

# BLAST-Pol

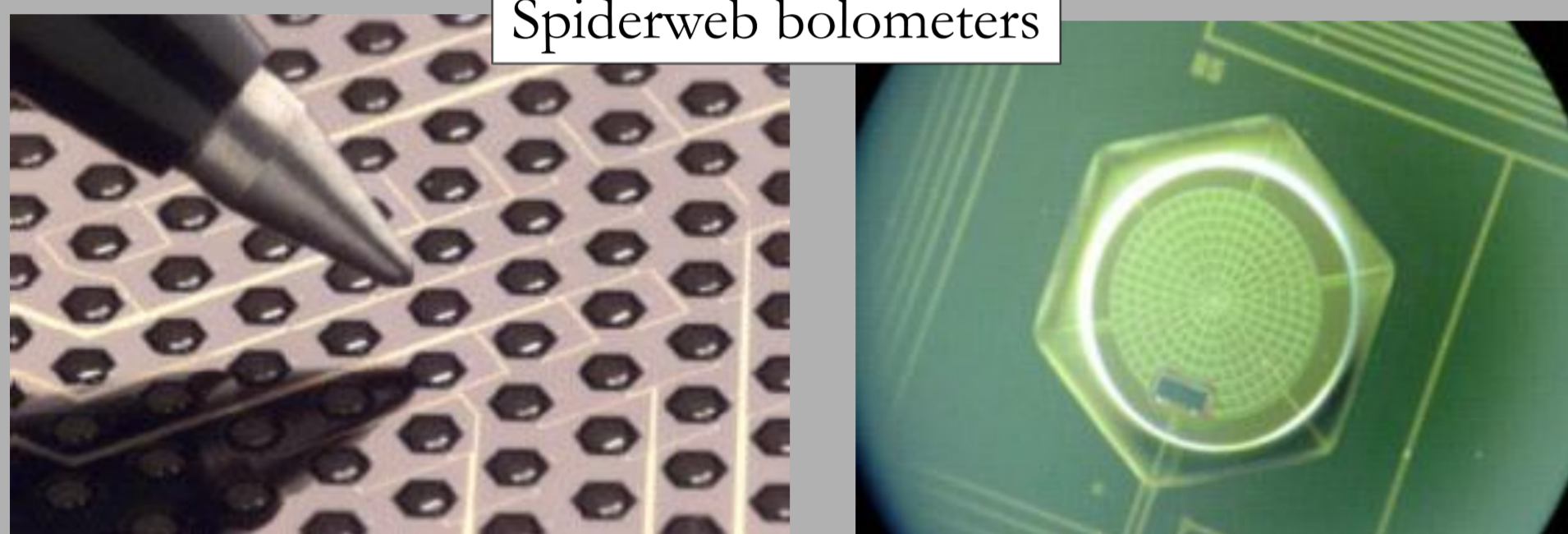
## BALLOON-BORNE LARGE-APERTURE SUB-MILLIMETER TELESCOPE FOR POLARIMETRY

The telescope that observed the polarized dust emission from Giant Molecular Clouds in search of the role of magnetic fields in star formation while hanging from a balloon at 40km over Antarctica

### The BLAST-Pol instrument

- Cassegrain telescope: 1.8m primary and 40cm secondary mirrors.
- Silicon-nitride micromesh spiderweb bolometers (SPIRE/Herschel prototypes) in three different bands.
- Polarizing grid in front of each detector array and 4 K stepping broad-band half-wave plate.
- In flight pointing  $\sim 1'$  and  $5''$  post-flight pointing reconstruction

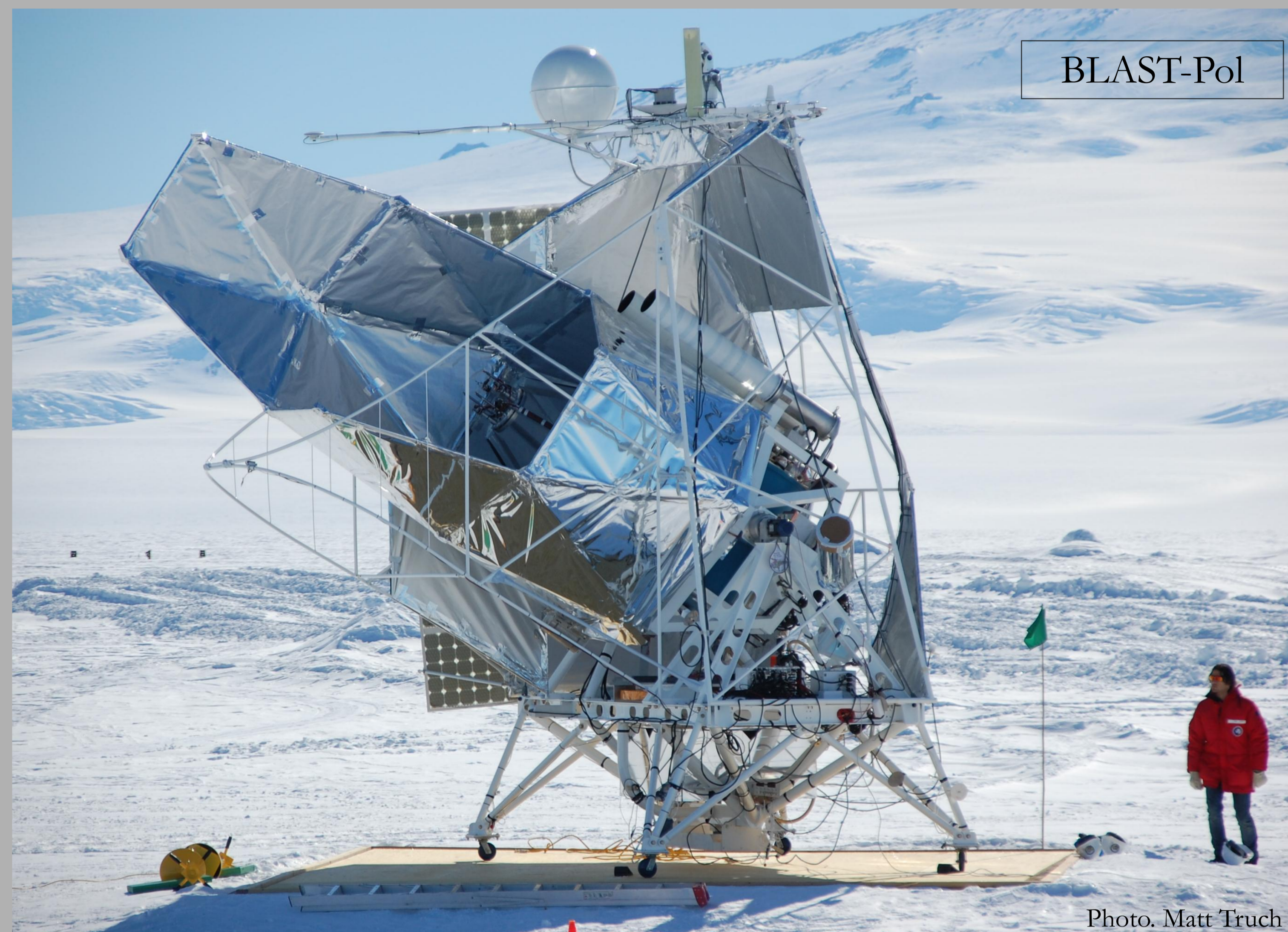
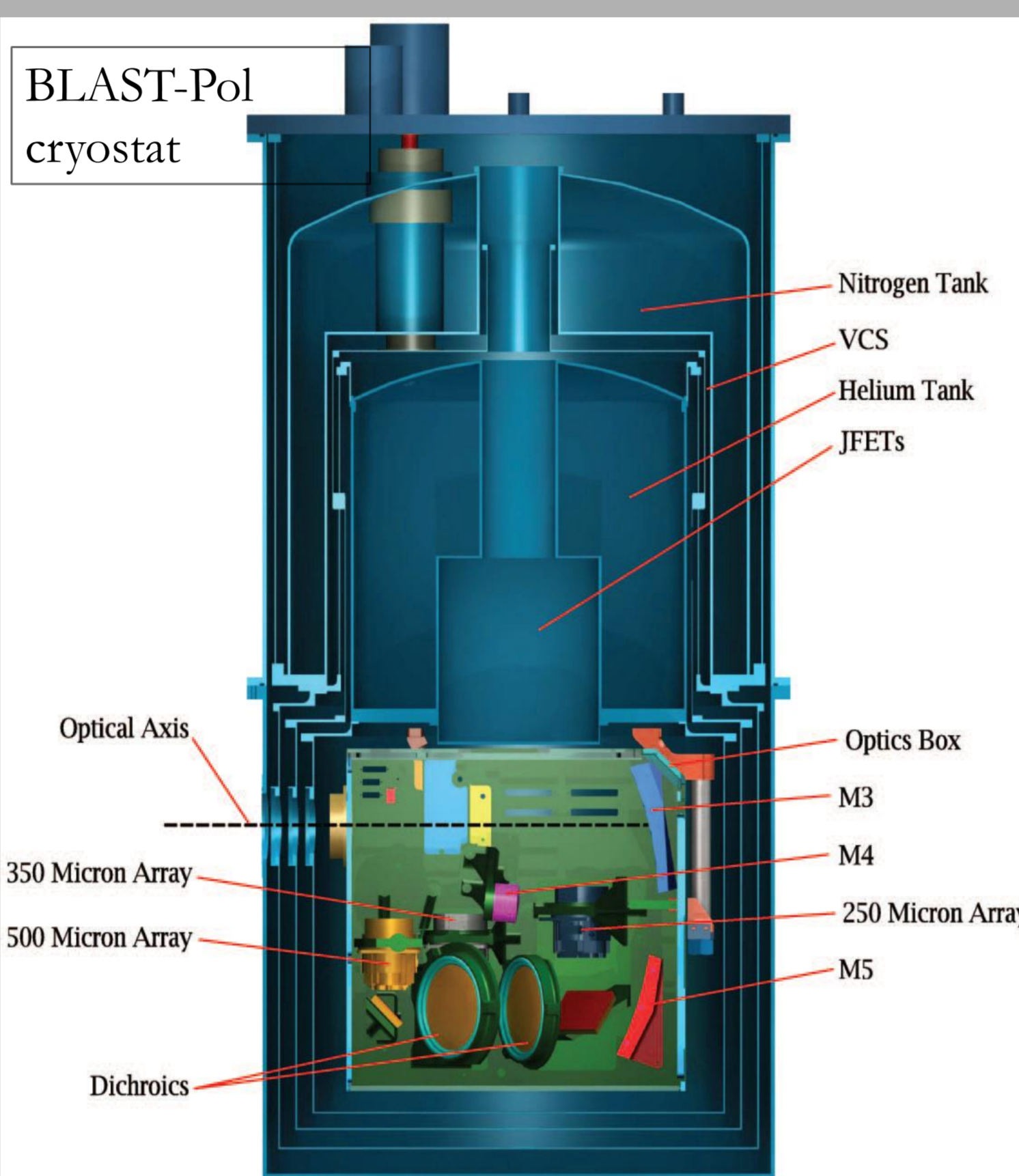
Spiderweb bolometers



BLAST-Pol Band ( $\mu\text{m}$ )	250	350	500
# of detectors	149	88	43
Beam FWHM	30"	42"	60"
NEF ( $\text{mJy}/\text{s}^{1/2}$ )	236	241	239
$\Delta S$ , 1hr obs ( $\text{mJy}$ )*	35	38	38
$\Delta S$ , 6hr obs ( $\text{mJy}$ )*	14.2	15.5	15.4

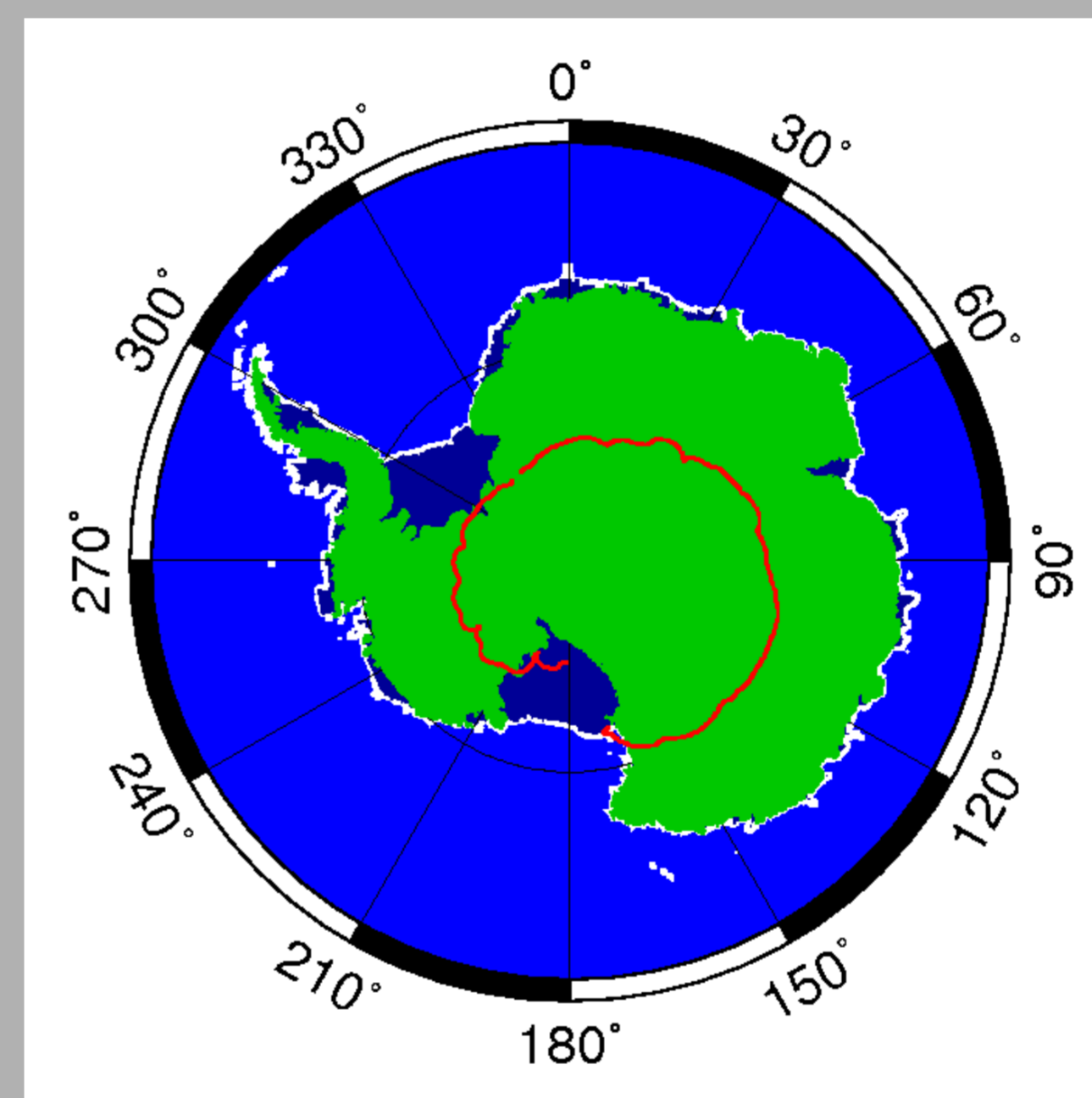
\* for  $0.25 \text{ deg}^2$

BLAST-Pol cryostat



BLAST-Pol

Photo: Matt Truch



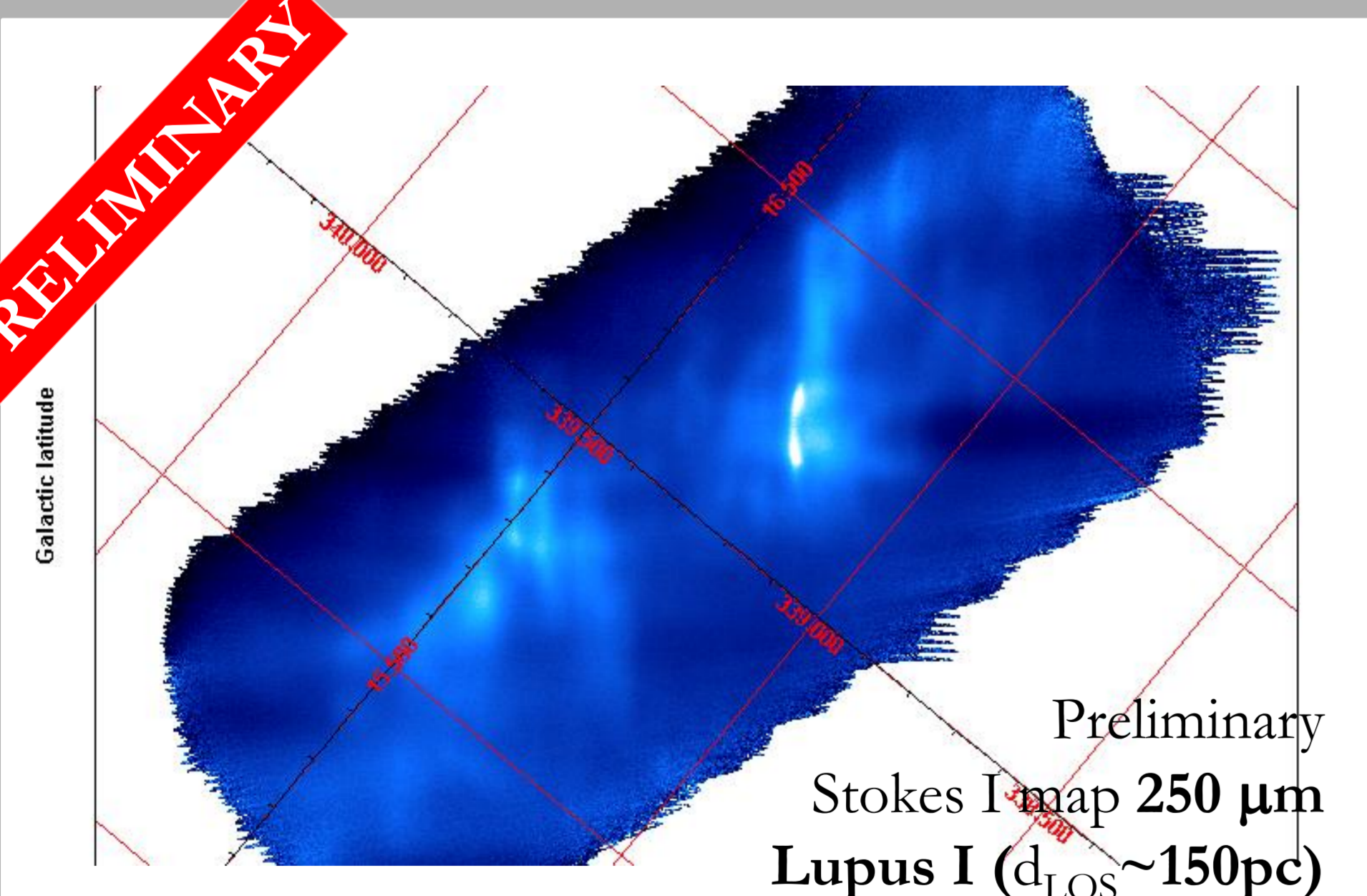
### BLAST-Pol flight and analysis

- 9.5-day flight over Antarctica on Dec 2010 – Jan 2011.
- 8 molecular clouds observed.
- Receiver and telescope recovered.
- Data analysis in progress

### BLAST-Pol science goals

Map linear polarization in giant molecular clouds with less than 1% and down to  $A_v \sim 4$  to study the role of magnetic fields.

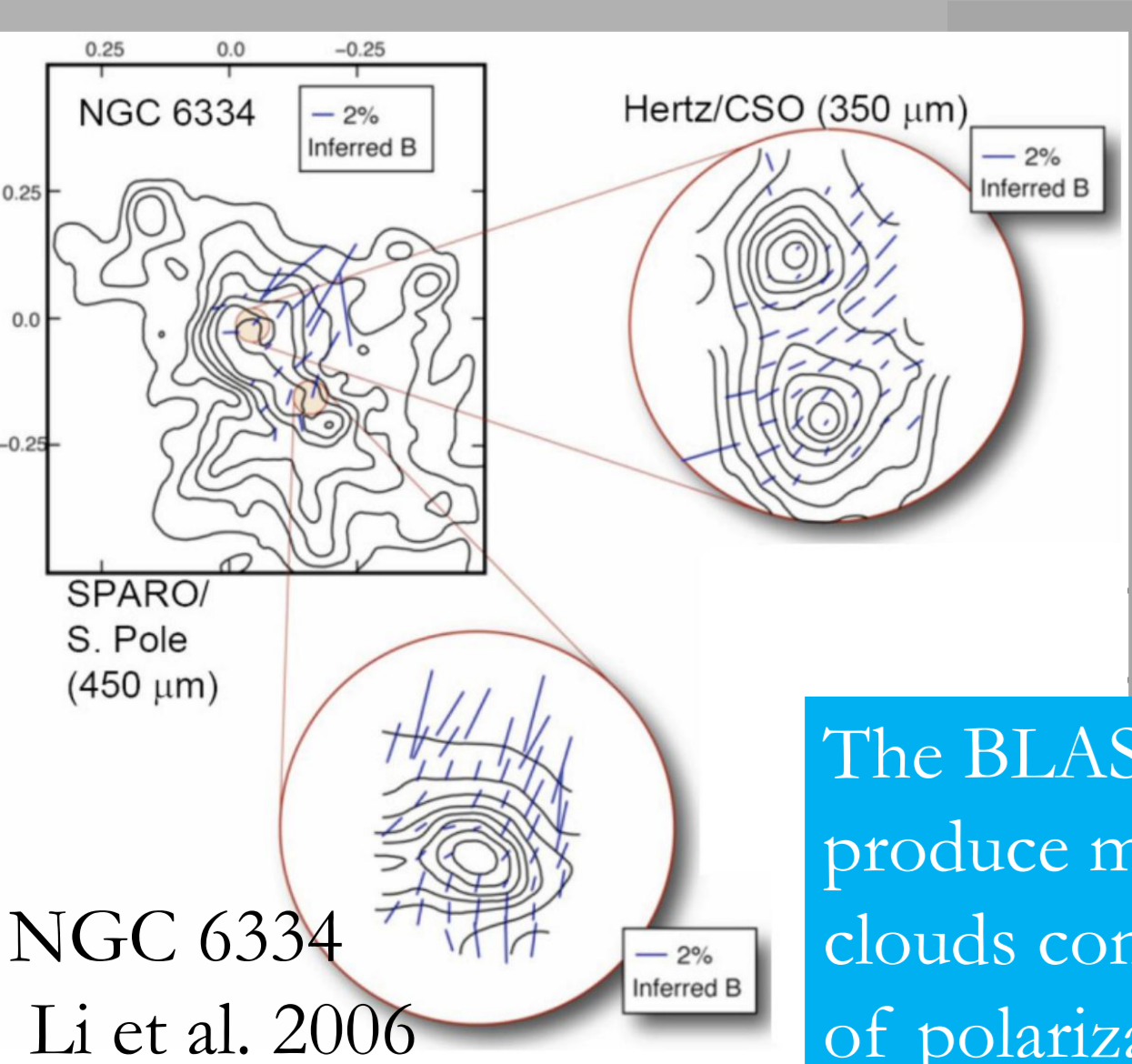
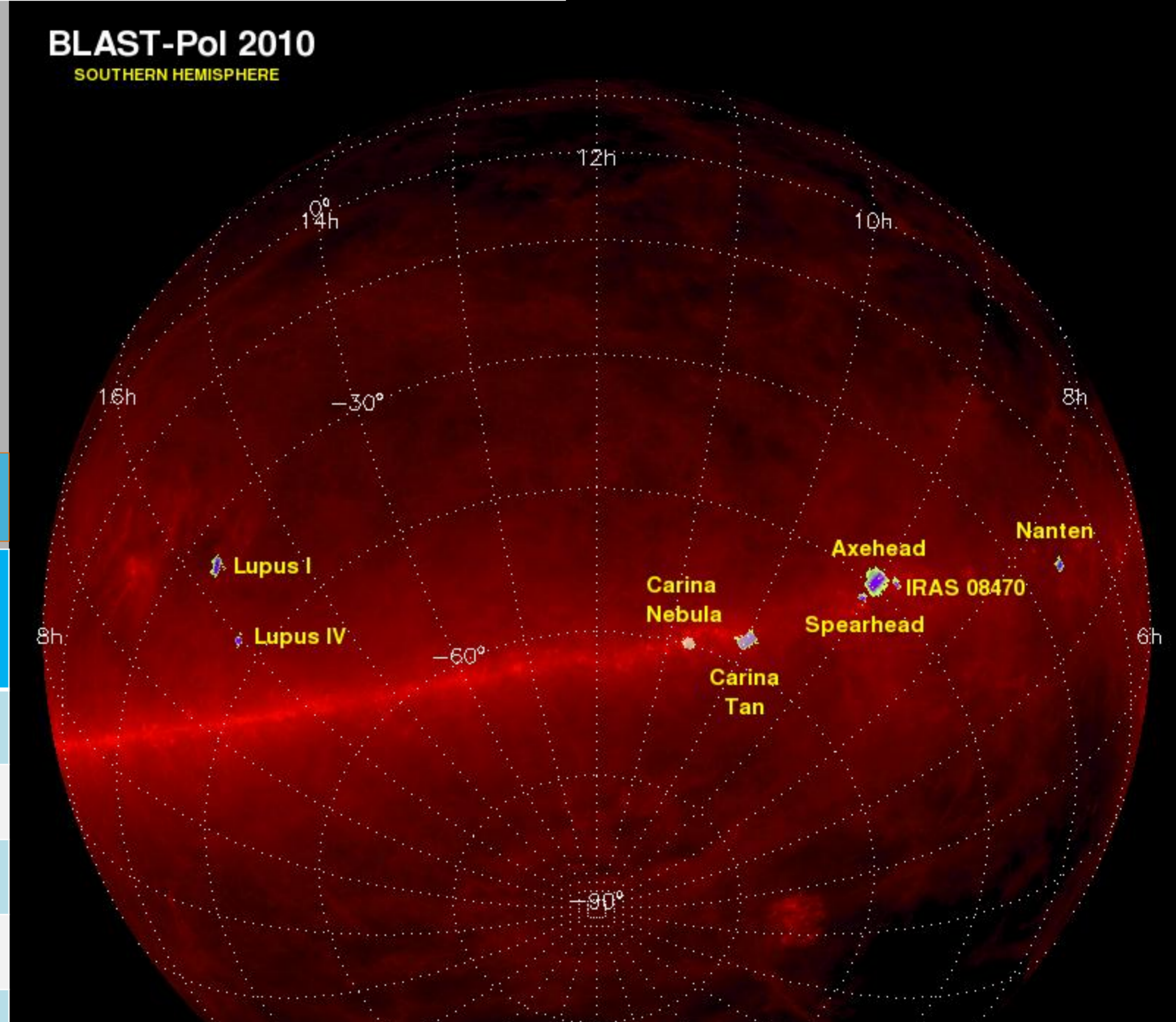
- Resolve fields from cloud scale to cores and filaments.
- Constrain magnetic field strength and study its variation from cloud to cloud.
- Compare magnetic field morphology with filamentary structure.
- Measure the sub-millimeter polarization spectrum of dust.



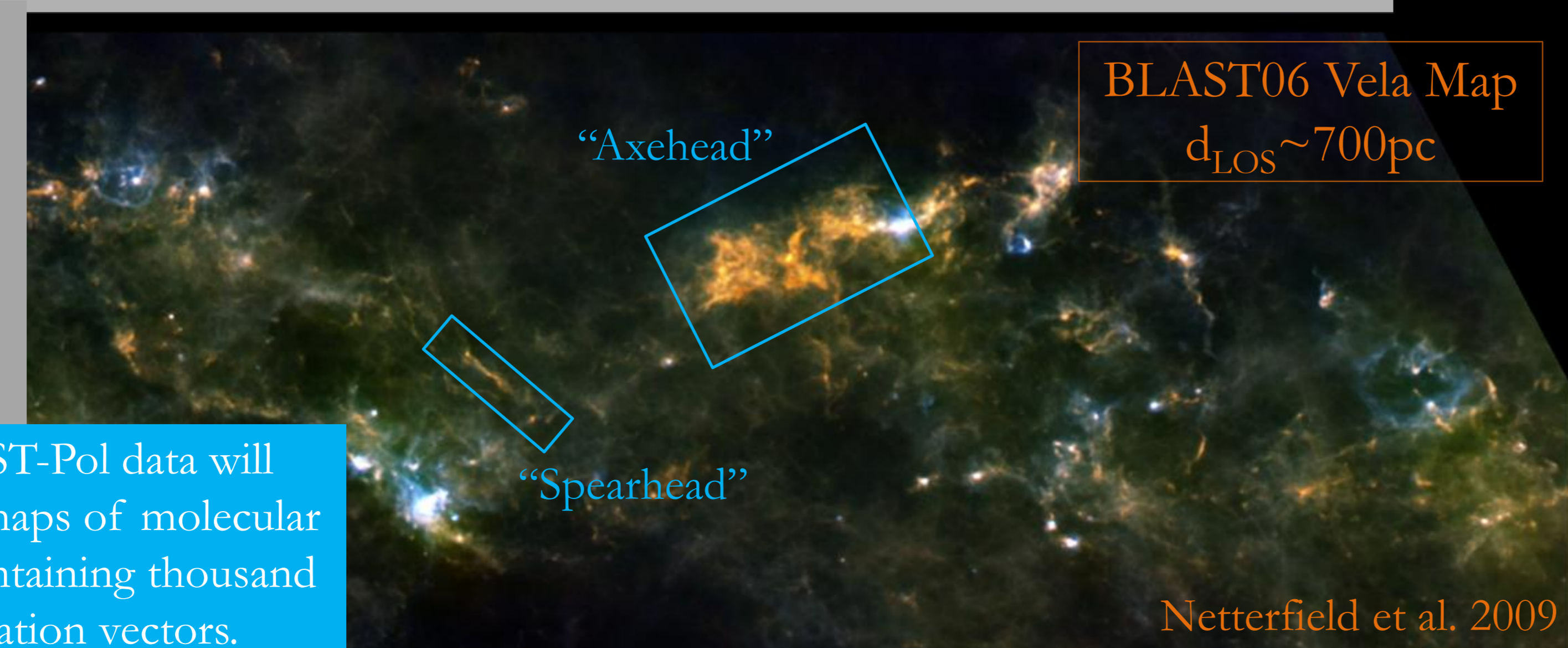
Preliminary Stokes I map  $250 \mu\text{m}$  Lupus I ( $d_{\text{LOS}} \sim 150 \text{ pc}$ )

### BLAST-Pol 2010 data set

Target	Area ( $\text{deg}^2$ )	Target	Area ( $\text{deg}^2$ )
"Axehead"	1.4	"Spearhead"	0.14
Lupus I	0.69	Lupus IV	1.4
Nanten	0.32	G331	0.2
Cen A	0.07	Carina Neb	0.2
G321	0.5	Carina Tan	1.0



The BLAST-Pol data will produce maps of molecular clouds containing thousand of polarization vectors.



BLAST06 Vela Map  $d_{\text{LOS}} \sim 700 \text{ pc}$

Netterfield et al. 2009



BLAST-Pol recovery

Photo: Matt Truch



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