

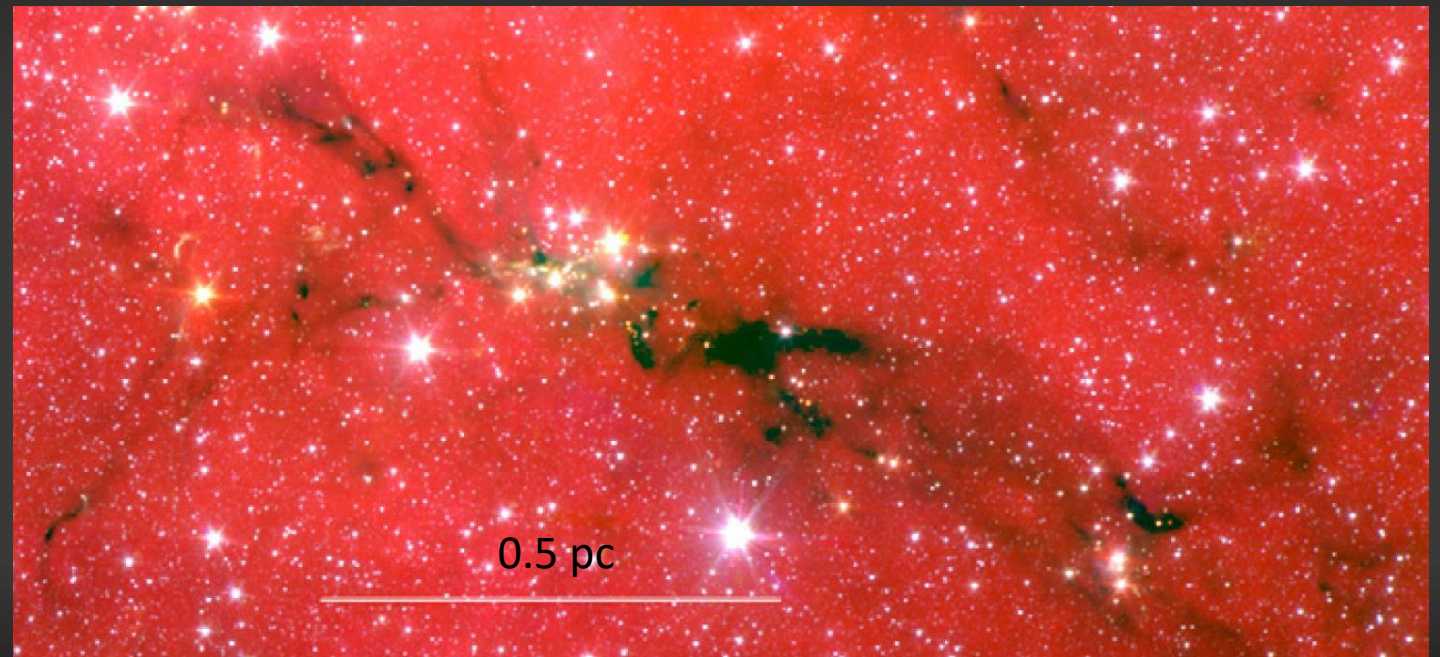
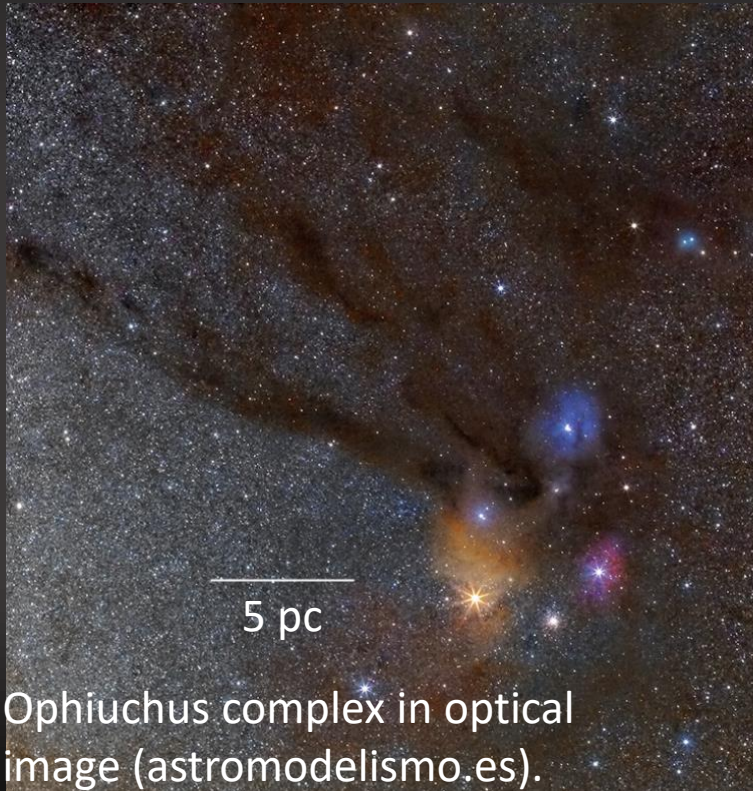
BISTRO: Magnetic Fields from Filamentary Clouds to Hub-Filament System in IC5146 Cloud Complex



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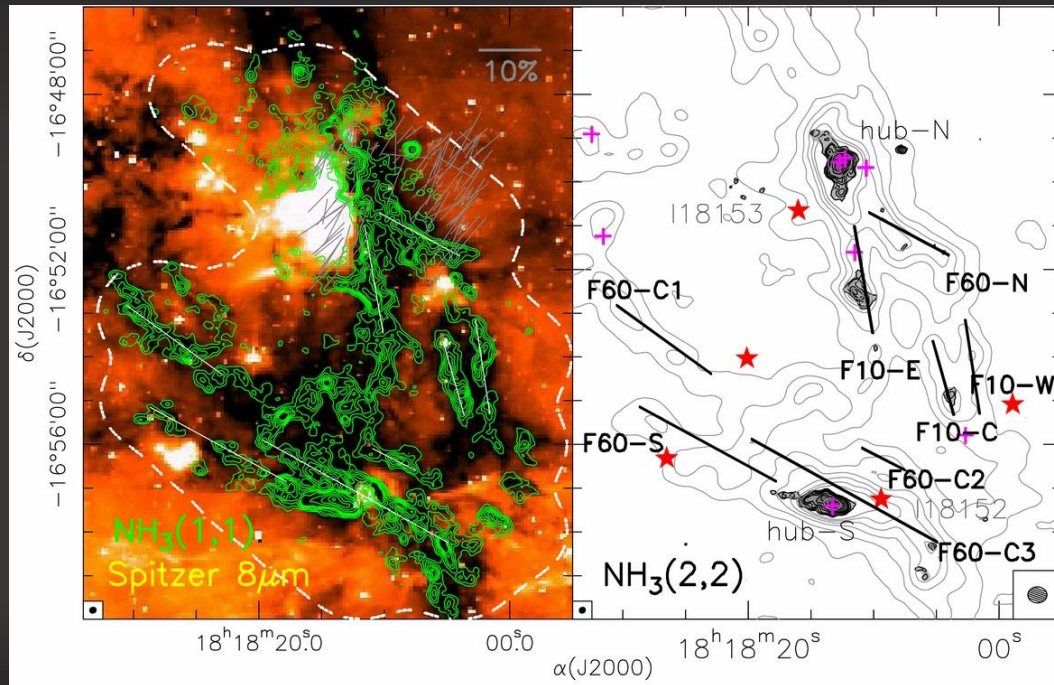
Hub-Filament Structure (HFS)

- Dense Hubs connecting to several filaments (Myers 2009)
- The potential sites of cluster formation

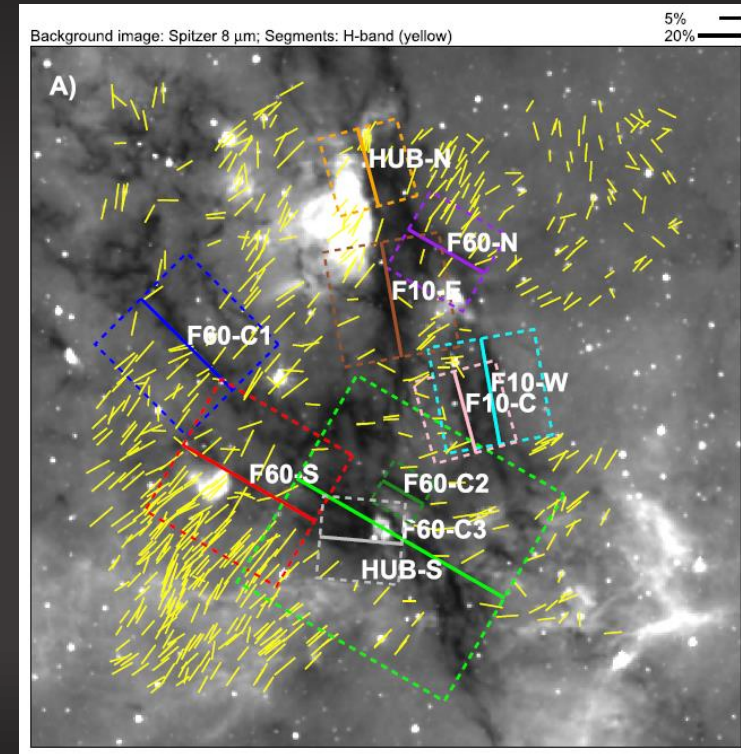


Hub-Filament Structure with large scale B-fields

- The large scale B-fields seem to be perpendicular to the parallel filaments



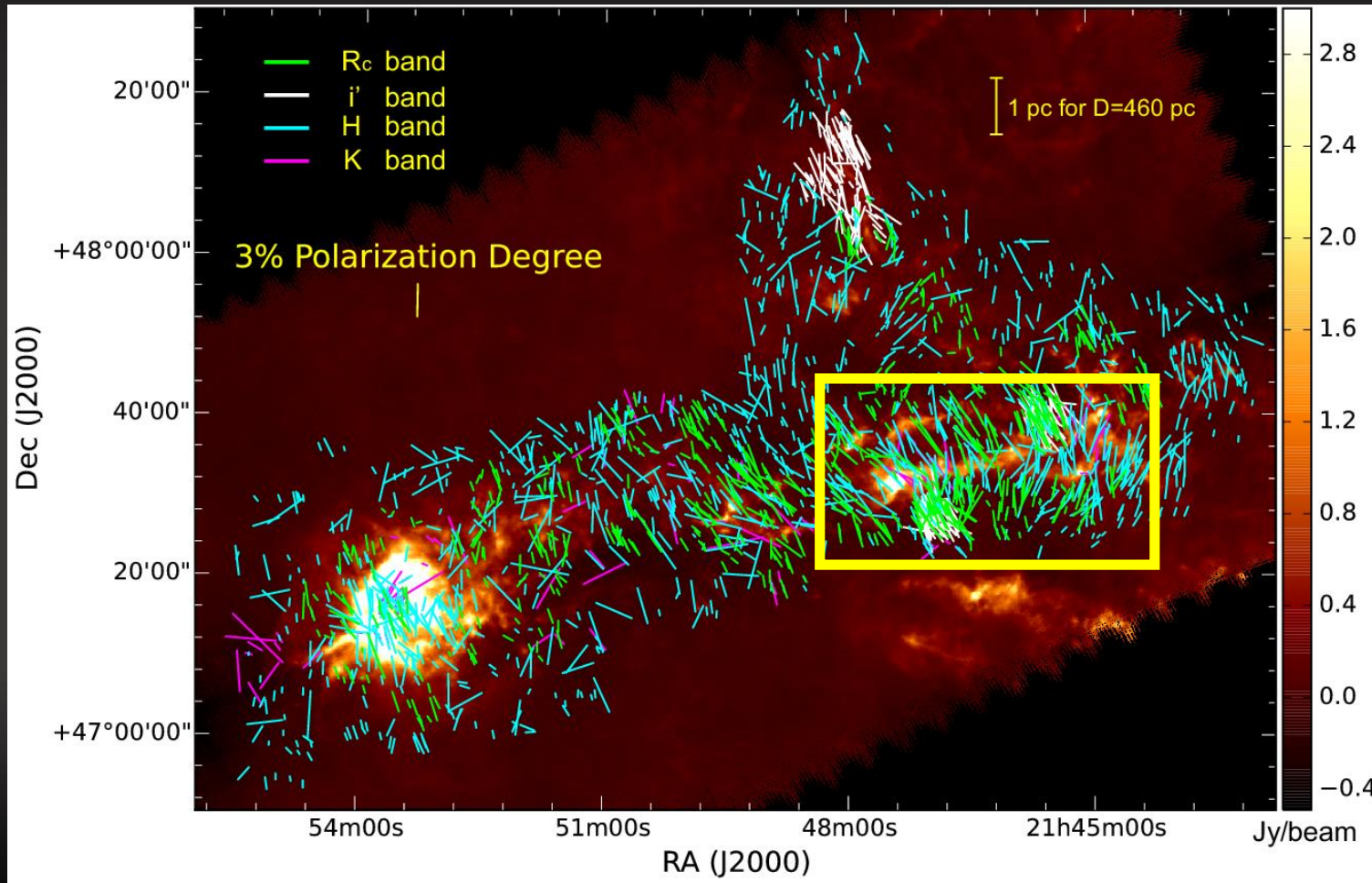
The HFS around G14.225-0.506 identified by NH_3
(Busquet et al. 2013)



The H-band polarization toward G14.225-0.506
(Santos et al. 2016)

Scientific Goal

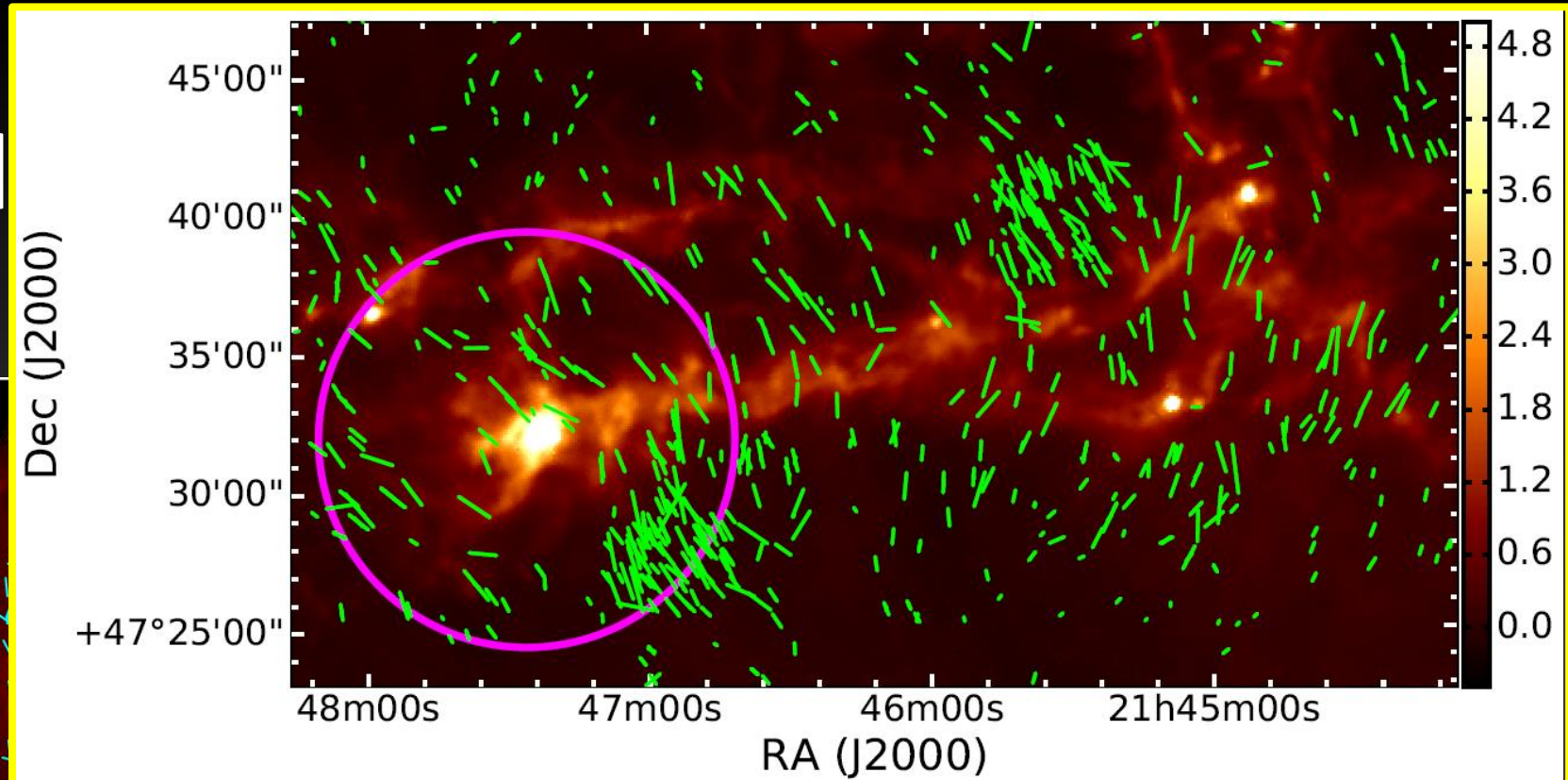
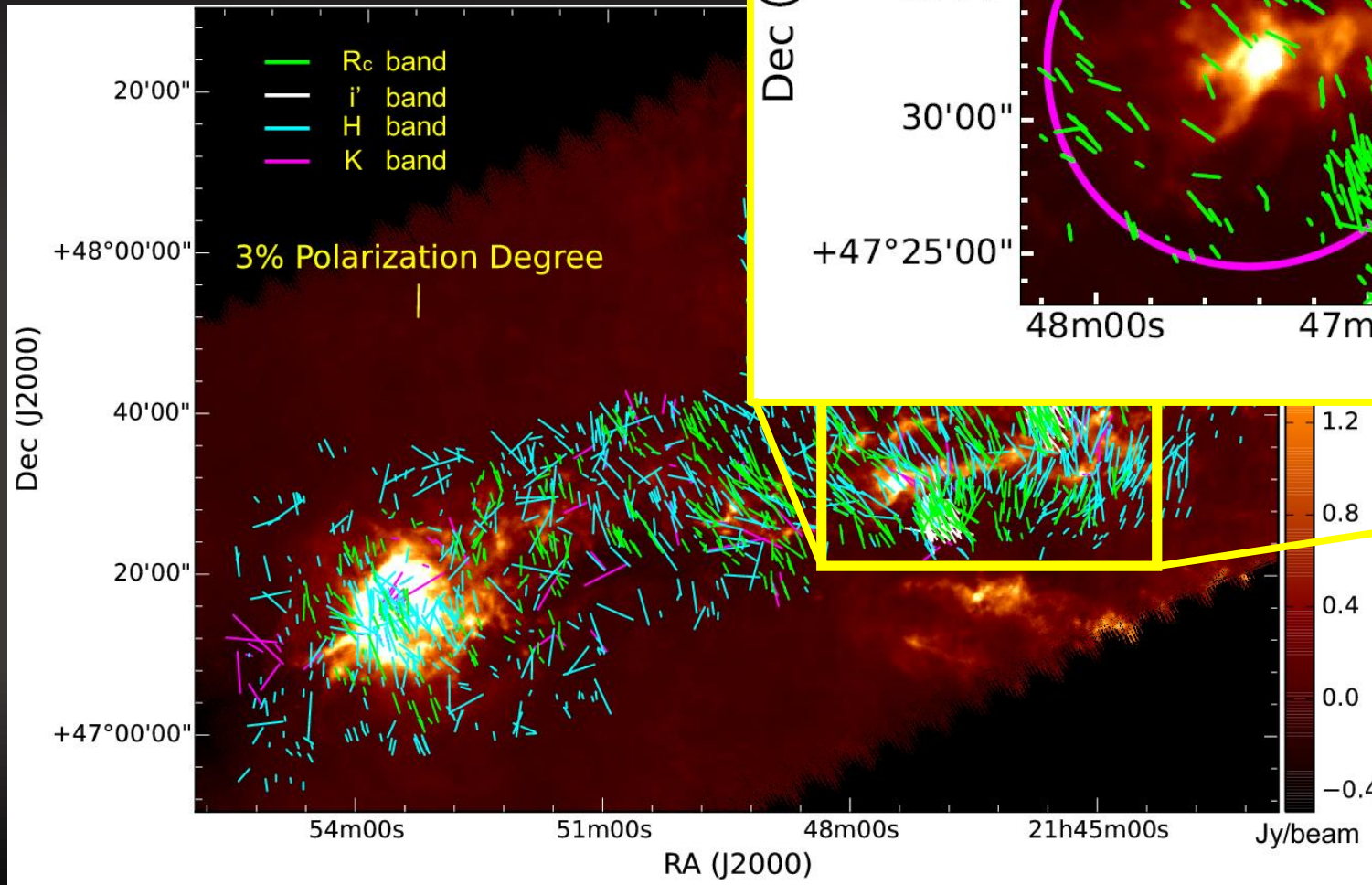
- Investigate How B-field changes from pc-scale to $\sim 10000\text{AU}$ -scale



Optical/Infrared polarization overlaid on
Herschel 250 micron map (Wang et al. 2017)

Scientific Goal

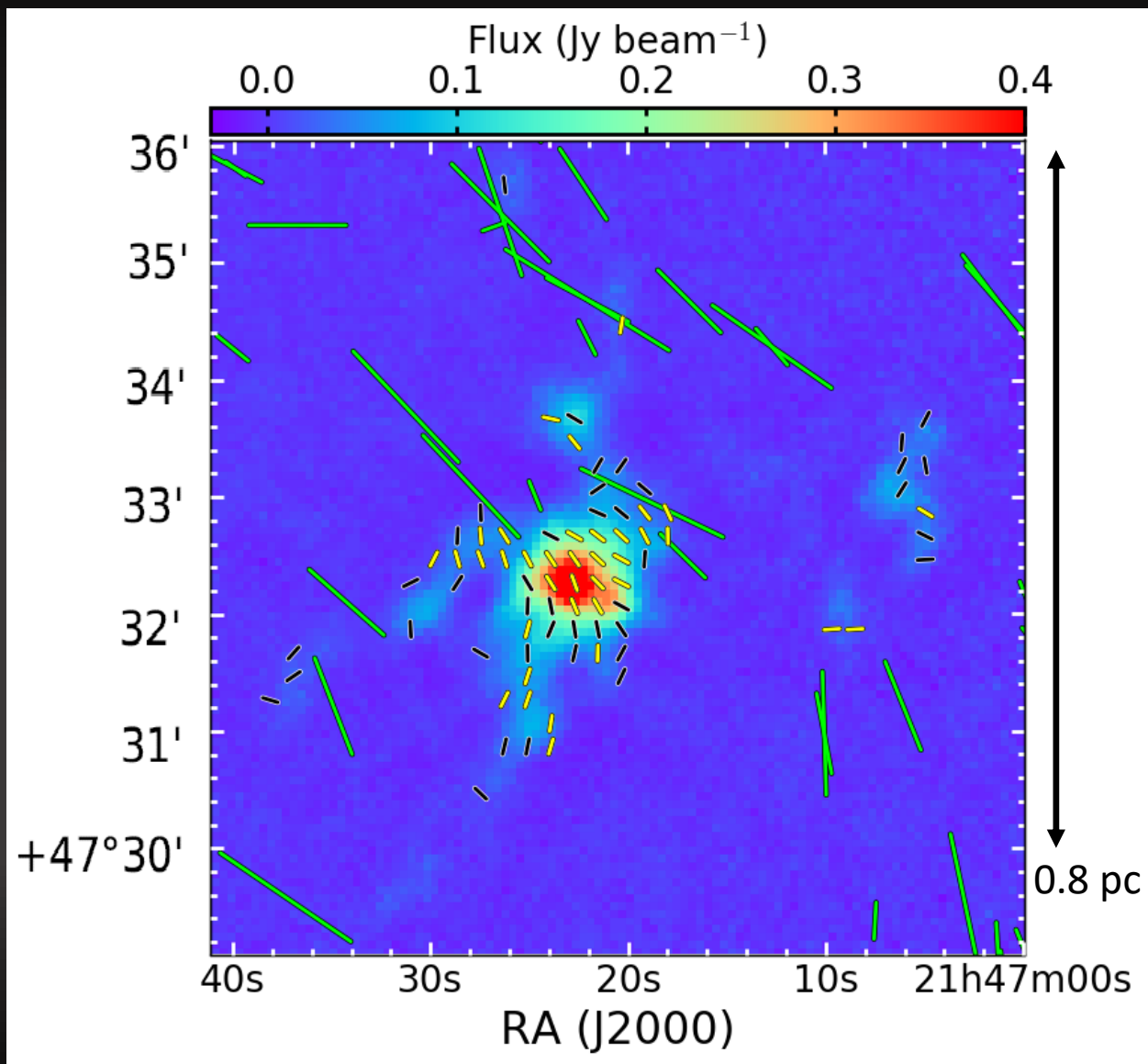
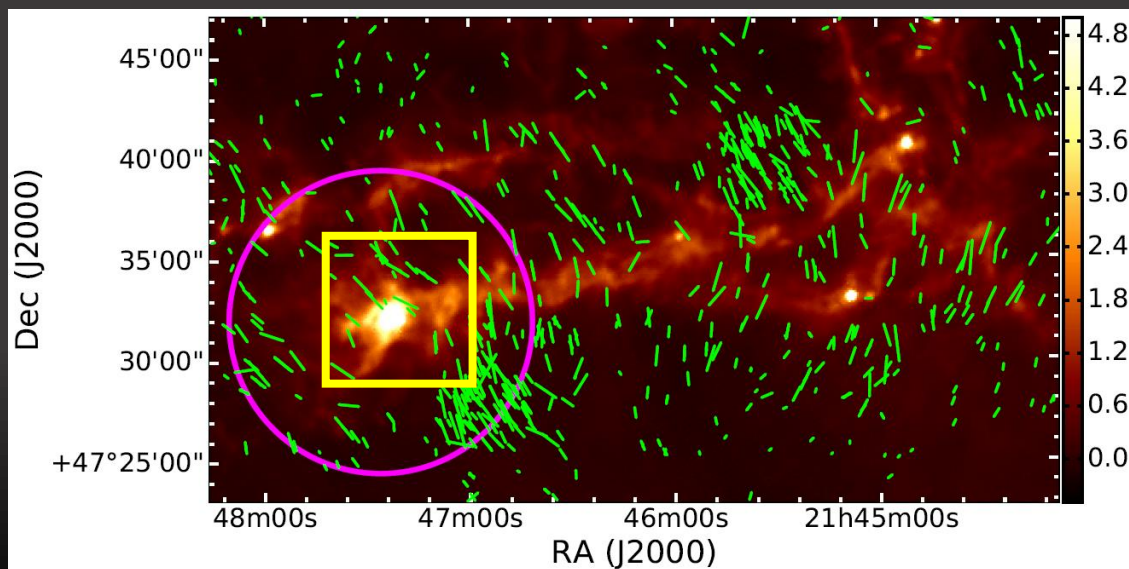
- Investigate How B-field



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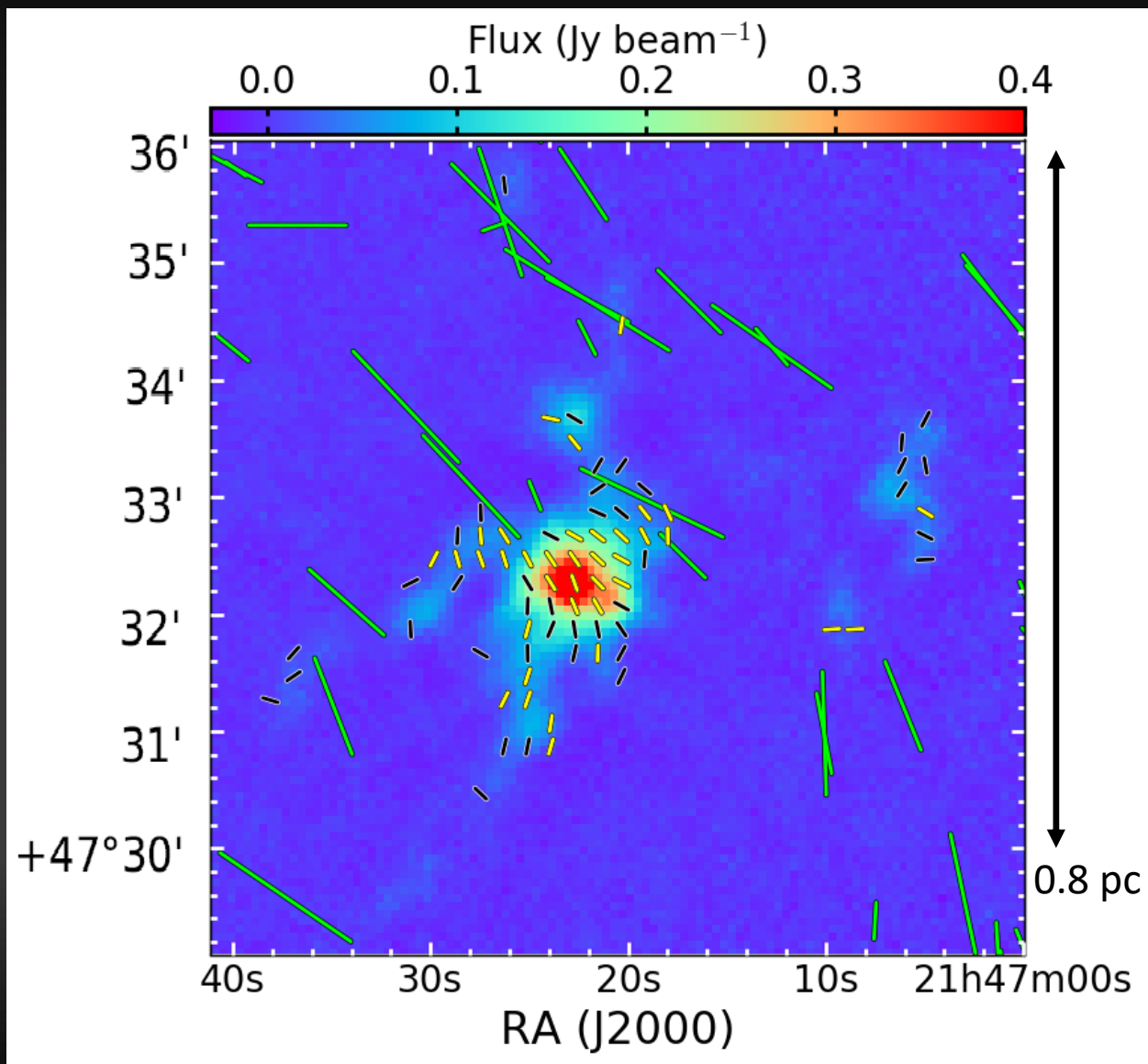
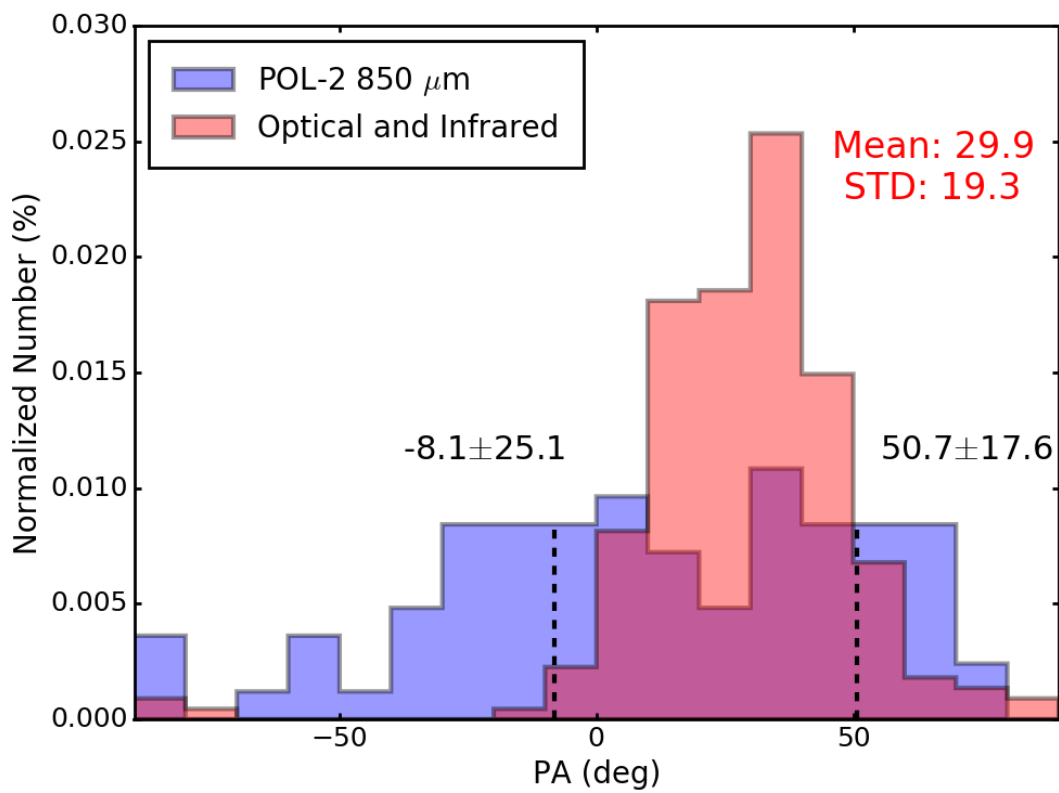
POL-2 Polarization Map

- Green: Optical/Infrared data
- Yellow: 3 sigma polarization detection (rotate by 90 deg, fixed length)
- Black: 2 sigma polarization detection (rotate by 90 deg, fixed length)



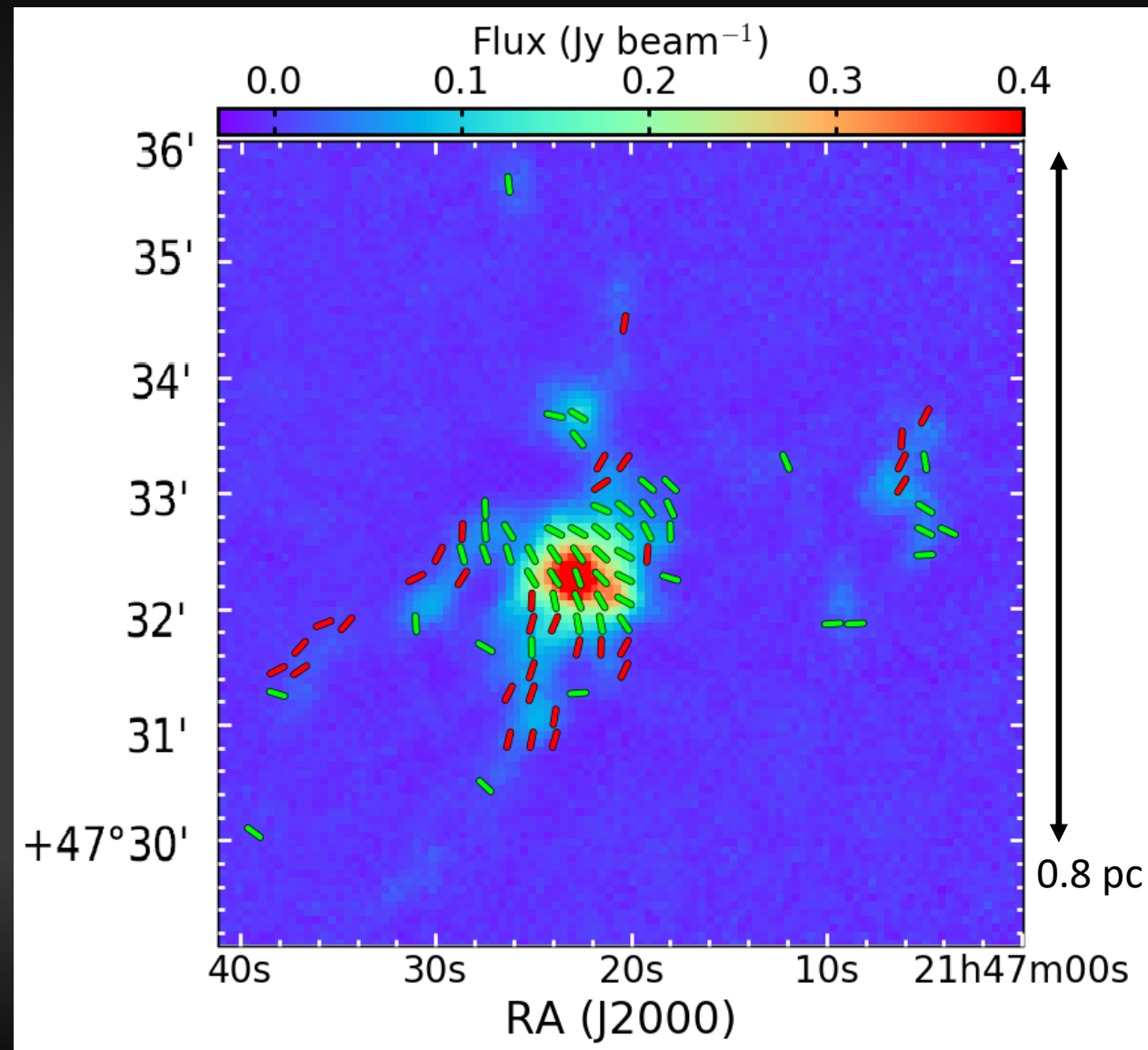
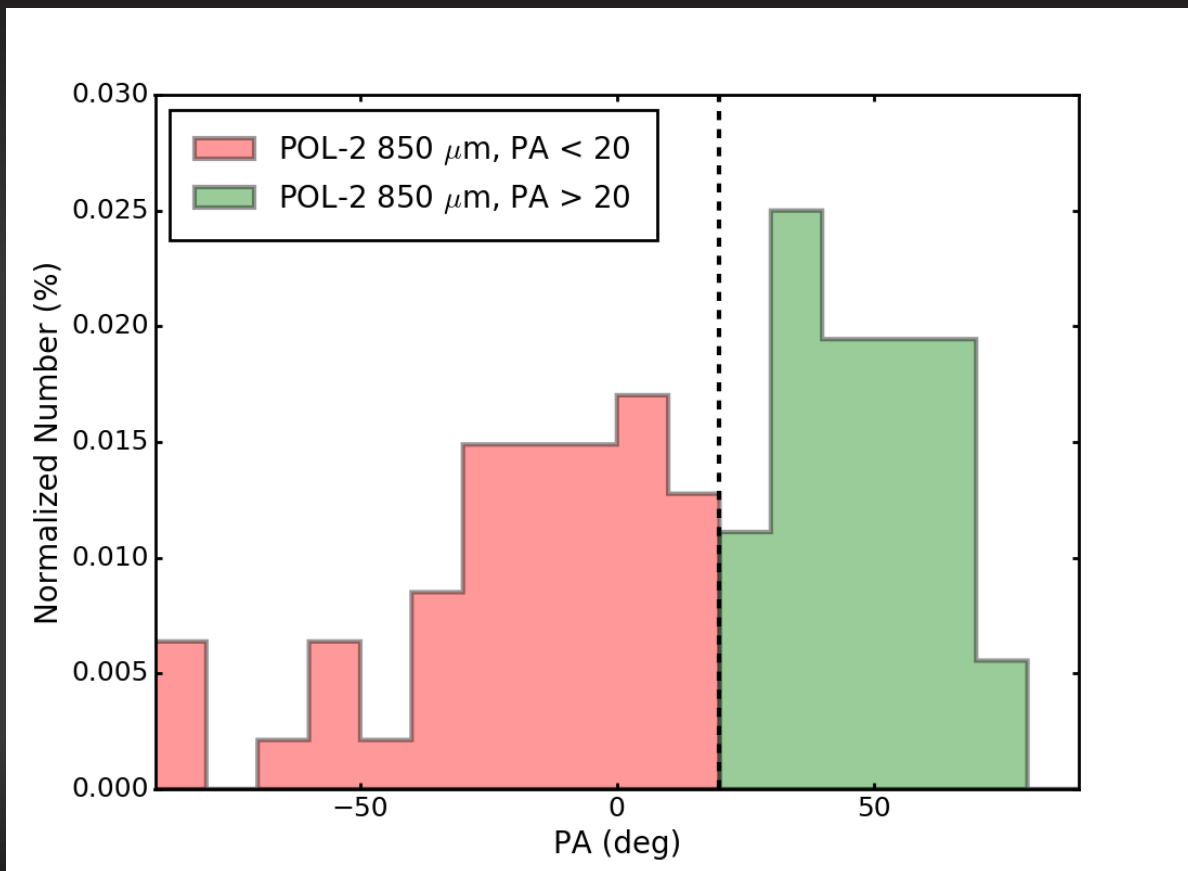
POL-2 Polarization Map

- Comparison to large scale B-field



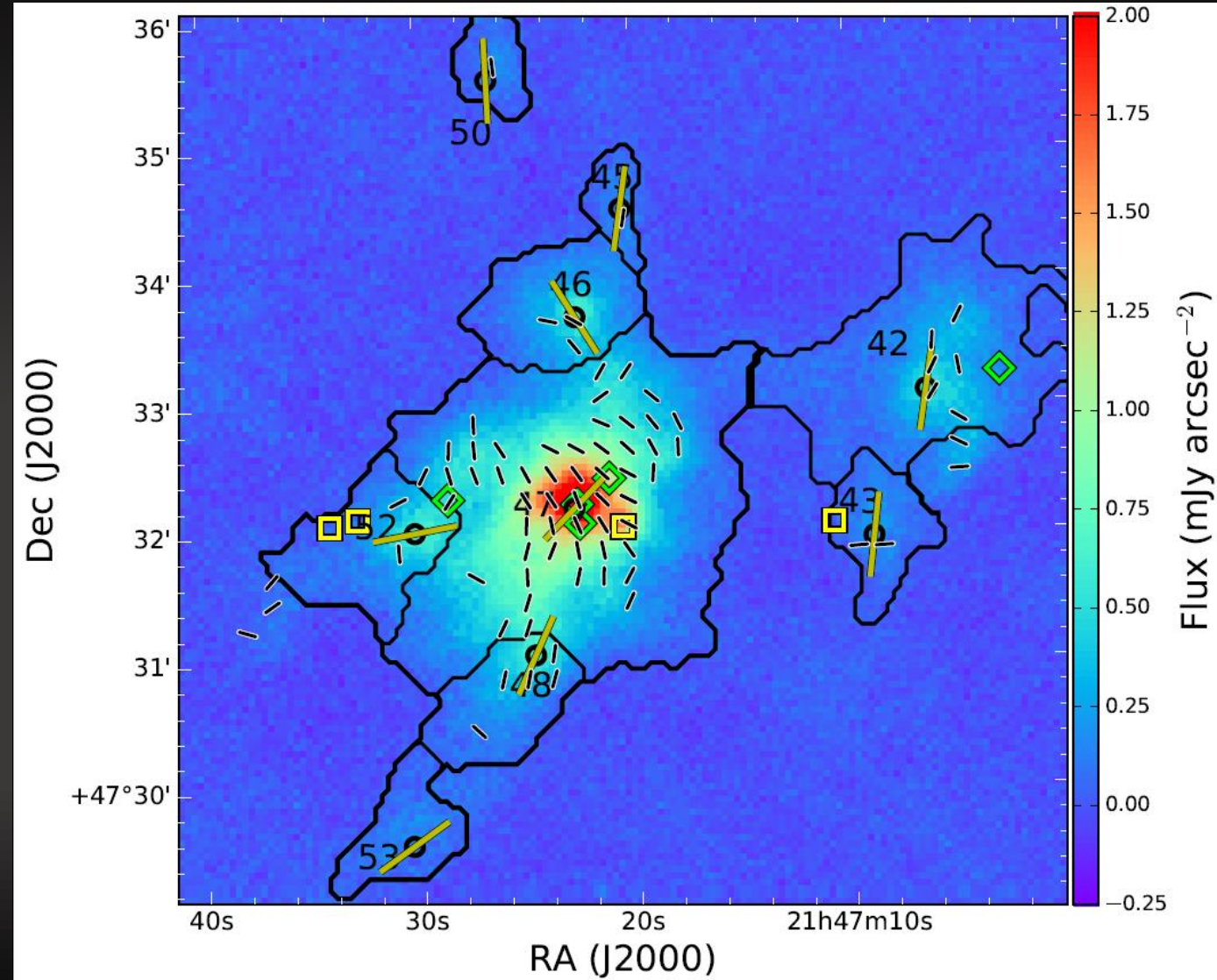
POL-2 Polarization Map

- Where are the two components



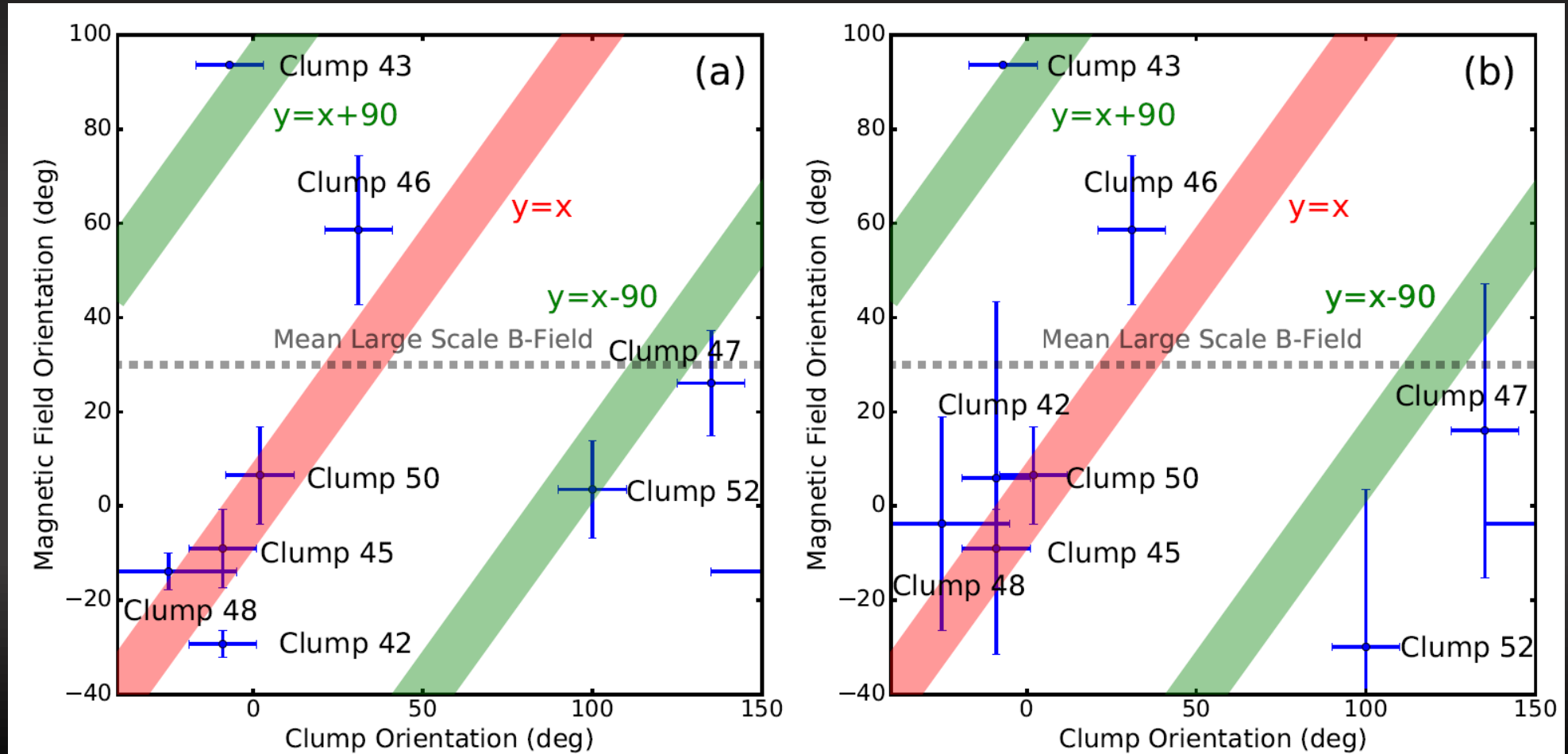
Alignment between clumps and B-field

- Clumps identified in Gould Belt Survey (Johnstone et al. 2017)
- Clump orientation: 2D Gaussian Fit
- Green Diamonds: Class 0/I YSOs
- Yellow Boxes: Class II/III YSOs



Alignment between clumps and B-field

- Clump orientation: 2D Gaussian Fit
- B-field orientation: (a) averaged near the peak (b) averaged within clumps



Discussion

- Feature 1: The magnetic fields are dragged along the pc-scale filament, instead of toward the central hub.
- Interpretation:
 - The gravity from the dense hub cannot compete the gravity of the pc-scale filament, at least at the time the B-fields are dragged.

Discussion

- Feature 2: The clumps within the HFS are aligned with the “local” and “curved” B-field

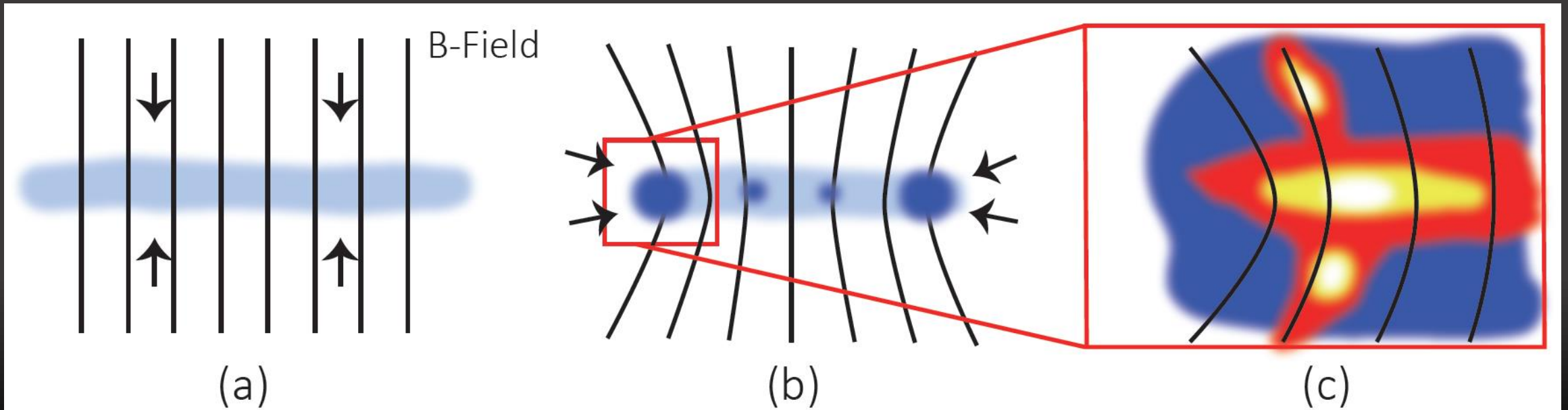
Interpretation:

- The HFS formed under the regulation of B-field, which had been modified by the main filament.

Possible Scenario for HFS formation

Fragmentation of filaments (e.g. Pon et al. 2011, 2012, Seifried & Walch 2015)

- (a) Large scale filament form in strong B-field.
- (b) Massive fragments appear at the ends of large scale filament.
- (c) Massive fragments further evolve to HFS.



Summary

- Observed features
 - B-fields within HFS are similar to large scale B-field, but dragged by main filament
 - Clumps within HFS are aligned with local B-fields
- These features suggest:
 - The gravity of the main filament could overcome B-field, and result in longitude contraction of the main filament.
 - At the same time, the gravity from the hub was less important, suggesting that the density of the hub was still low.
 - The HFS could formed/became massive after the longitude contraction of the main filament.
 - One possible scenario is that the observed HFS was evolved from the fragment of the main filament.