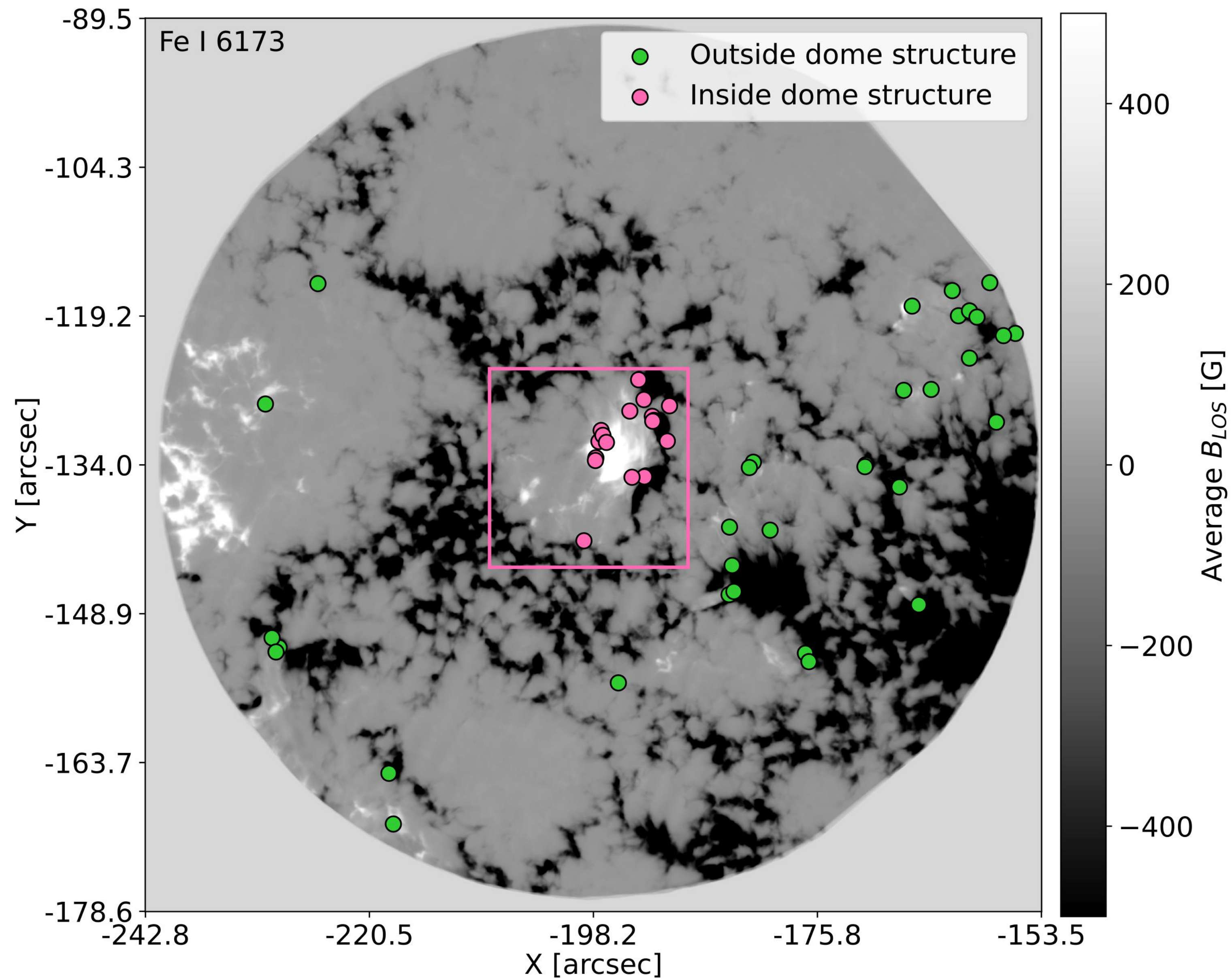
Minimum distance to PIL



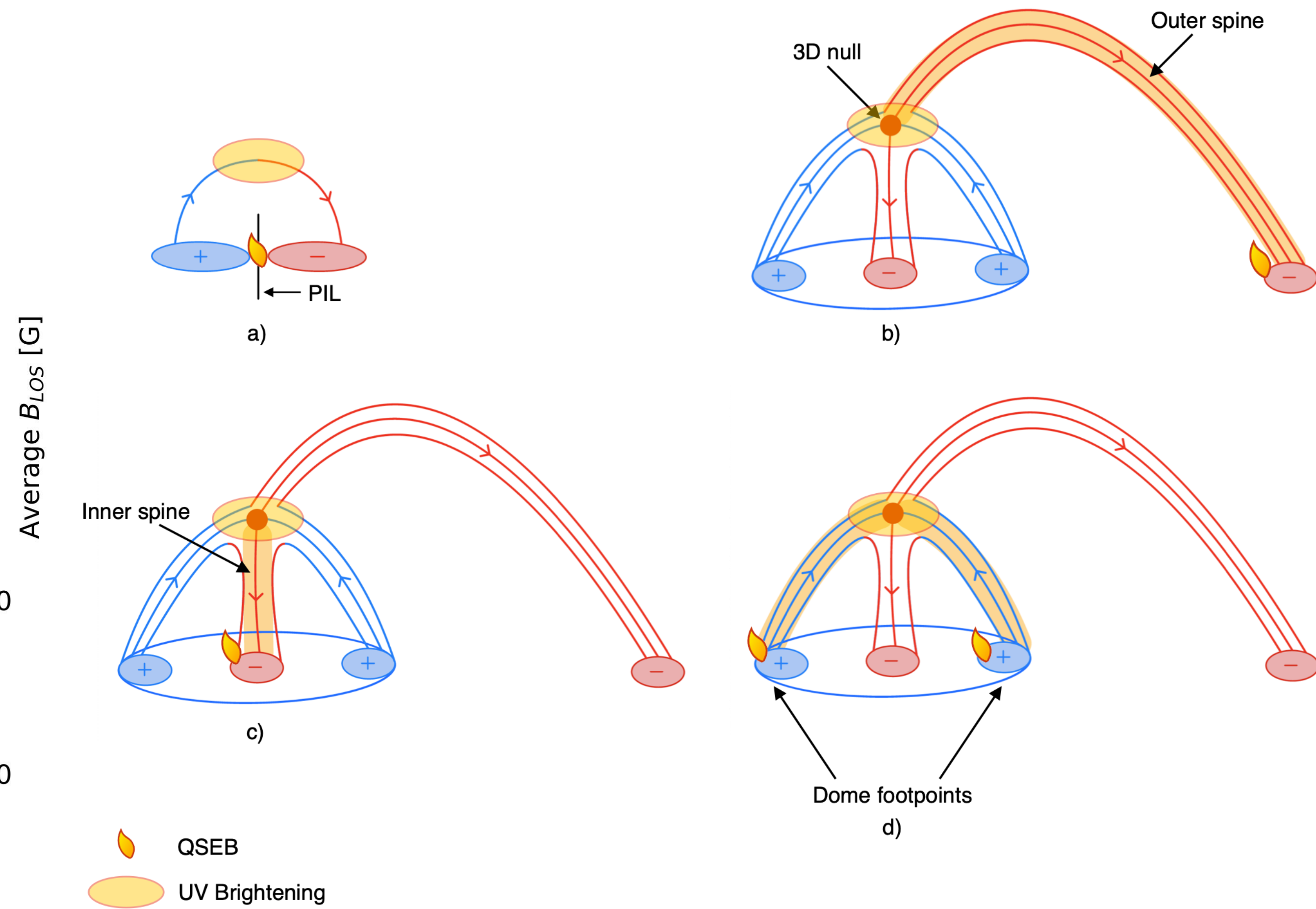
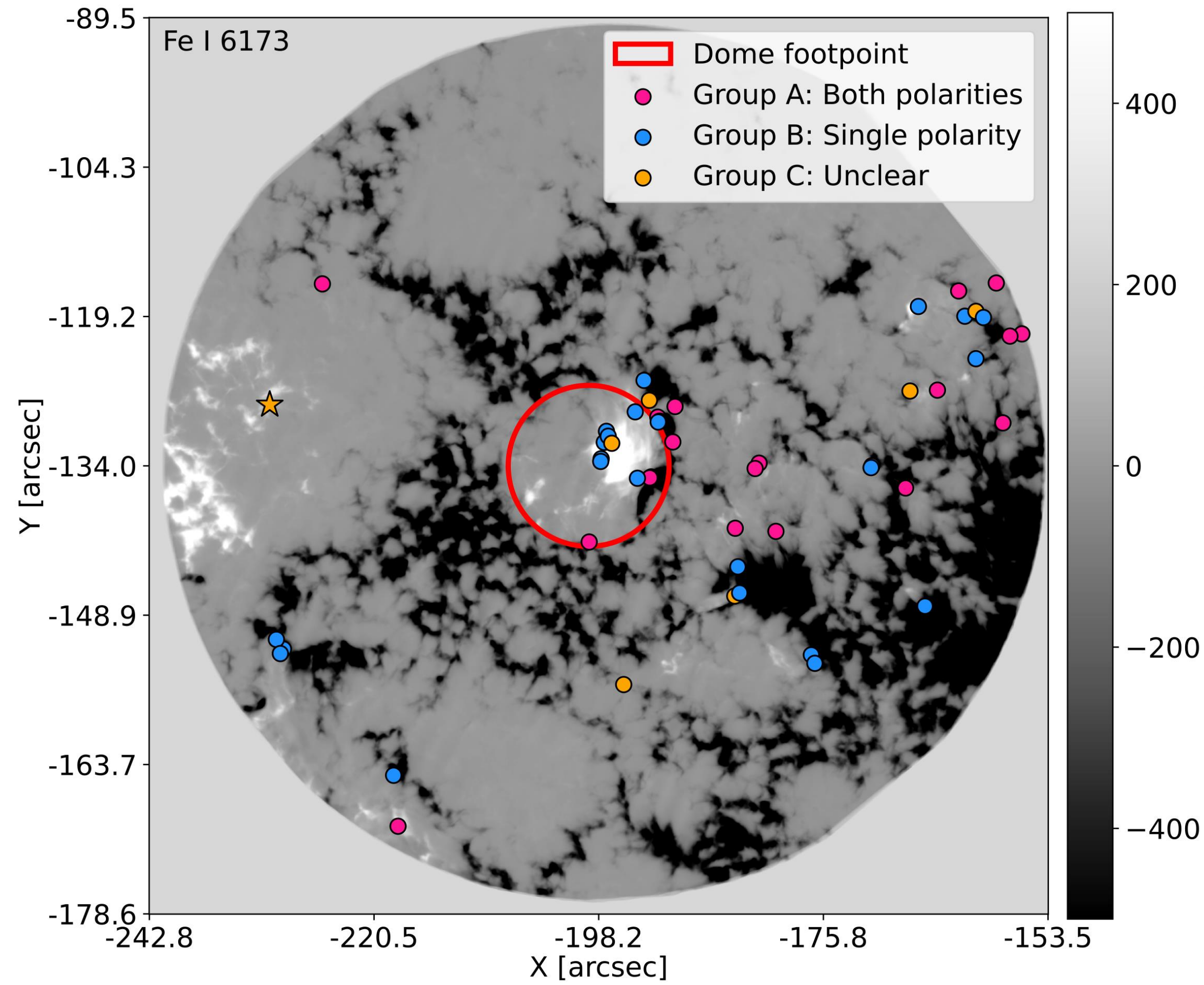
Possible magnetic topologies



Separate EBs inside and outside dome



Fan-Spine Topology



Bhatnagar et al. 2025

Conclusions

- We apply a 4-level intensity threshold to $H\alpha$ wings to detect EBs.
- We find median maximum area of 0.275 arcsec^2 and median lifetime of 3 min.
- 18 dipolar EBs, 26 unipolar EBs, 7 EBs are unclear.
- Unipolar EBs are most likely due to a reconnection site located higher in the atmosphere.