BLAST-TNG: High Resolution Measurements of Polarized Dust Emission

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University of Pennsylvania

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SCAR AAA 2015

Specifications

Primary: **2.5 m**

Bands: **250, 350, 500 μm**

# of Dual-Pol Pixels:

647, 324, 201

FOV: **22'**

Resolution: **25", 35", 50"**

Penn

CIERA Center for Interdisciplinary Exploration and Research in Astrophysics

ASU

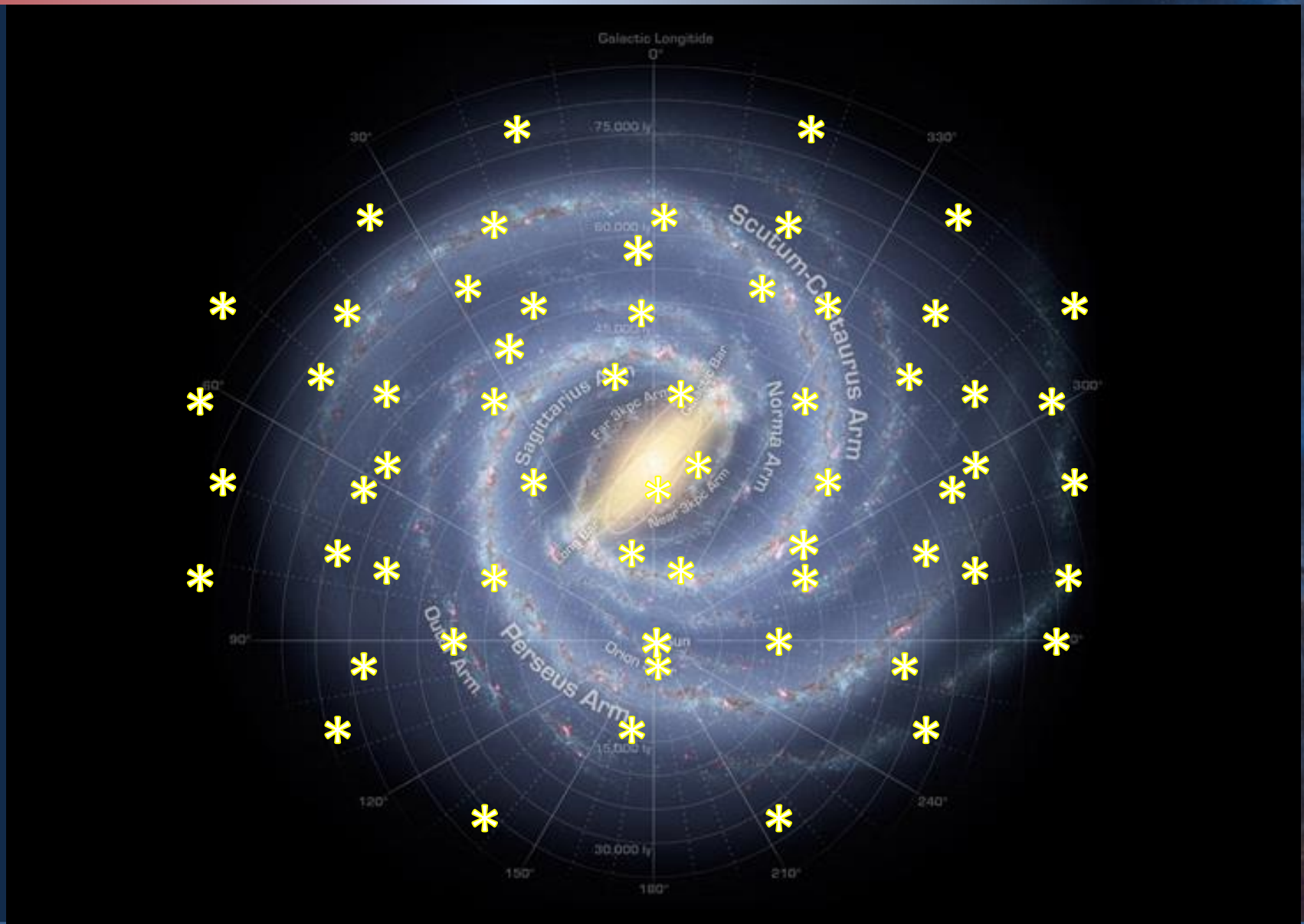
Stanford University

NIST

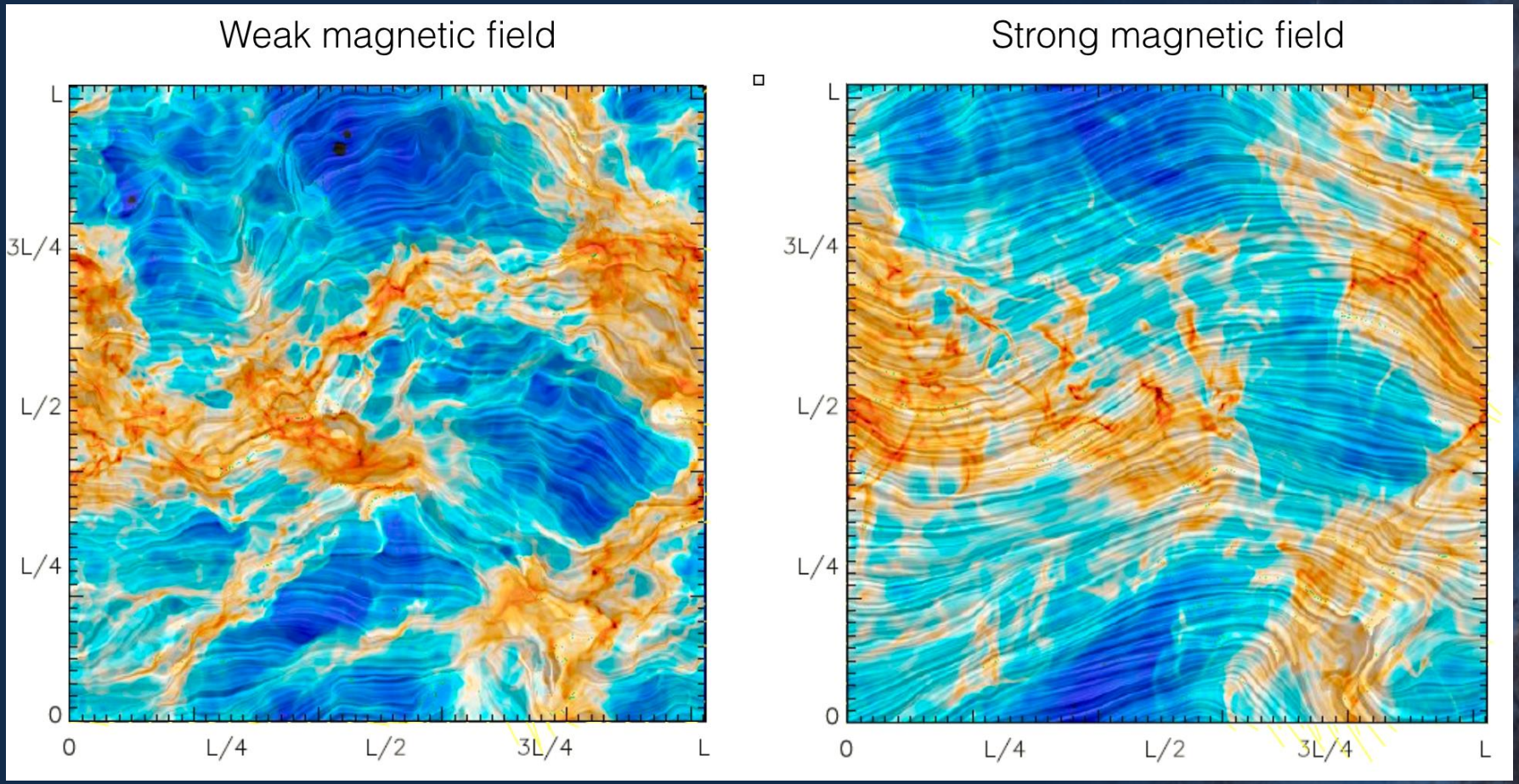
SACRAMENTO STATE

NASA

Low Star Formation Rate

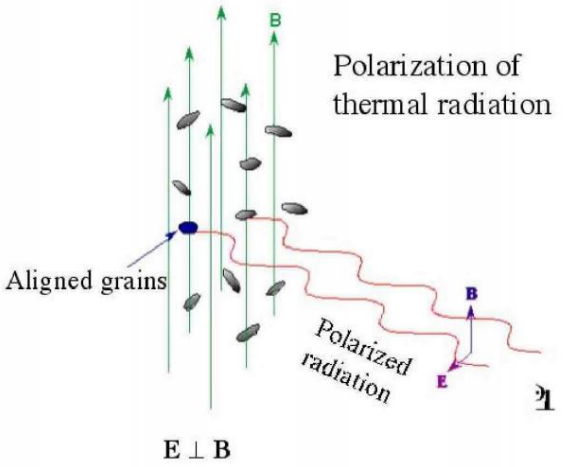


Turbulence and Magnetic Fields

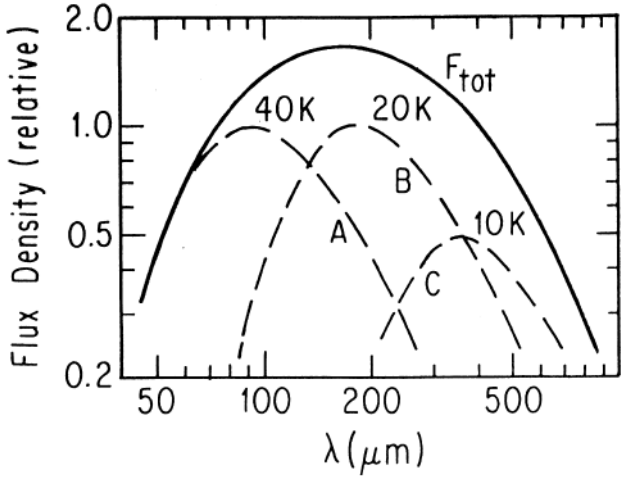


Molecular Cloud Simulations, Soler et al. (2013)

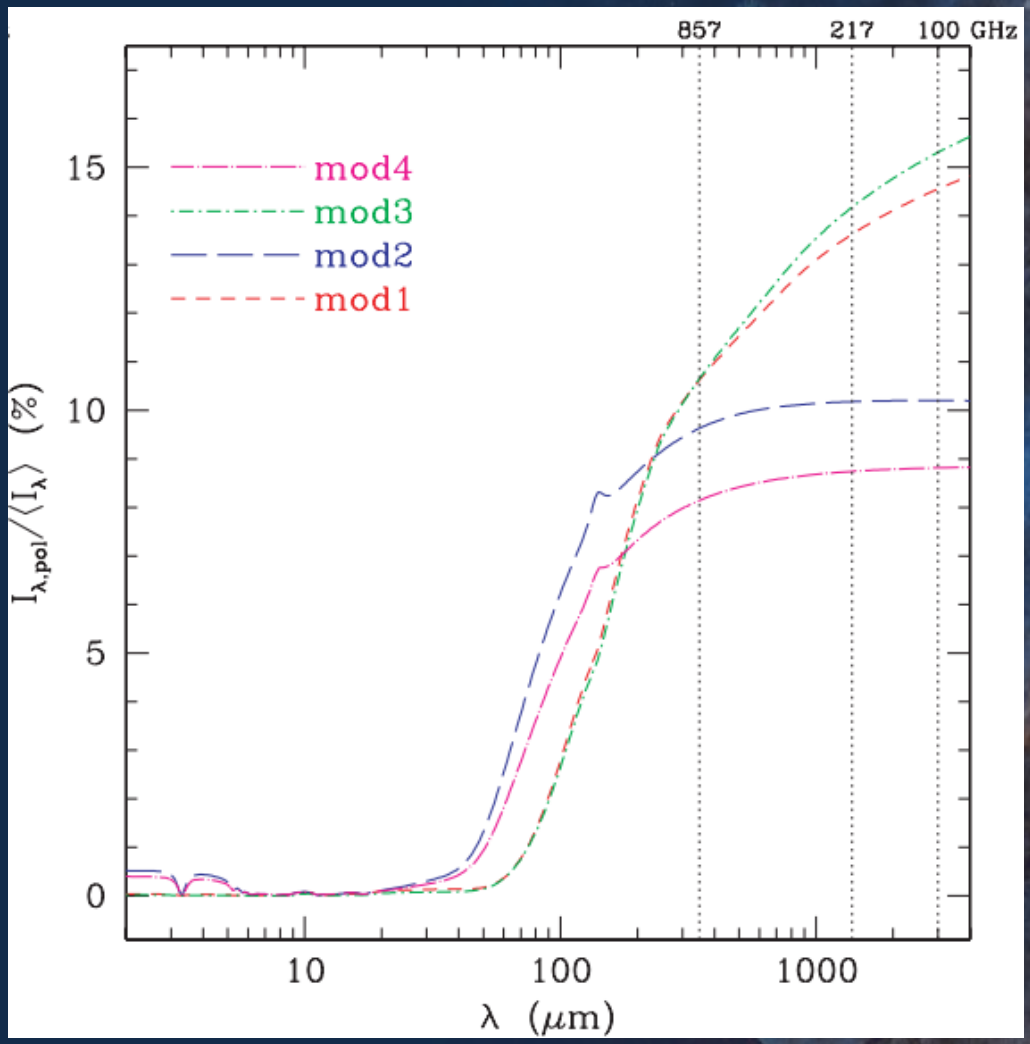
Aligned Dust Grains



Lazarian (2007)

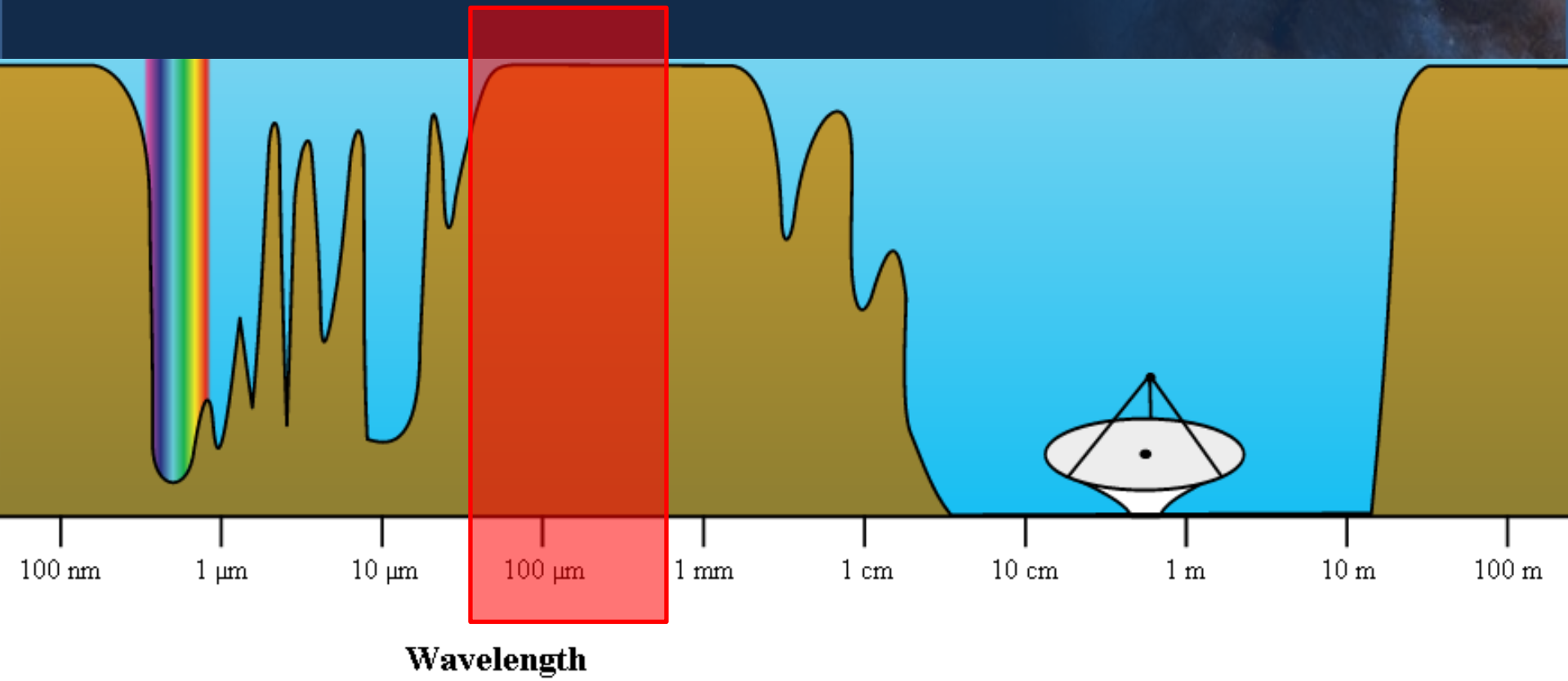


Hildebrand et al. (2000)



Draine and Fraisse (2009)

Why Antarctica



BLASTPol 2012

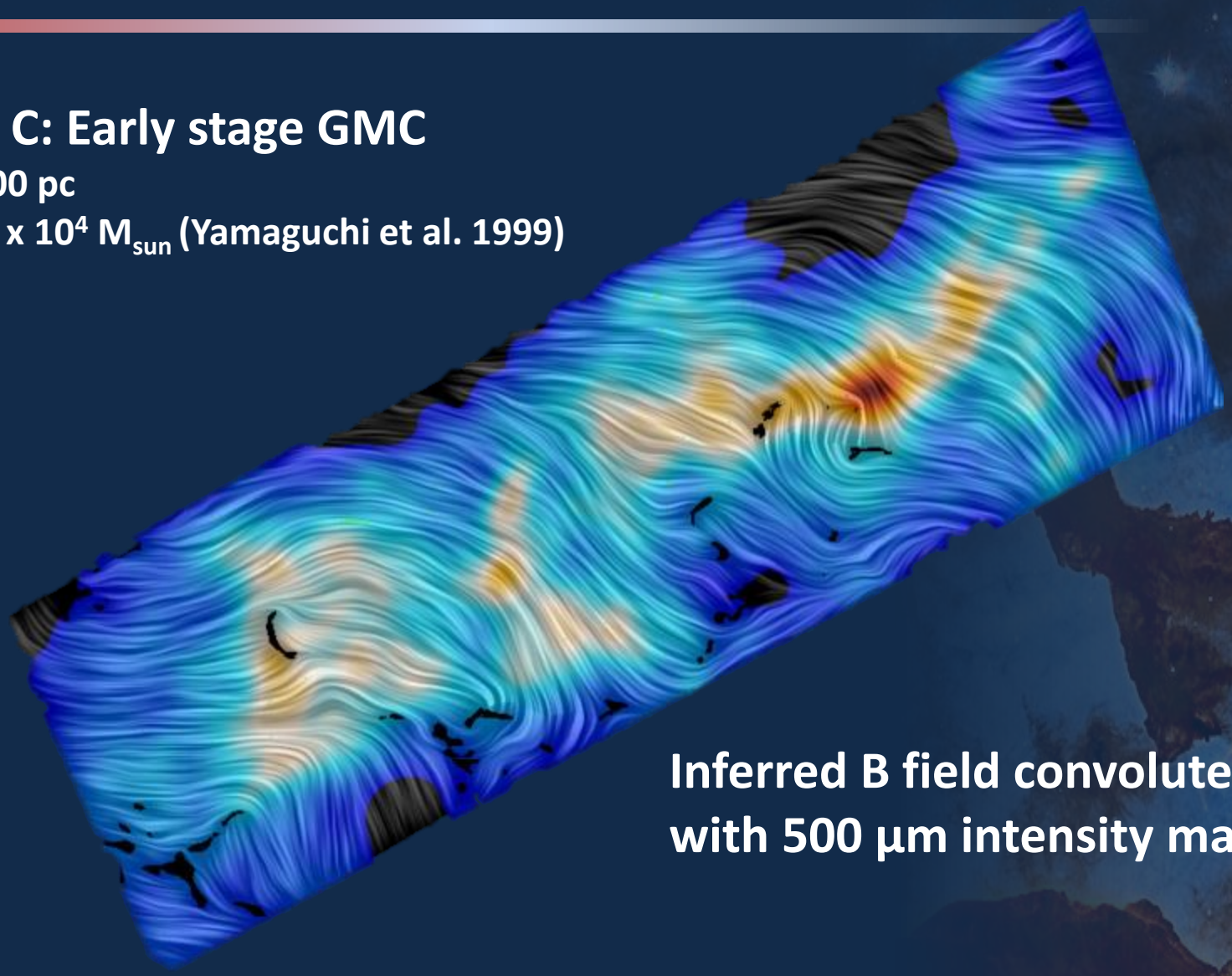
- LDB Flight time: 16 days
- 250, 350, and 500 micron observing bands (FAR-IR/Submillimeter)
- 36, 42, and 60”nominal resolution
- 270 bolometers
- 1.8 m Cassegrain

BLASTPol 2012 Results

Vela C: Early stage GMC

D = 700 pc

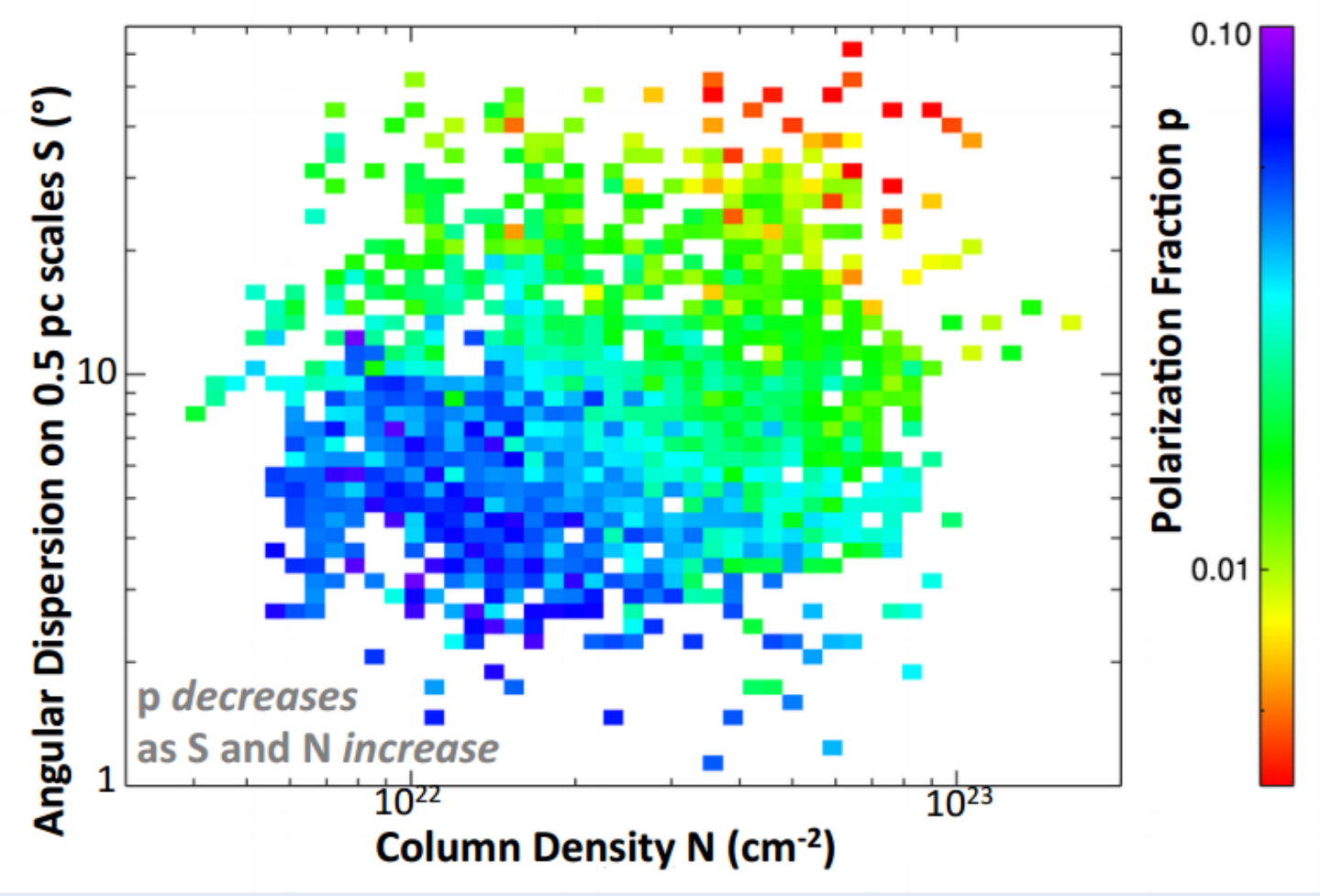
M = 5 x 10^4 M_{sun} (Yamaguchi et al. 1999)



Inferred B field convoluted with 500 µm intensity map

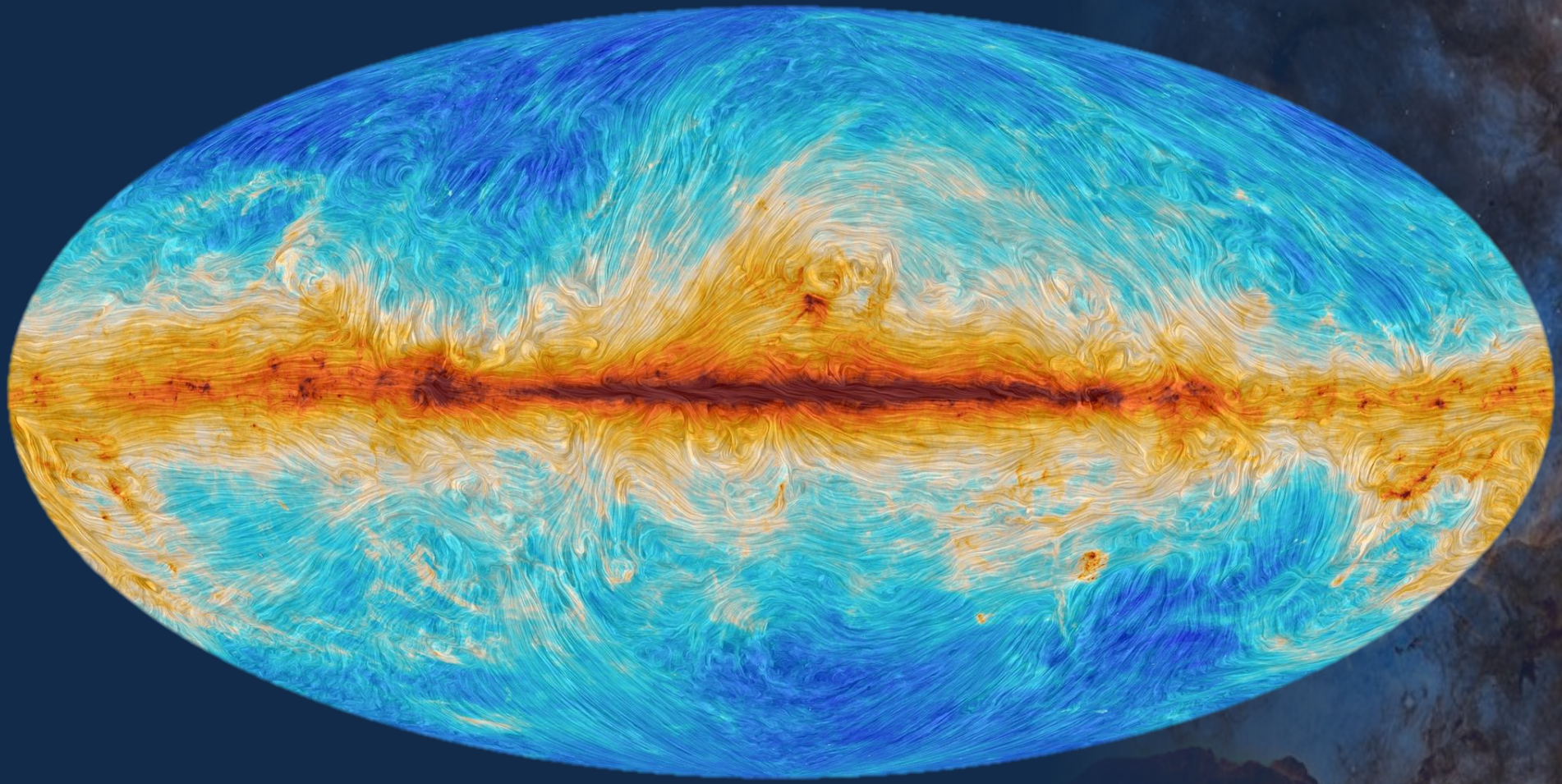
BLASTPol 2012 Results

Best fit power-law model: $p(N, S) = p_0 N^{-0.4\pm0.1} S^{-0.6\pm0.02}$

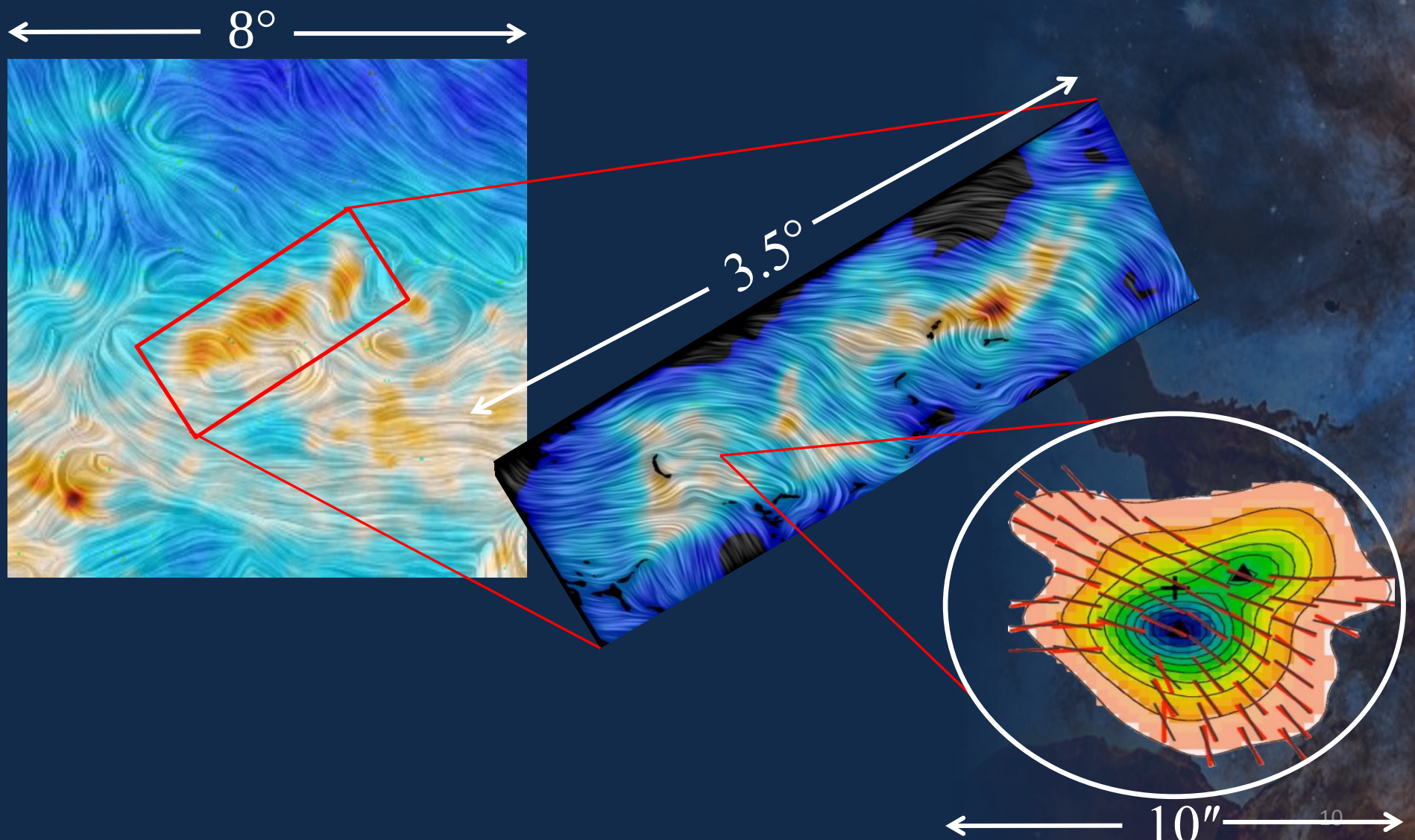


N vs S scatter, Color is median *p* per bin
(Fissel et al. 2015, in preparation)

We Need More!



Resolution Gap



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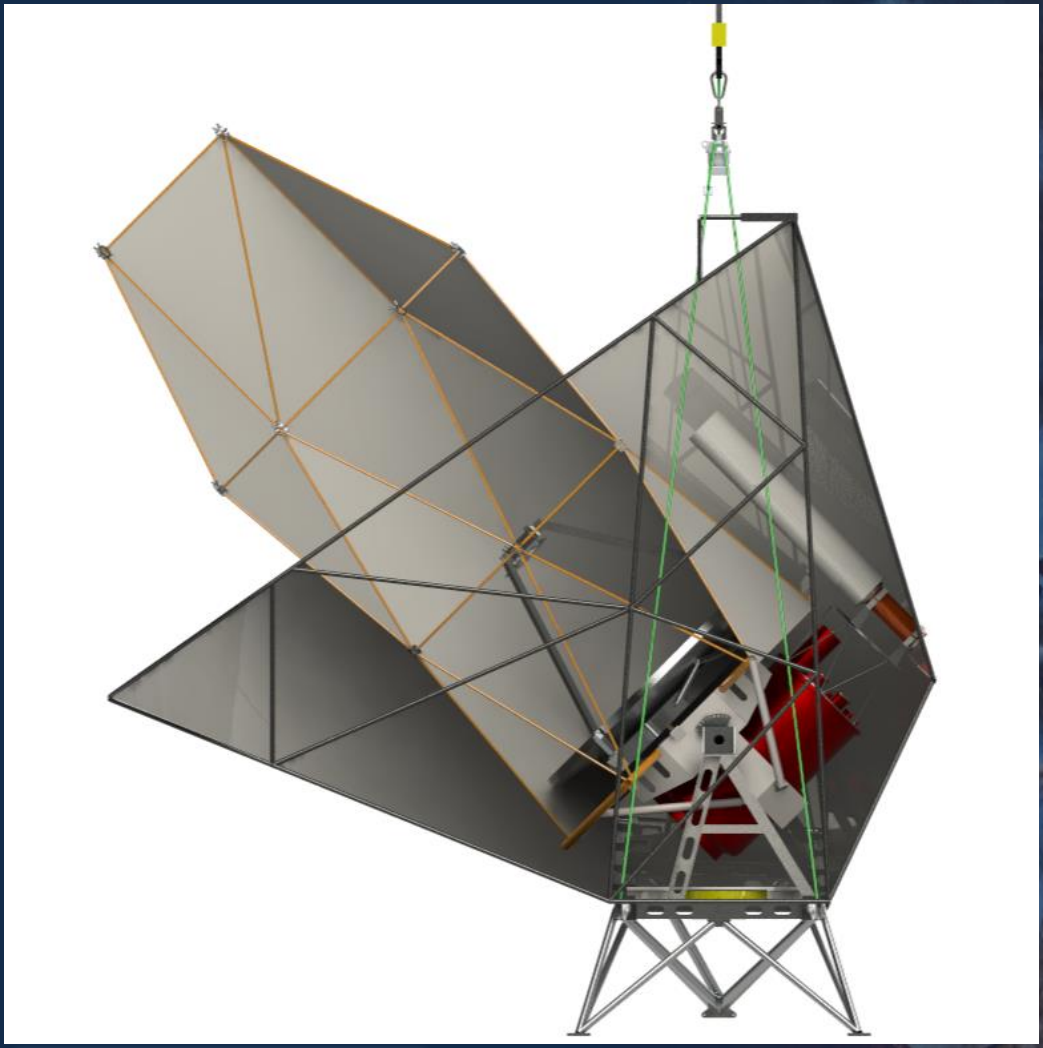
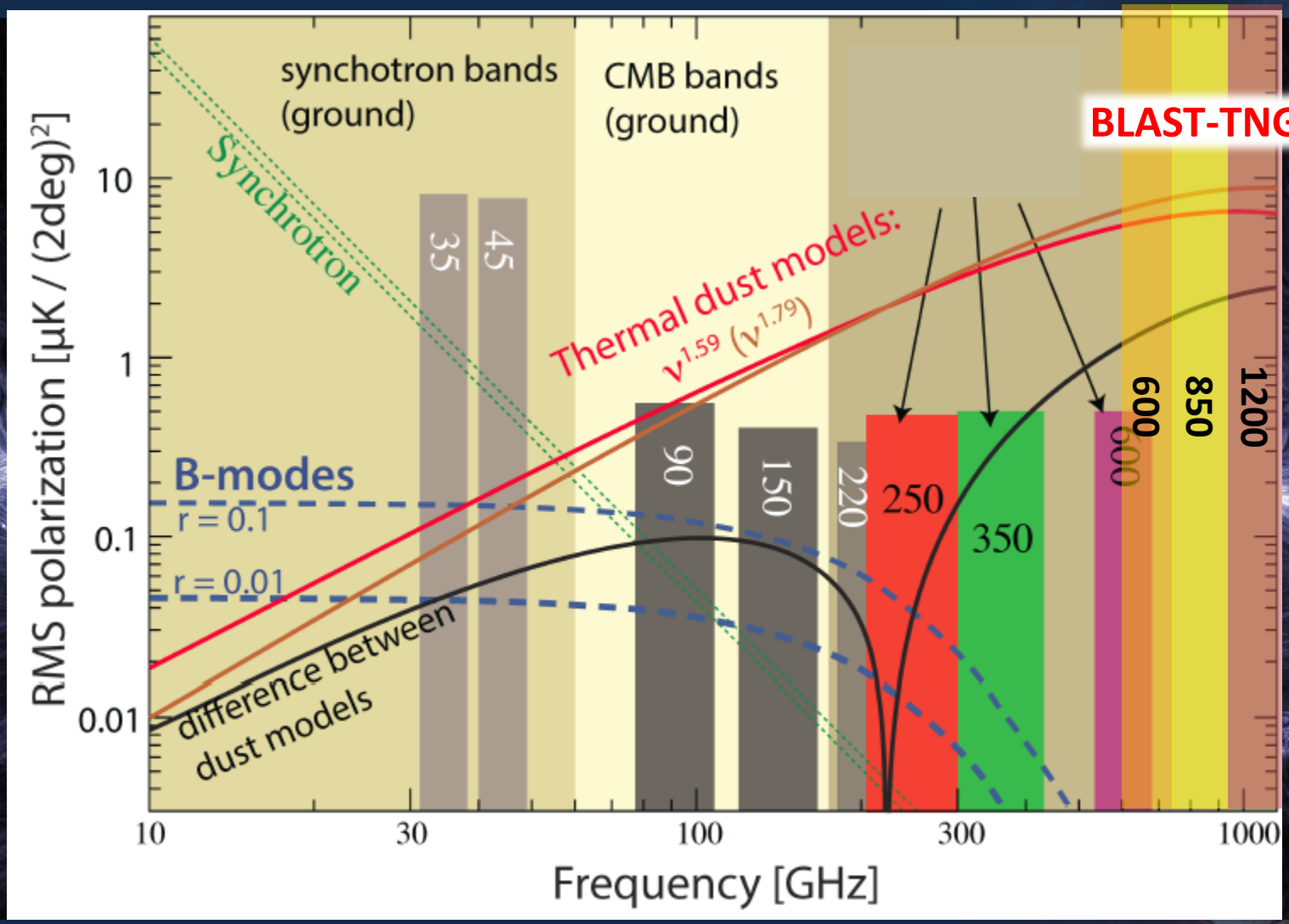
16 x BLASTPol Mapping Speed



See Galitzki et al. 2014

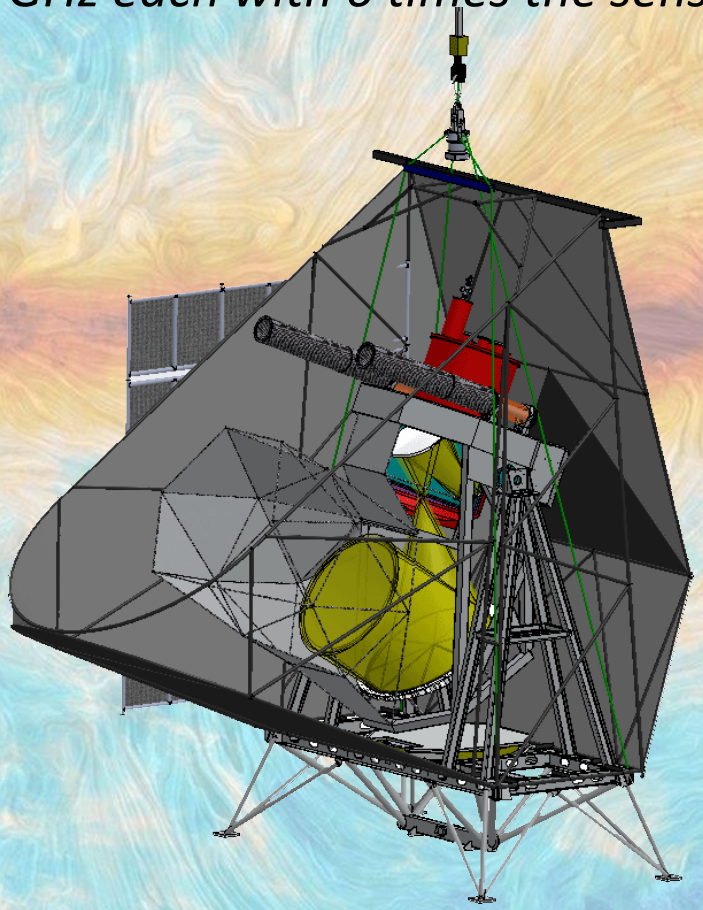
B-Mode Foreground Exploration



The B-mode Foreground Experiment

BFORE

"A sub-orbital balloon mission to map the polarized dust foreground at 270, 350, and 600 GHz each with 6 times the sensitivity of Planck 353 GHz over 10,000 deg^2."



Key Features

Detectors: 11,800

7,840 TES detectors at 270, and 350 GHz

4,960 KID detectors at 600 GHz

Telescope:

1.35 meter primary –> 1.7 to 4.2 arcmin

4 K secondary

Flight:

28+ days above Antarctica

10,000 deg^2 overlapping ACT, BICEP2, CLASS, PolarBear and SPT

First flight – December 2018 (proposed)

Background: Planck/ESA

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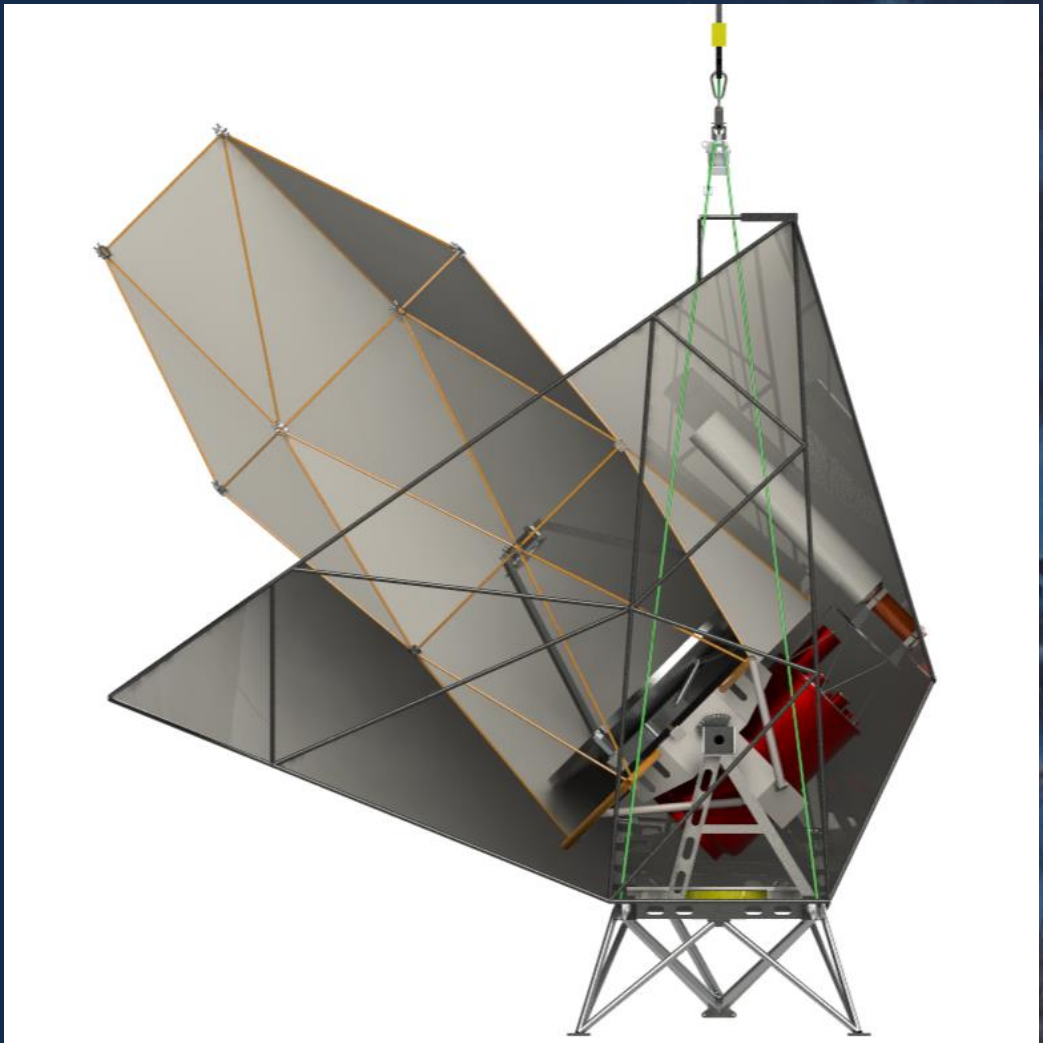

See Galitzki et al. 2014