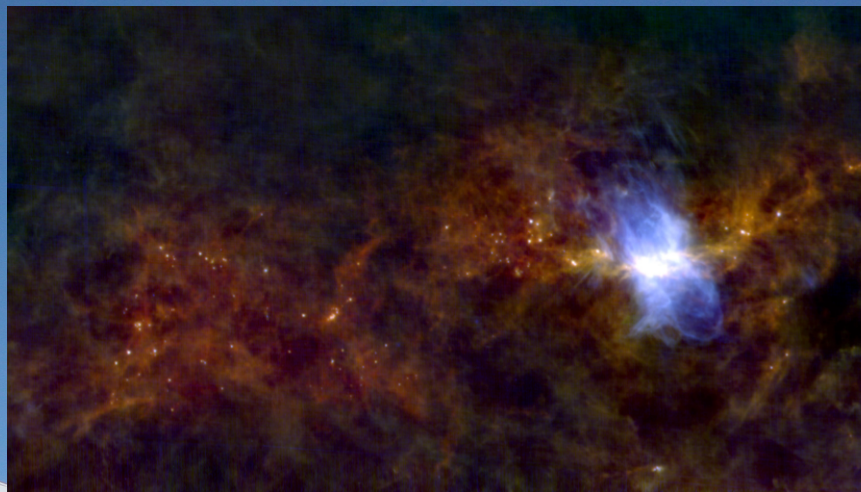
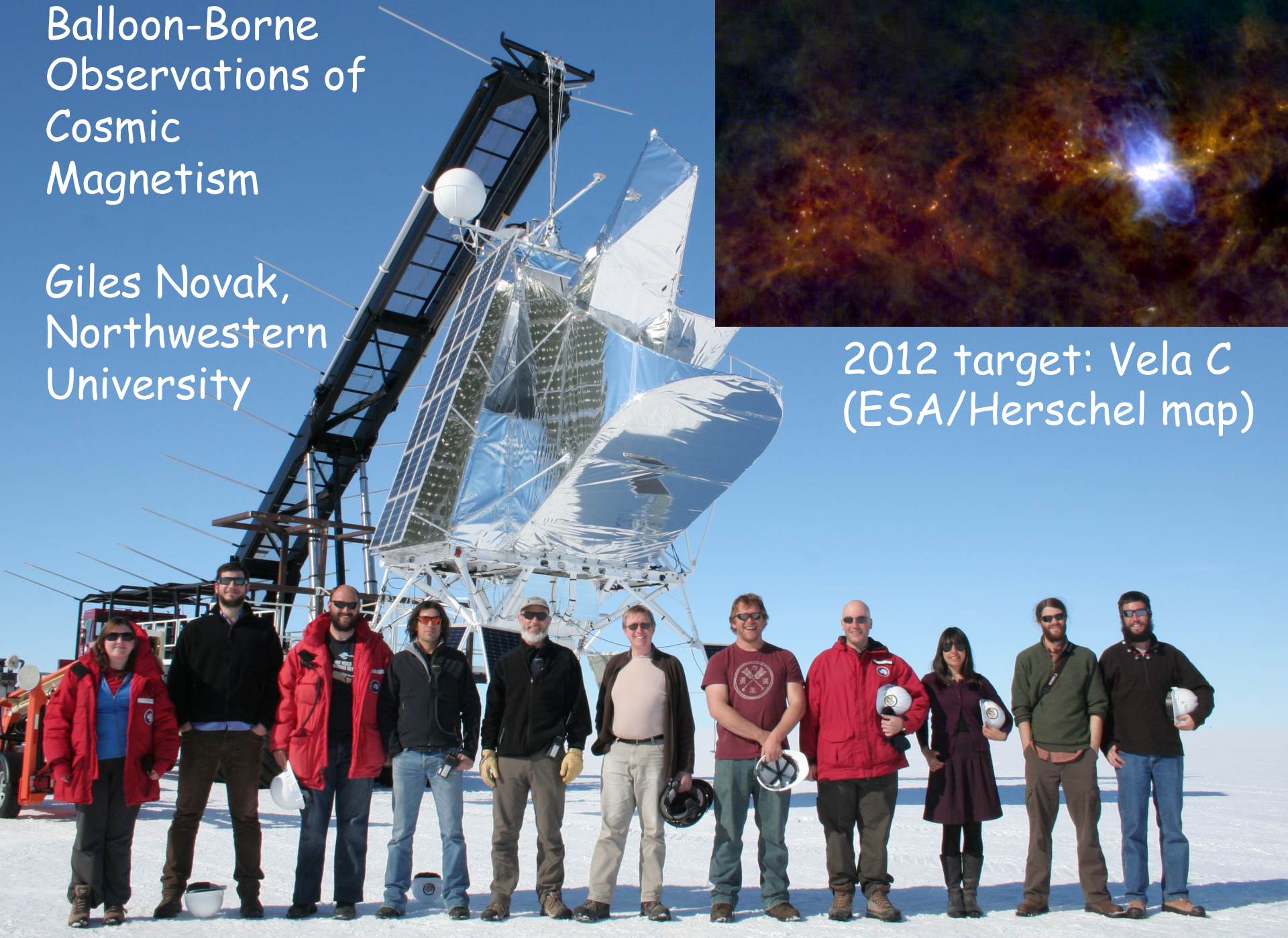


Balloon-Borne Observations of Cosmic Magnetism

Giles Novak,
Northwestern
University

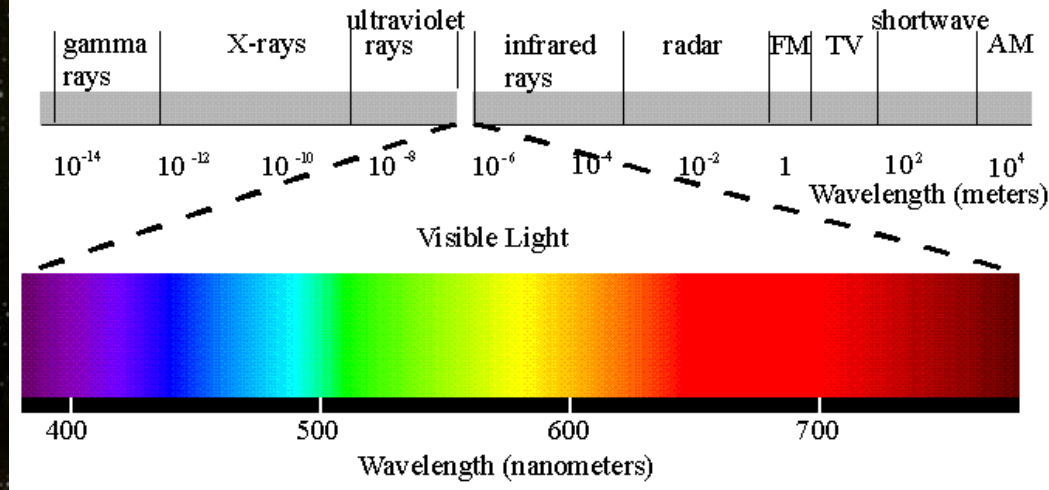


2012 target: Vela C
(ESA/Herschel map)



The Milky Way





Near-IR image; Sword of Orion

Note:

Orion Nebula

Orion Nebula Cluster

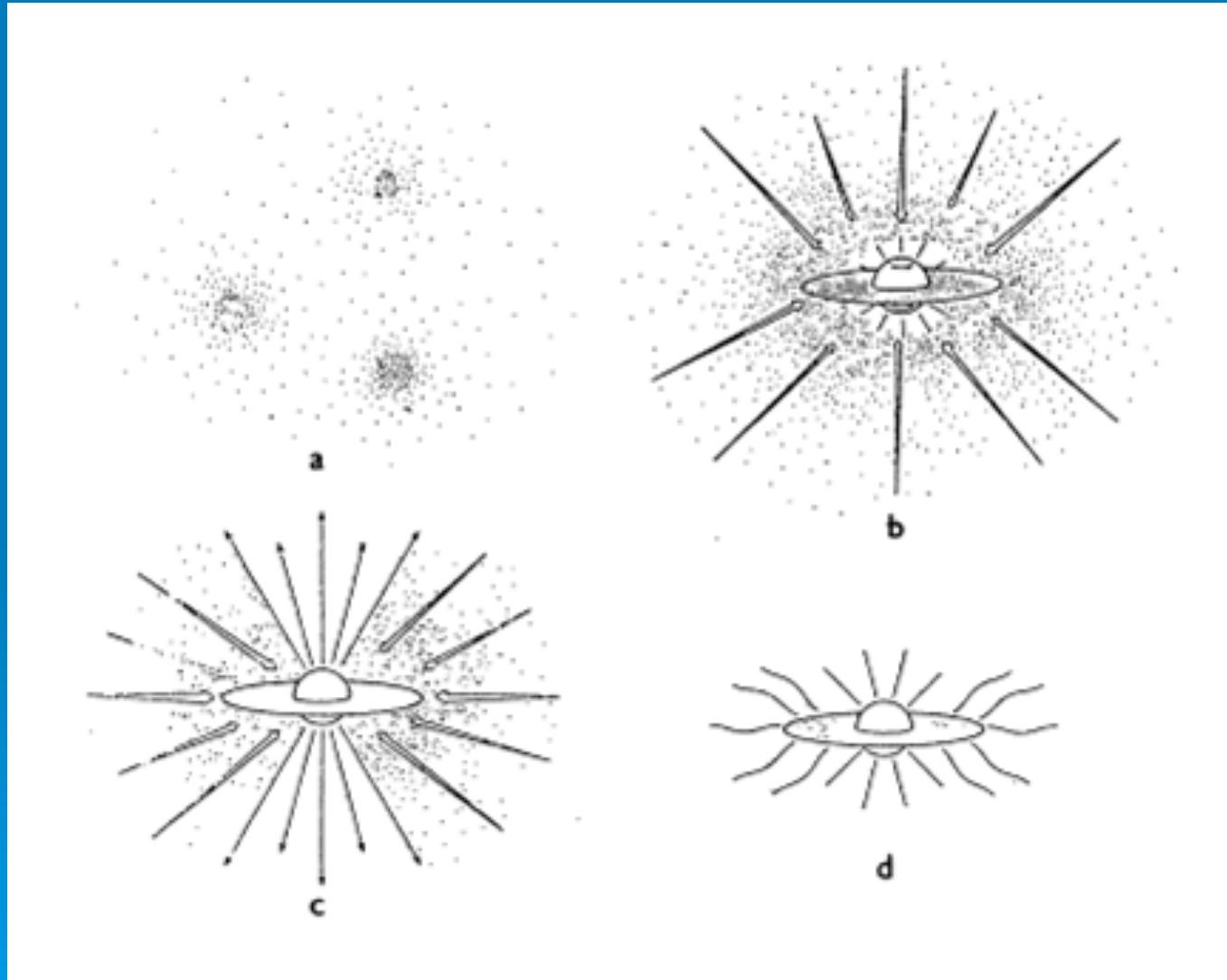
Trapezium (bright white spot)

Sword of Orion

One of the best-known nebulae in the sky, easily visible to the naked eye from nearly everywhere in the world

stages of star formation

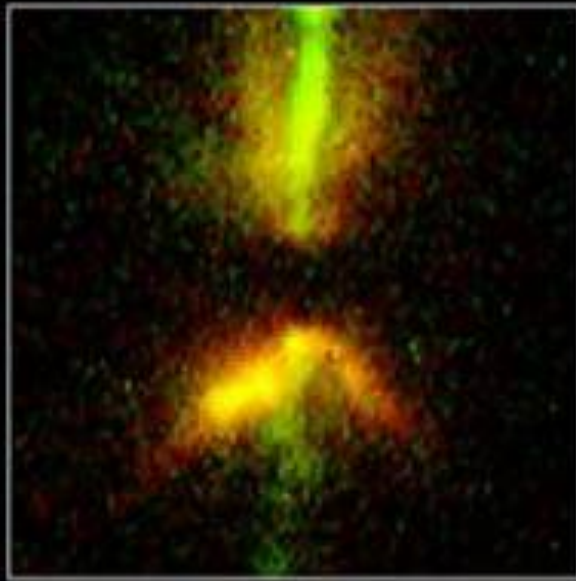
(picture from Shu, Adams, & Lizano 1987)



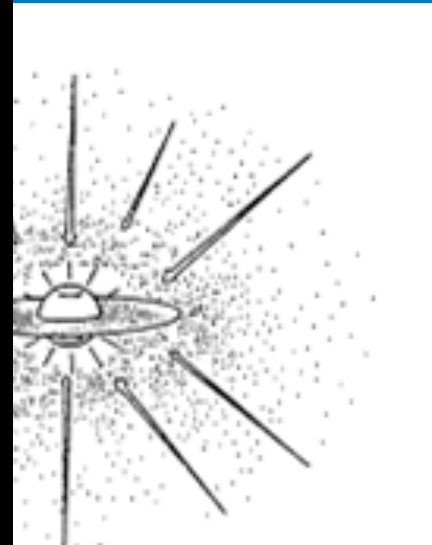
Formation (Lizano 1987)



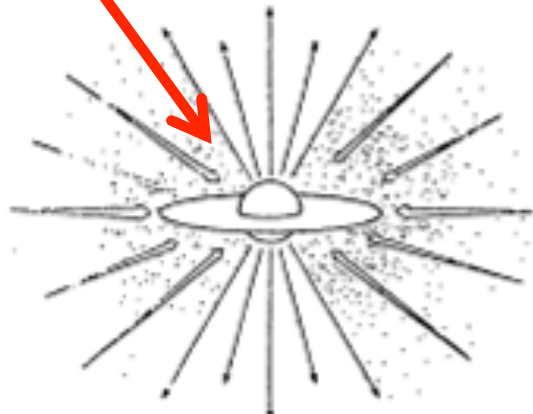
NICMOS



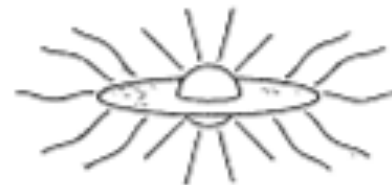
WFPC2



b



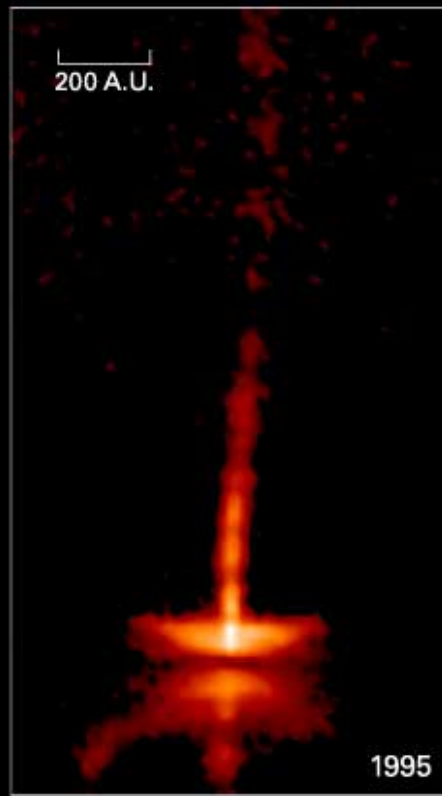
c



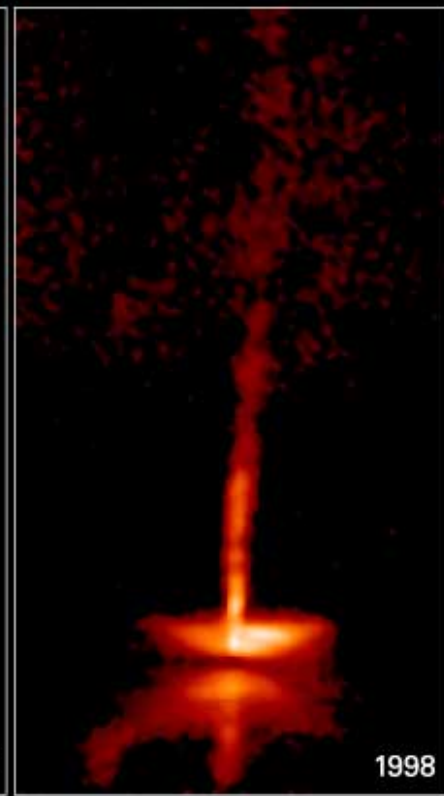
d



NICMOS



1995

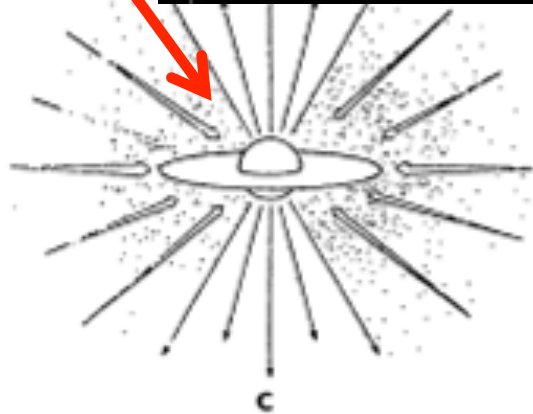


1998

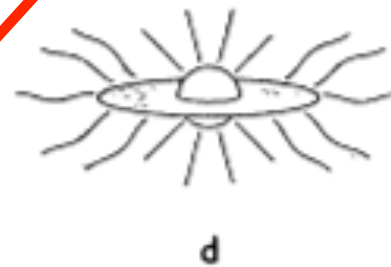


2000

The Dynamic HH 30 Disk and Jet



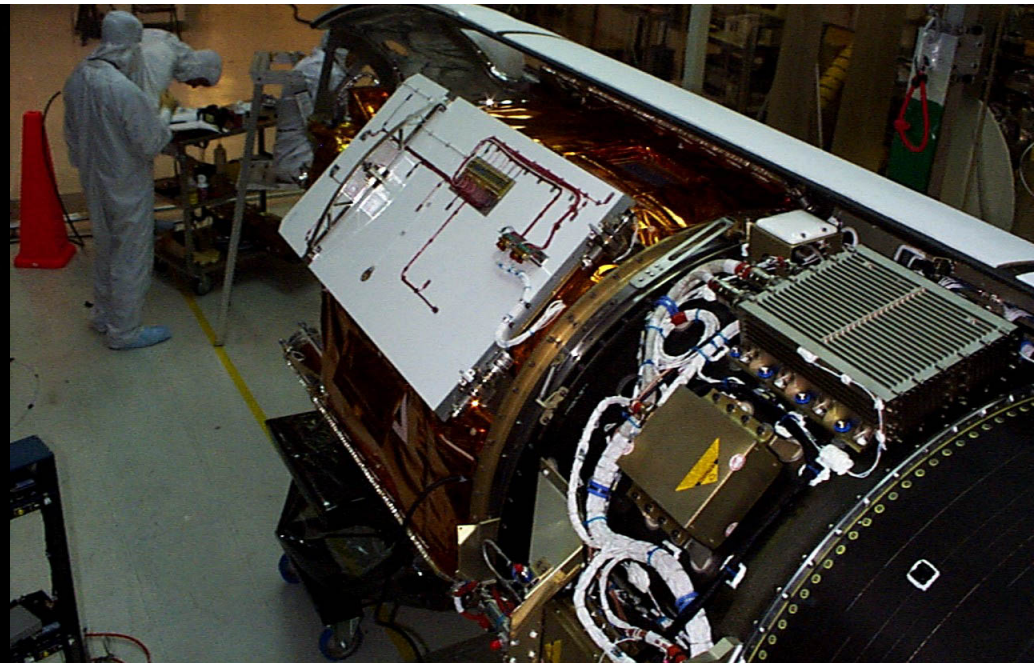
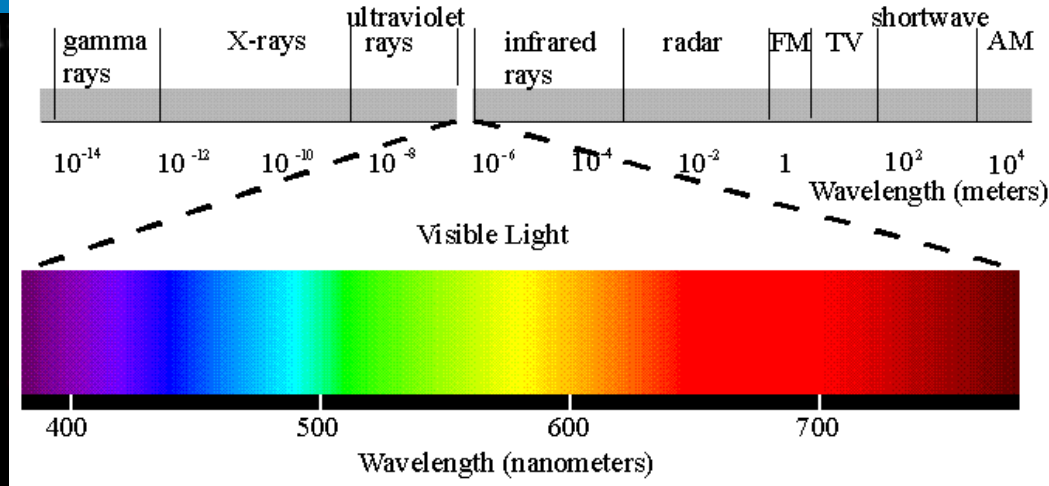
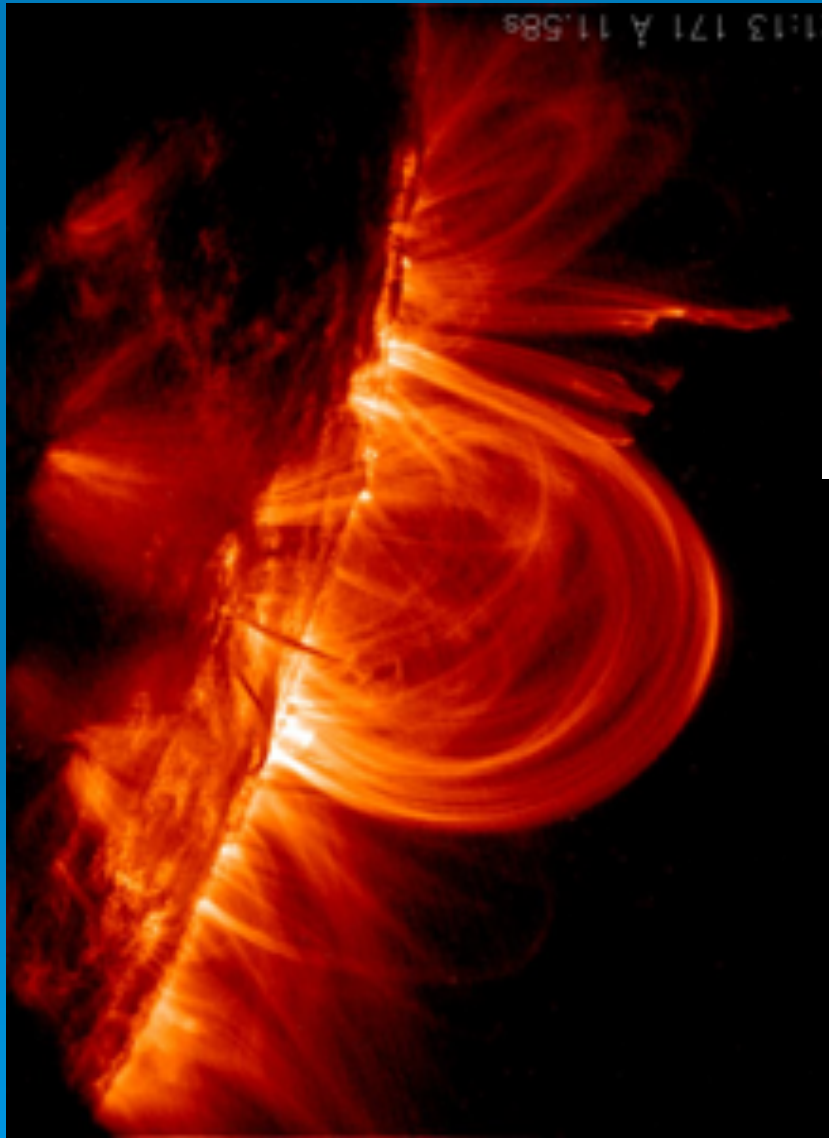
c



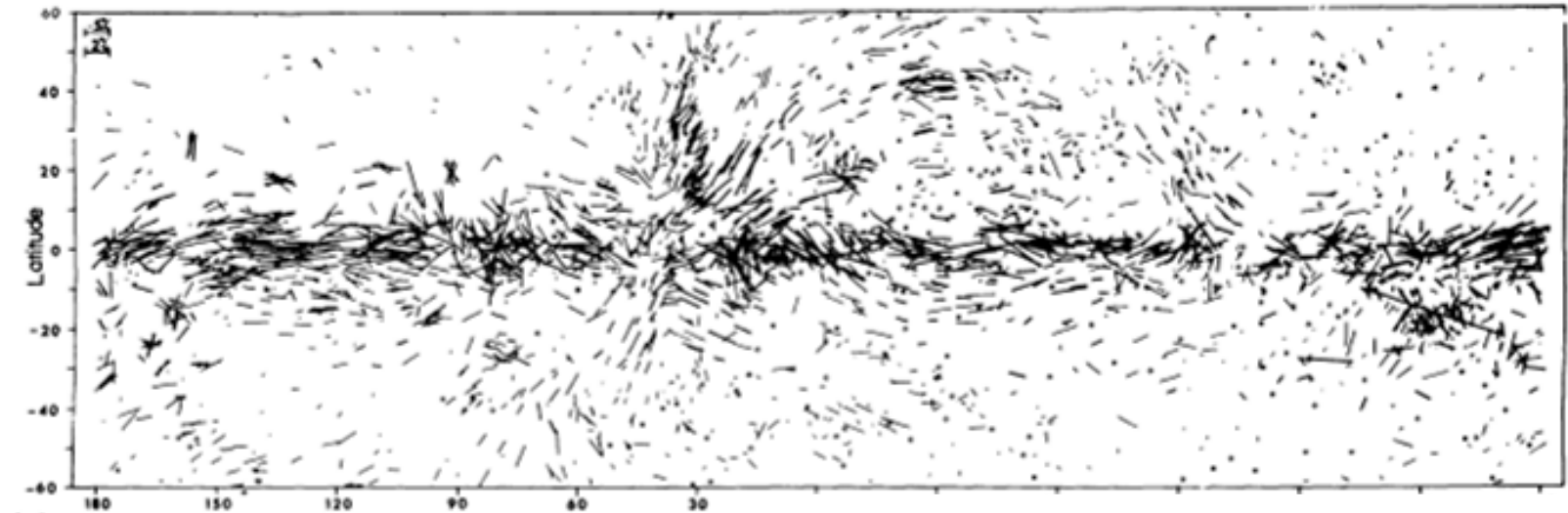
d



extreme-ultraviolet picture of Sun

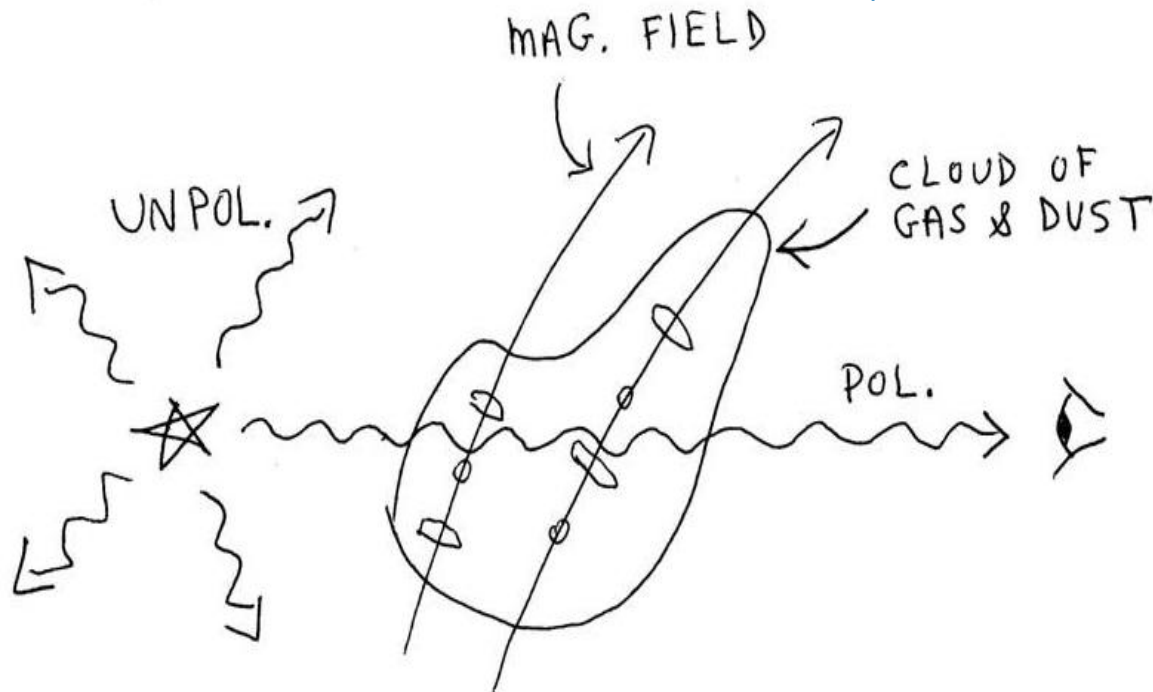


optical polarization of starlight



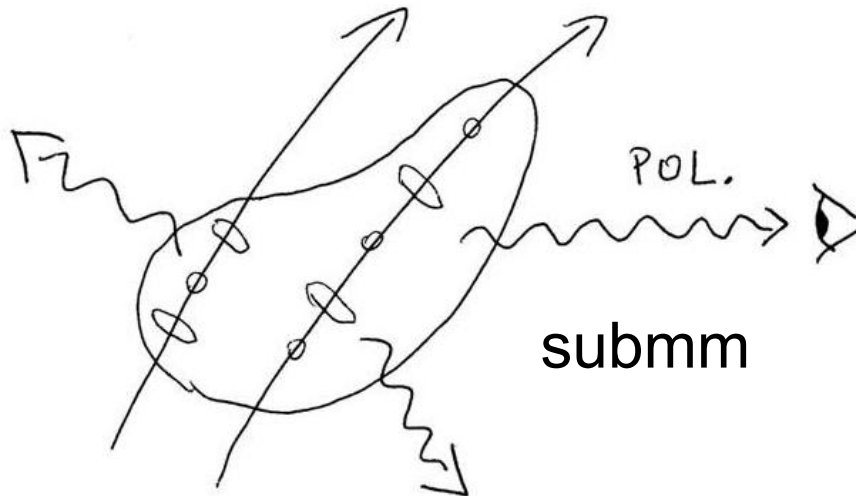
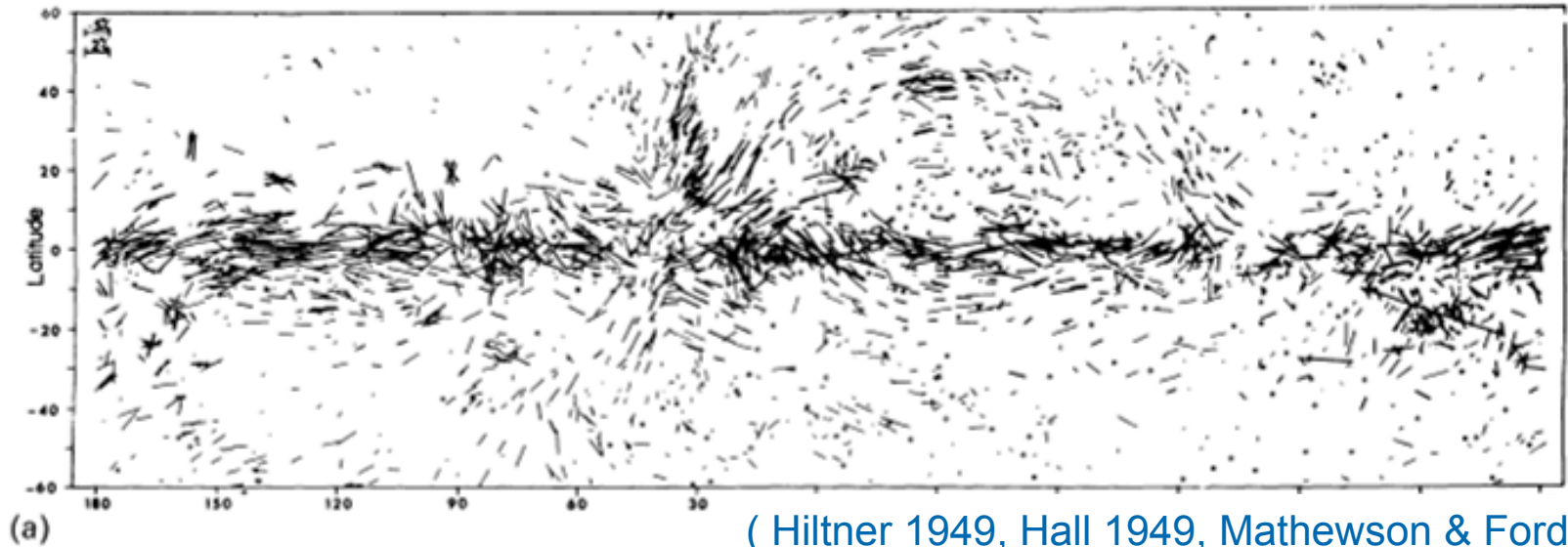
(a)

(Hiltner 1949, Hall 1949, Mathewson & Ford 1970)



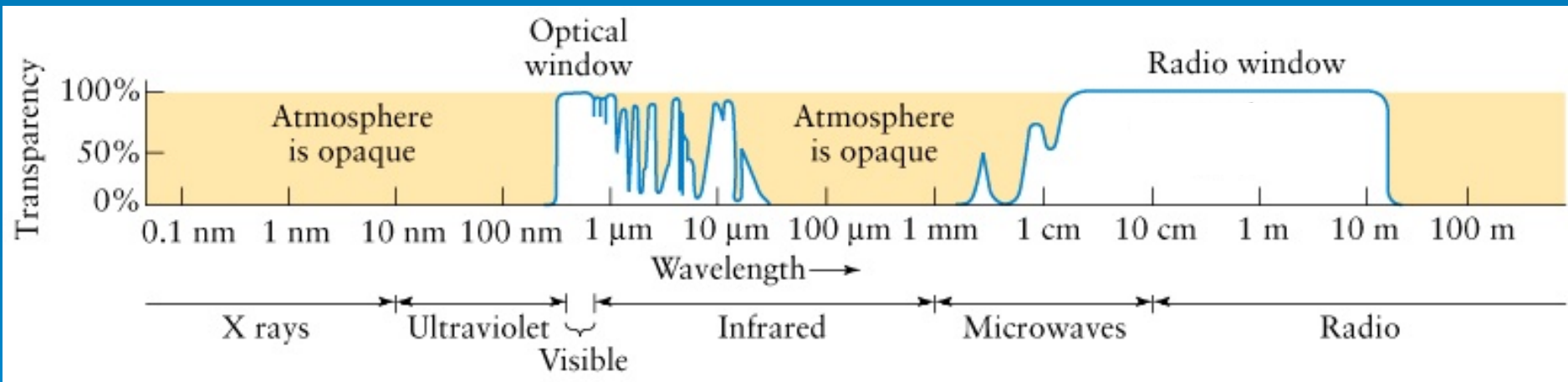
spinning grains
acquire a net
alignment whereby
longer axes are
aligned \perp **B**

optical polarization of starlight

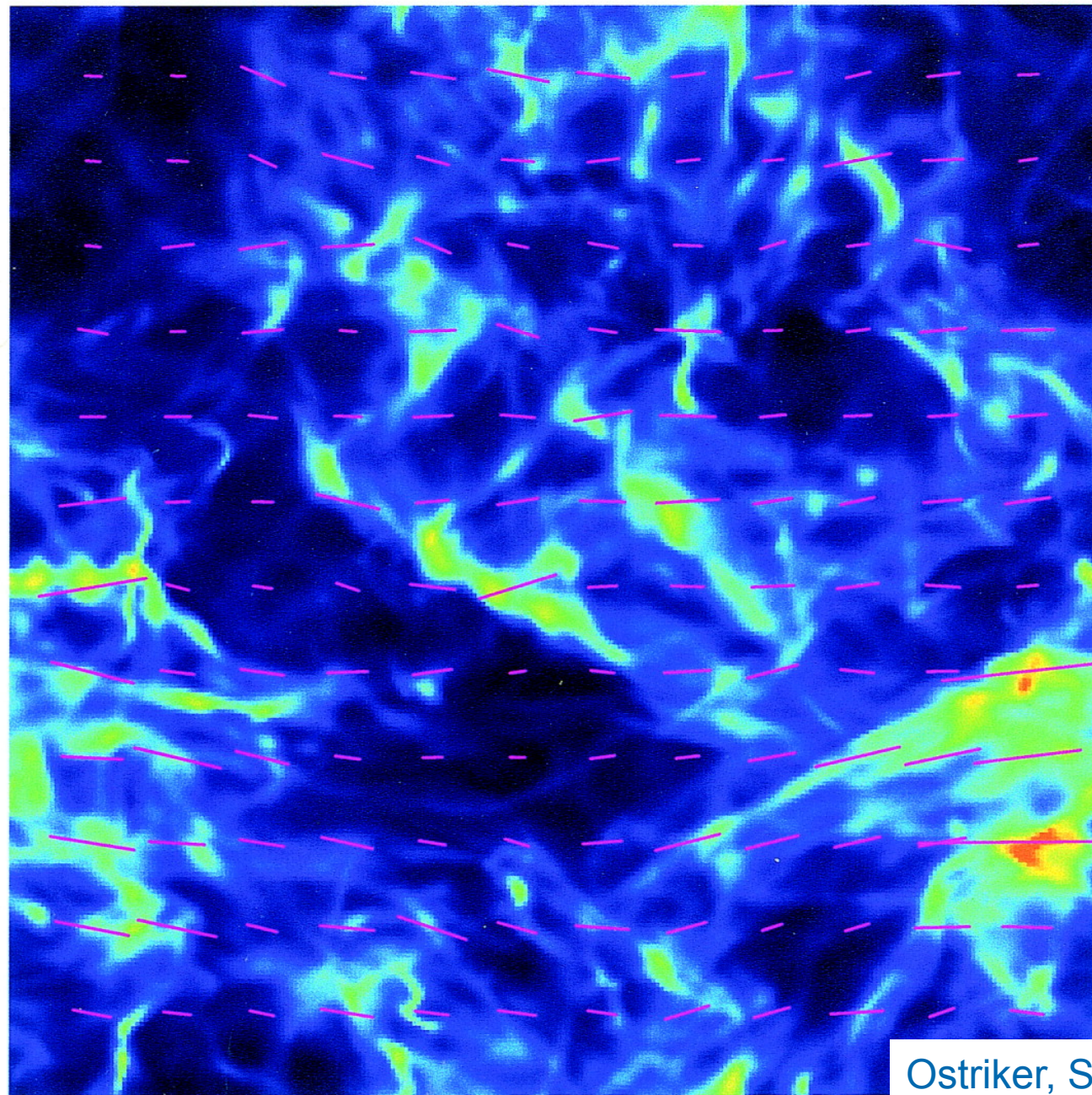


spinning grains
acquire a net
alignment whereby
longer axes are
aligned \perp **B**

the Earth's atmosphere blocks most wavelengths of electromagnetic radiation



$P=0.1$



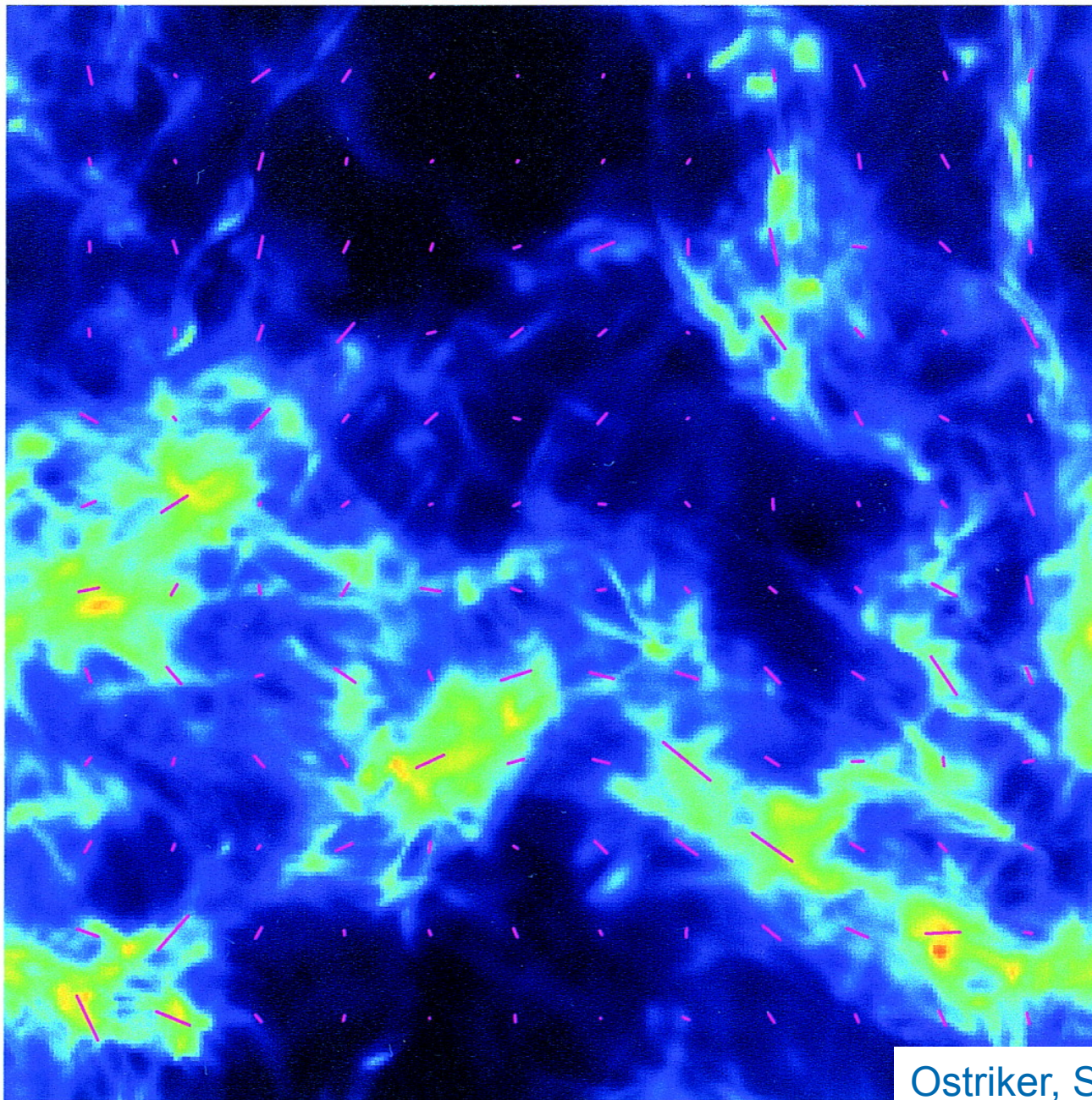
simulated cloud

3-dimensional
simulation of
magnetohydro-
dynamic (MHD)
turbulence;

*this map
assumes
strong B-field*

Ostriker, Stone, & Gammie (2001)

— P=0.1



simulated cloud

*this map
assumes
weak B-field*

Ostriker, Stone, & Gammie (2001)



winter-over
scientist Greg
Griffin filling
SPARO

Submillimeter
Polarimeter for
Antarctic
Remote
Observations



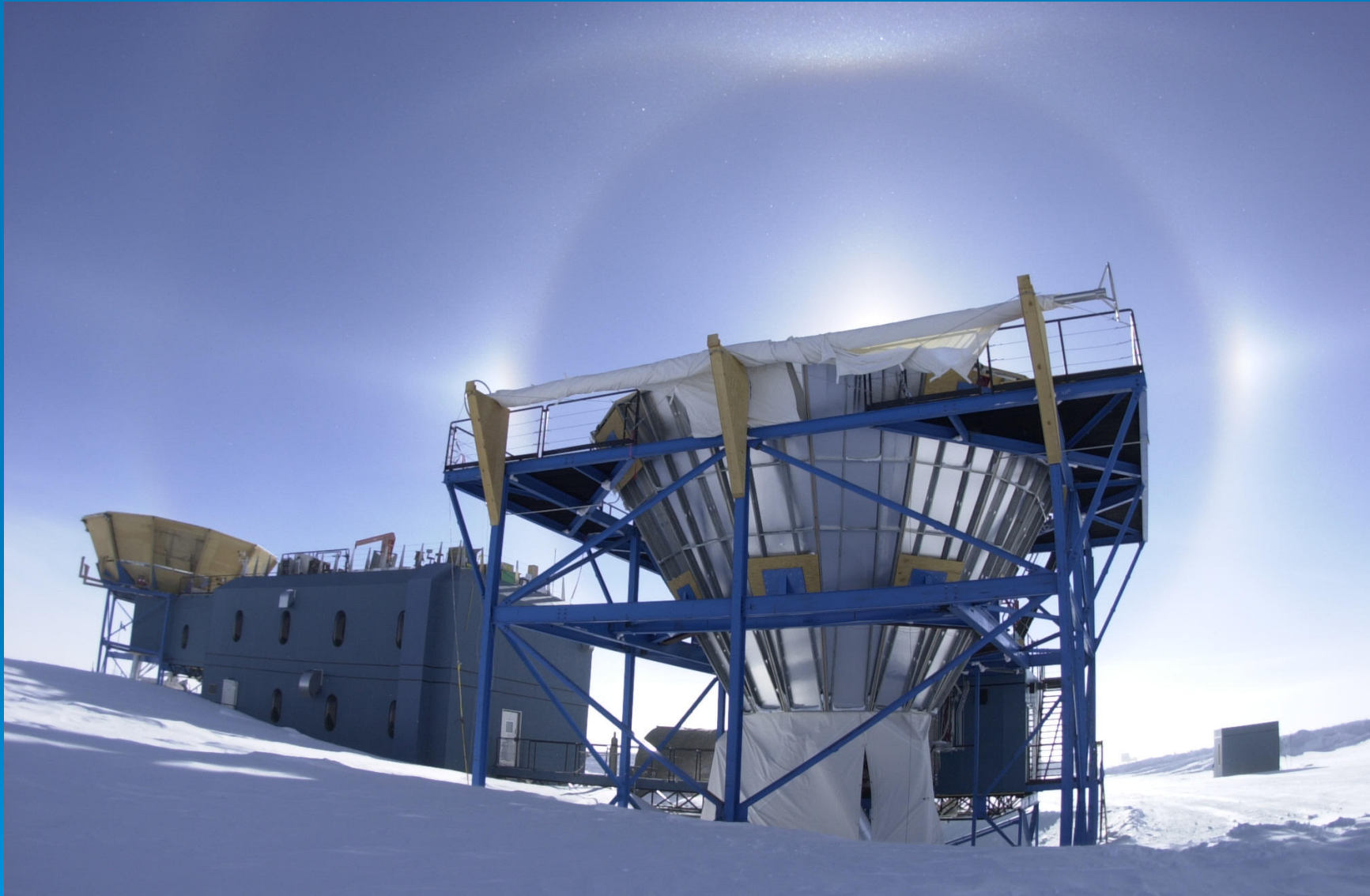


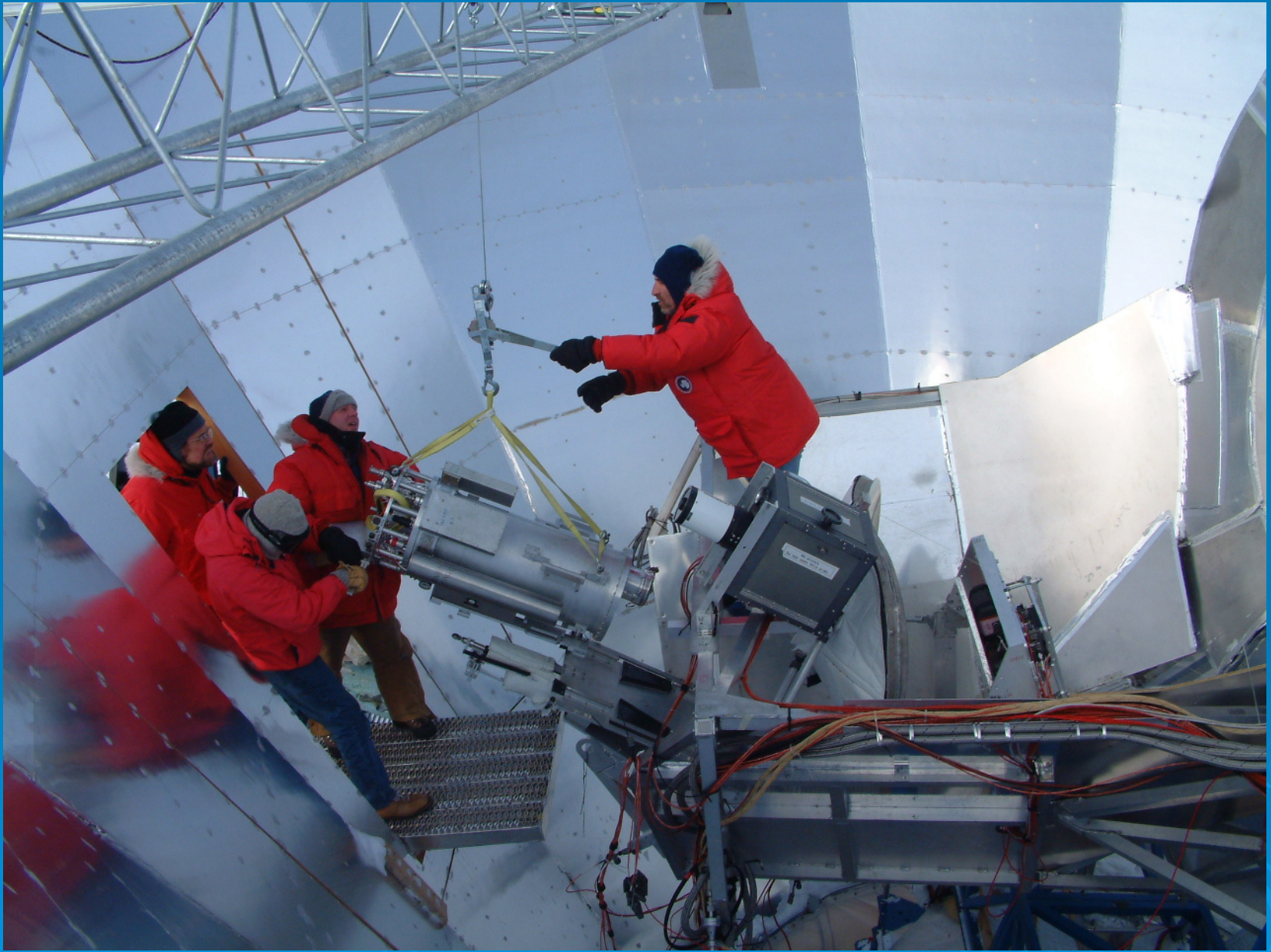














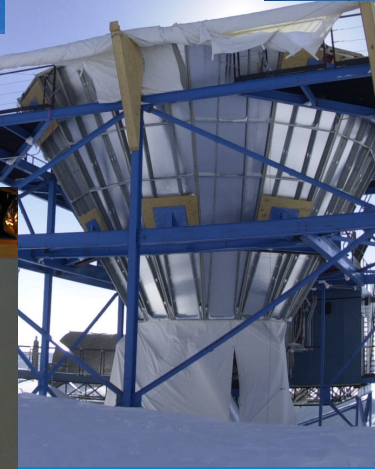
Jen Marshall
Texas A&M



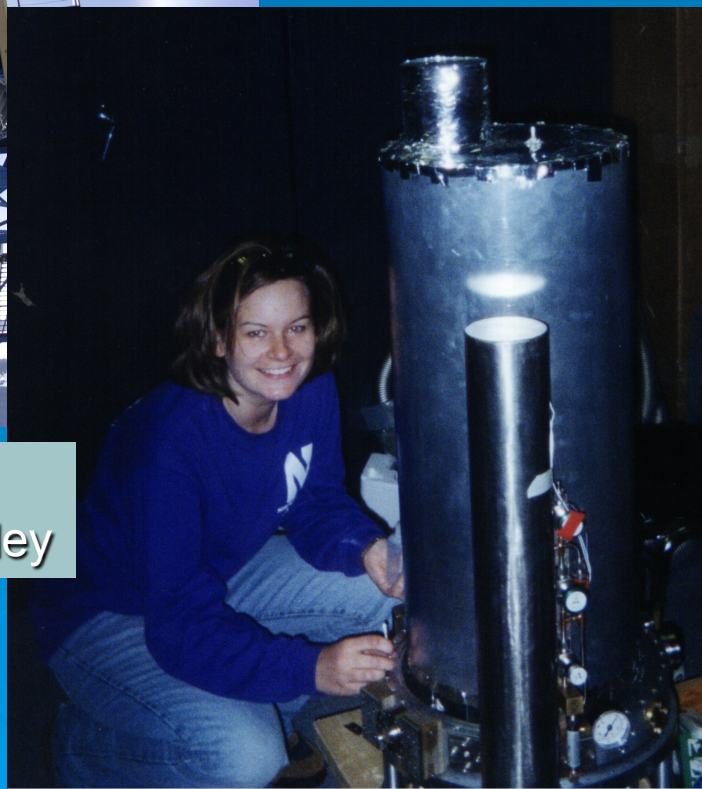
Hua-bai Li
C. U. H. K.



David Chuss
Villanova U.



Jill Prince
NASA – Langley





Jen Marshall
Texas A&M



Hua-bai Li
C. U. H. K.



David Chuss
Villanova U.

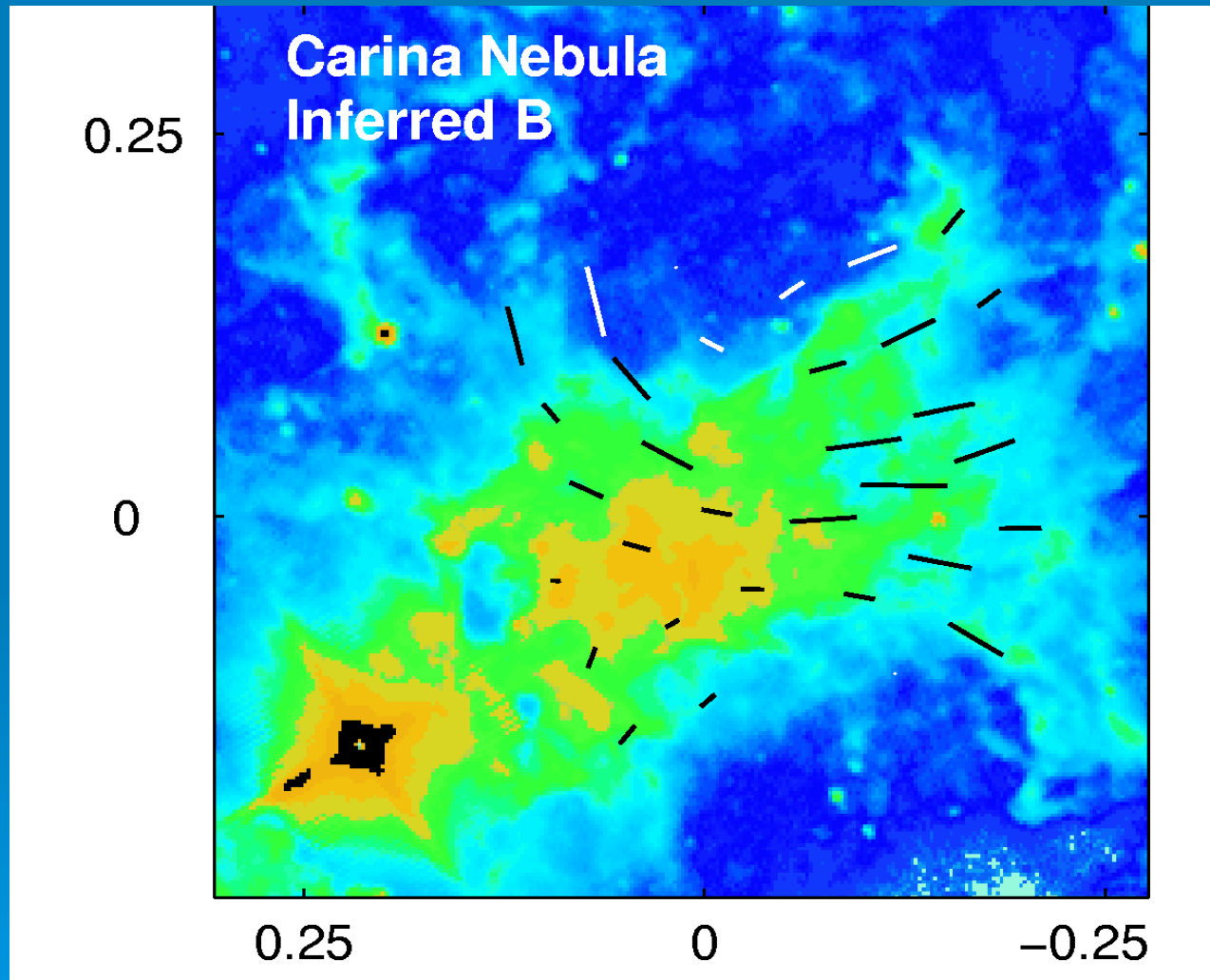


Jill Prince
NASA – Langley



Women in Aerospace Achievement Award - 2010

SPARO B-vectors on mid-IR map (MSX mission)

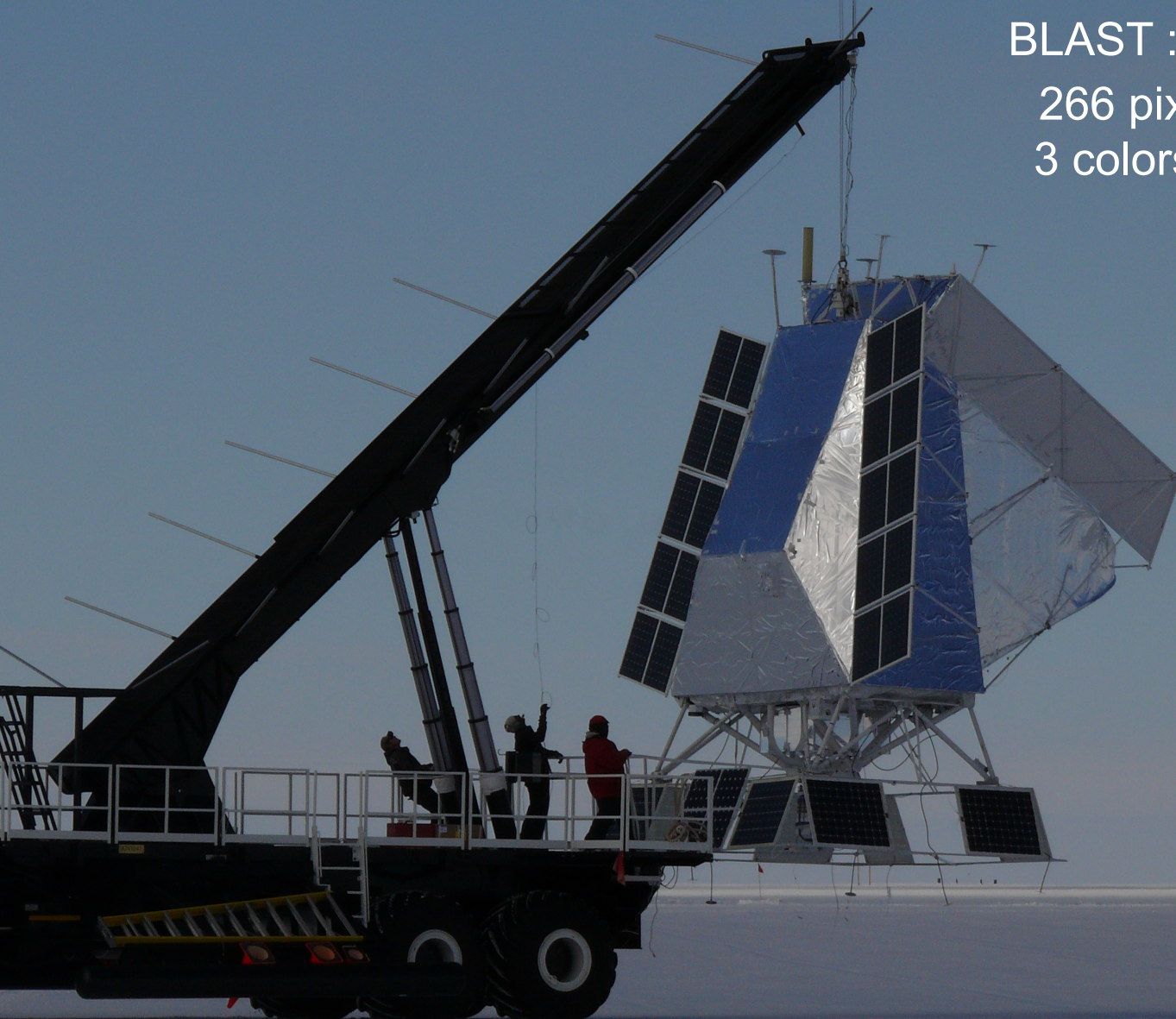


Balloon-borne Large-Aperture Submm Telescope

BLAST :

266 pixels

3 colors



Balloon-borne Large-Aperture Submm Telescope

BLAST :

266 pixels

3 colors

BLAST results :

ApJ (14 papers), Nature,
Physics Today, Colbert Rept.



Balloon-borne Large-Aperture Submm Telescope

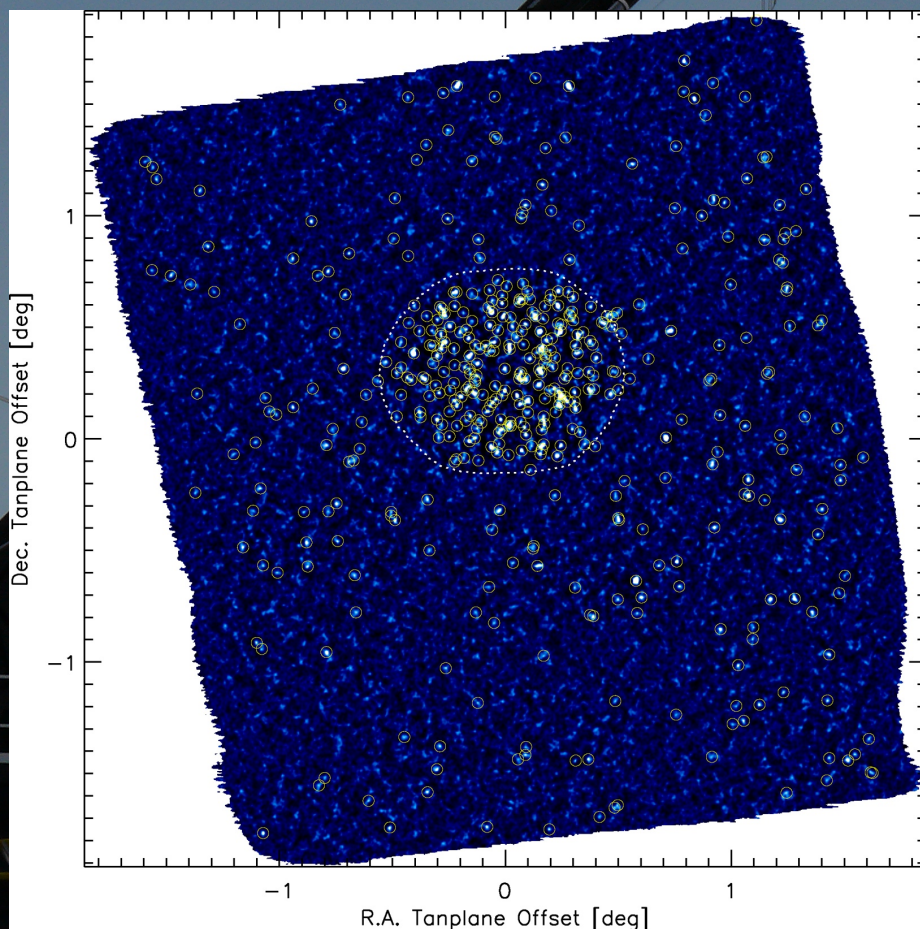
BLAST :

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ApJ (14 papers), Nature,
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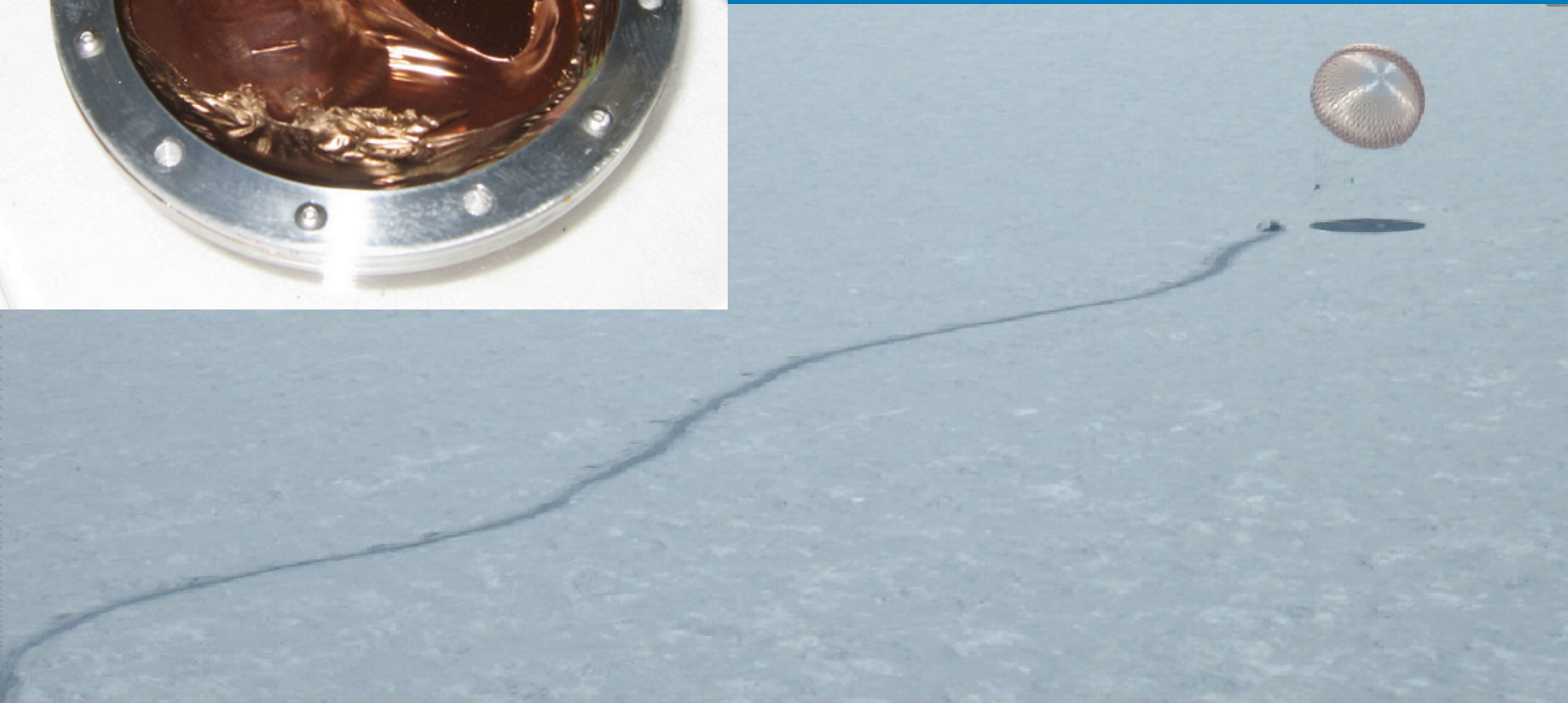
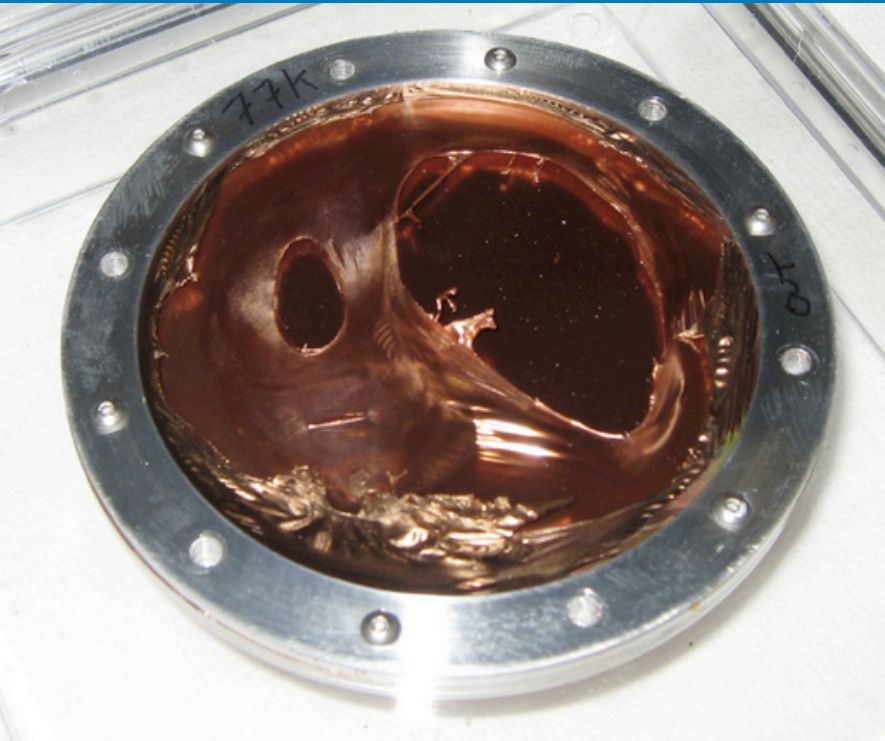


BLAST Deep
and Wide
Fields ... 100's
of protogalaxies
detected

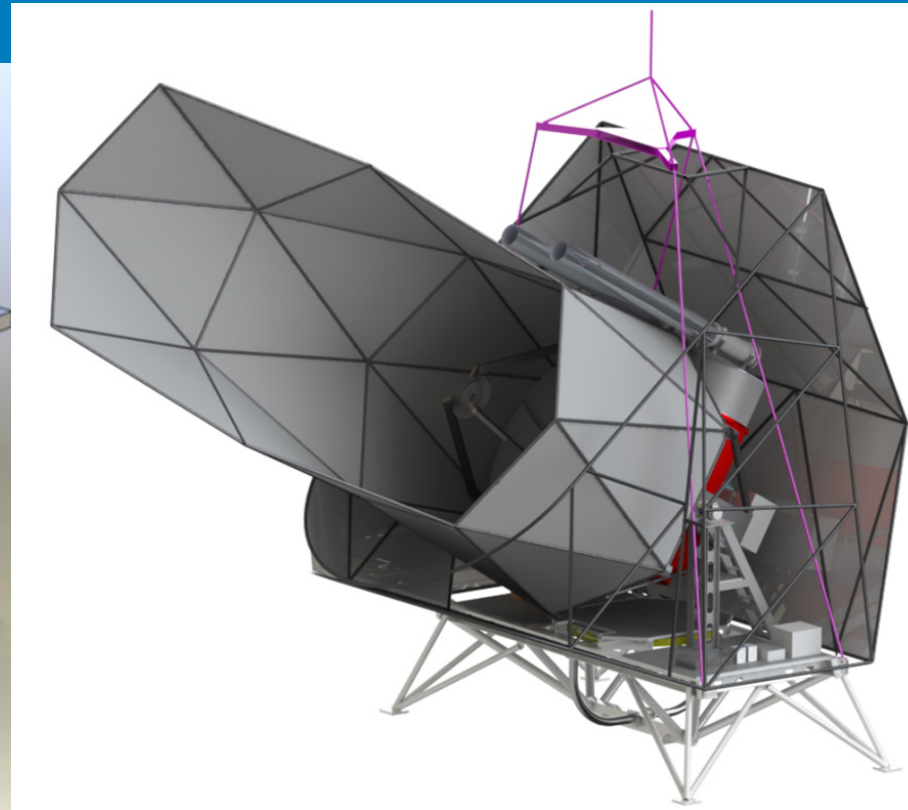
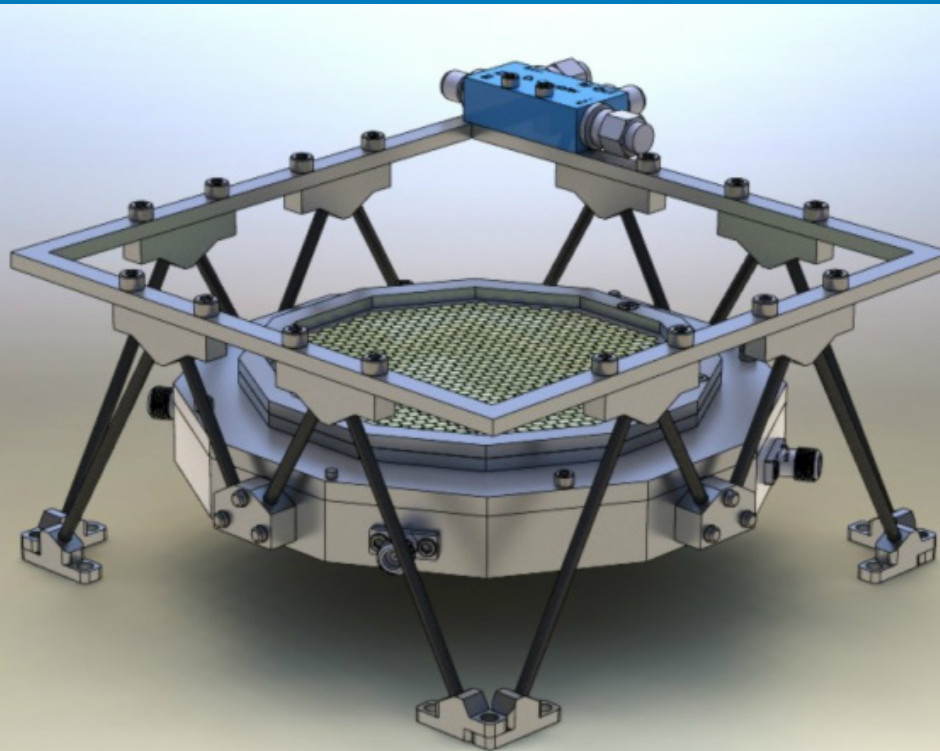
hazards of astrophysical ballooning

Below: 2006: telescope dragged across ~hundred km of ice after parachute fails to release following 2006 observations.

At left: 2010: scattered sunlight melts IR blocking filter after telescope spins out of control during ascent

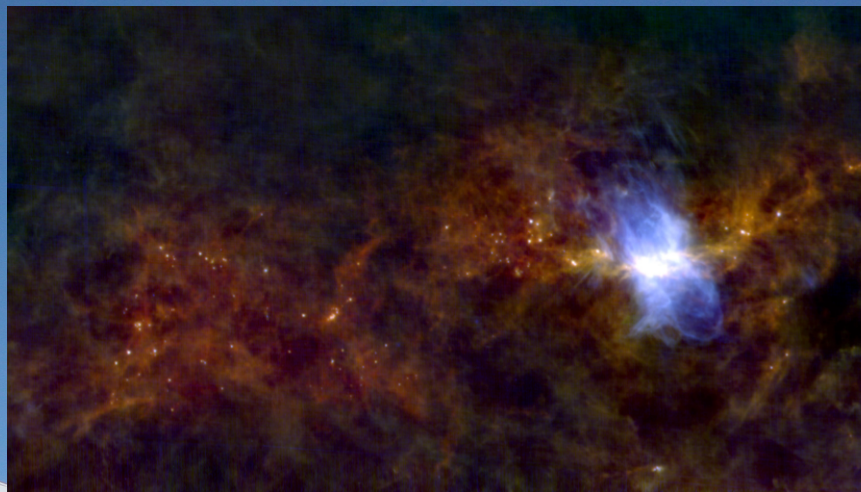


- BLAST-TNG (stands for “the next generation”)
- ~2300 MKID detectors (cooled to 0.3 °K)
- primary mirror: carbon fiber reinforced polymer; Vanguard Space Technologies;

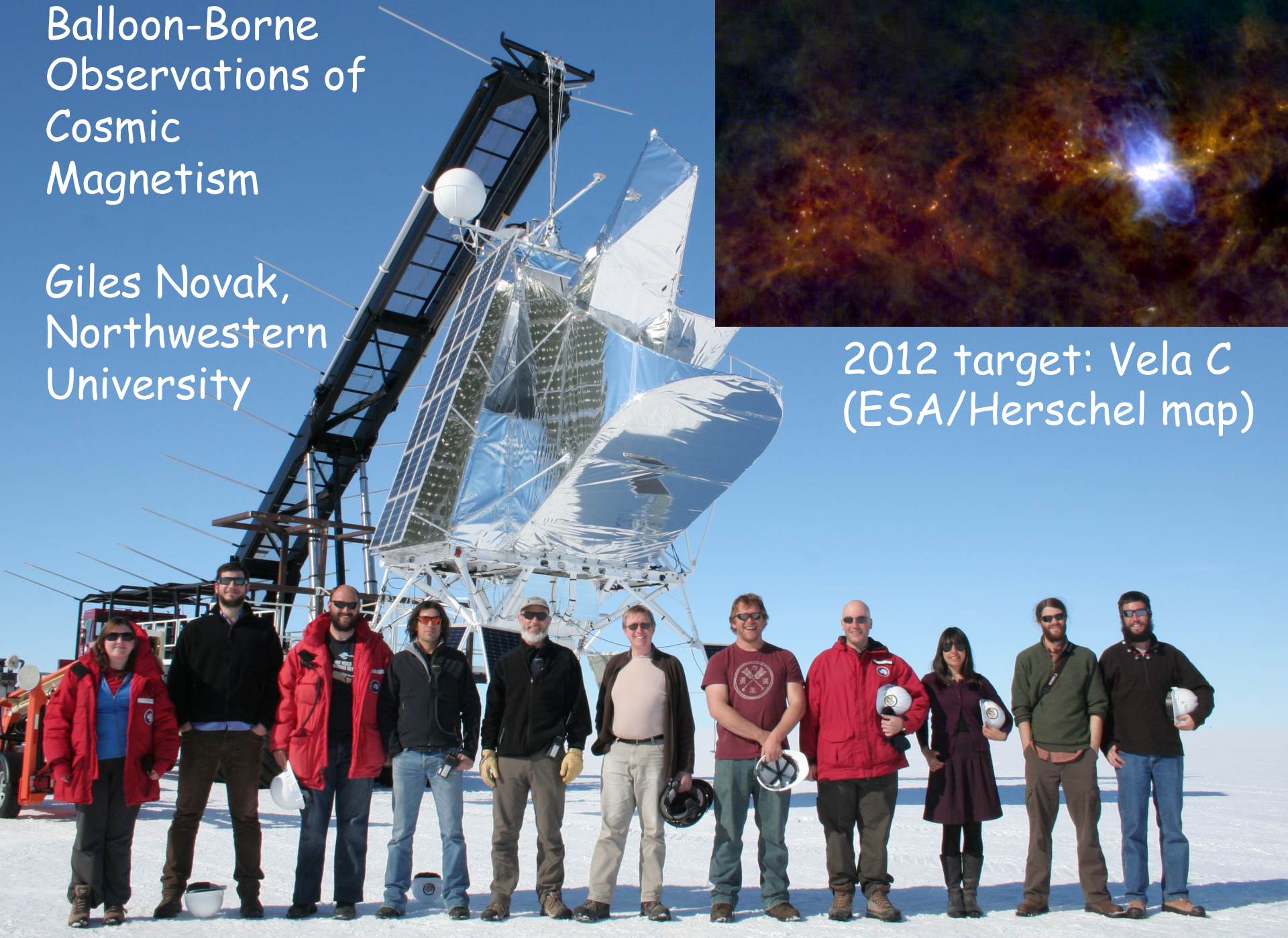


Balloon-Borne Observations of Cosmic Magnetism

Giles Novak,
Northwestern
University



2012 target: Vela C
(ESA/Herschel map)



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Giles Novak,
Northwestern
University

(2012 B-field map
removed from posted
presentation, but should
be available on-line soon)

2012 target: Vela C
(ESA/Herschel map)



