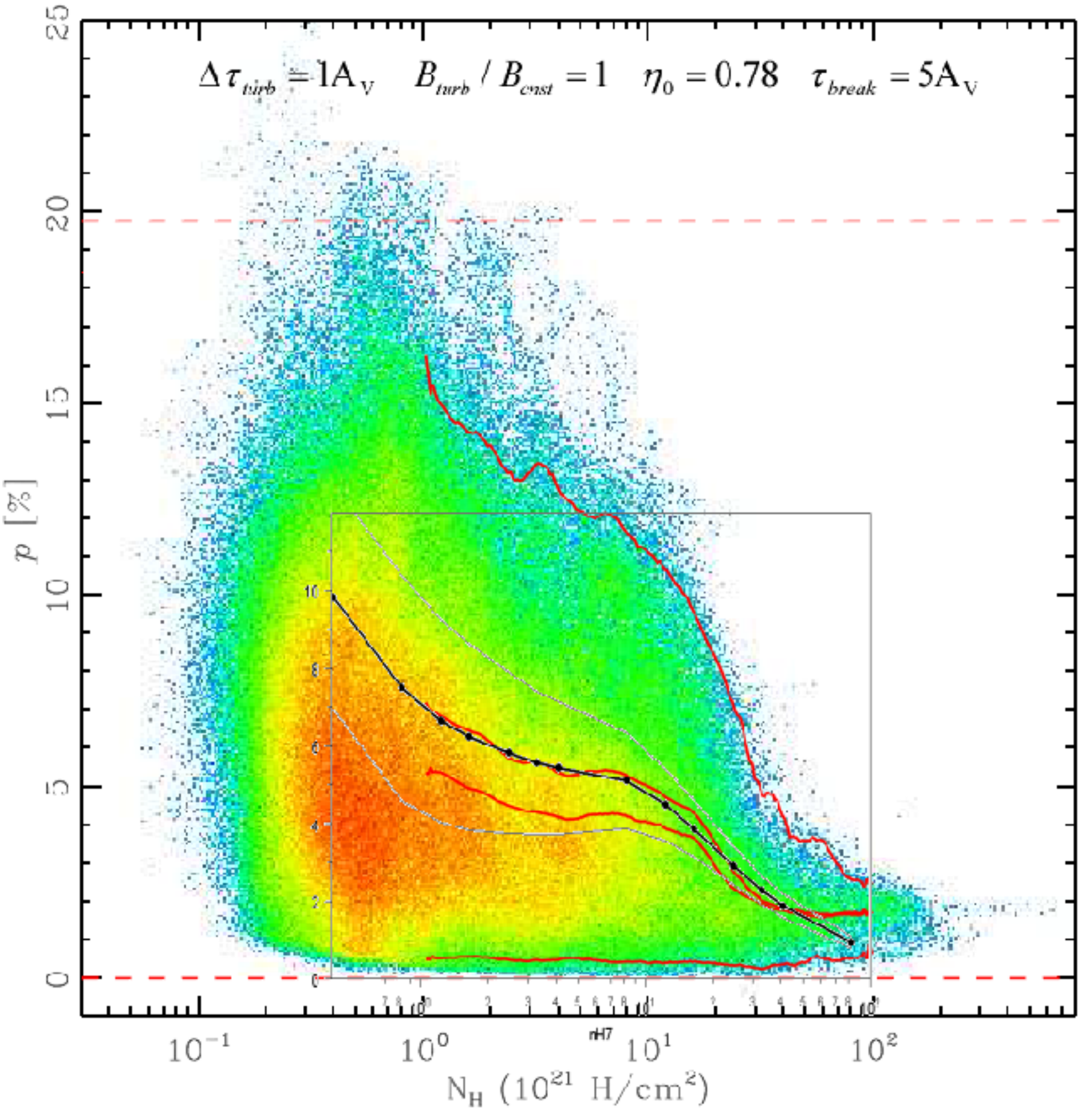
PICO Galactic Science

- Sensitivity
  - Diffuse ISM
- All-sky coverage
  - Molecular Clouds
  - External Galaxies
- Connects largest scales to cloud cores

PICO Galactic Science

- Galactic Molecular Clouds
- Diffuse ISM
- External Galaxies
- Grain Alignment
- Are we missing important topics?

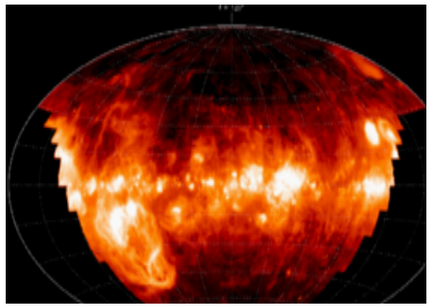


Planck Intermediate Results XIX

Turbulent Galactic Magnetic Fields

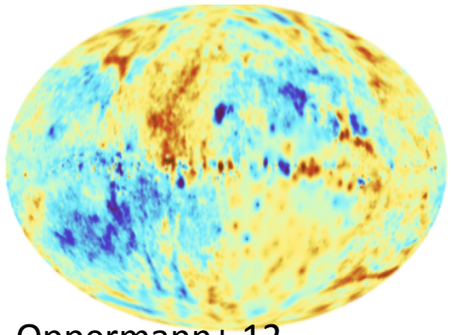
Siyao Xu, University of Wisconsin-Madison

Galactic Hα Map



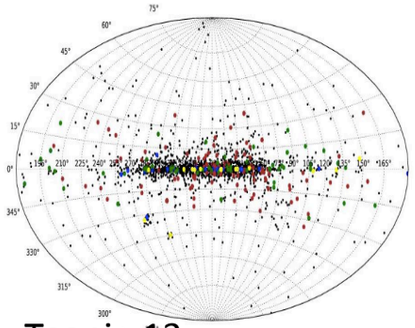
Haffner+ 03

Galactic Faraday Sky



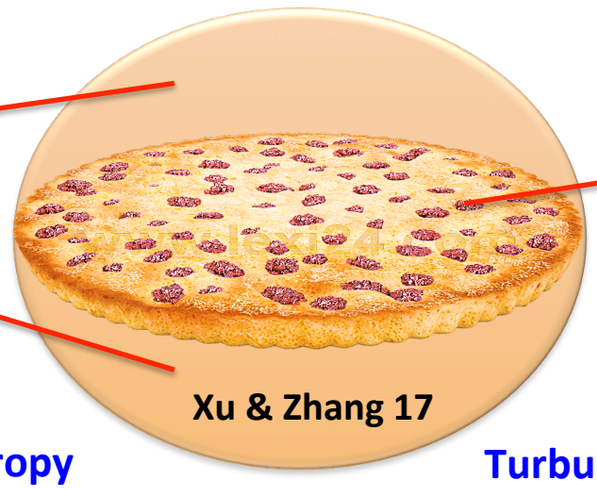
Oppermann+ 12

Galactic pulsars



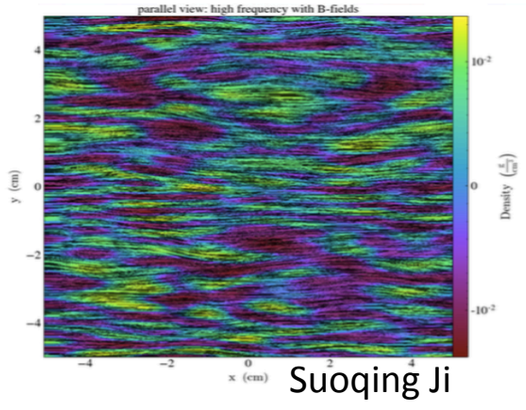
Taani+ 13

MHD Turbulence Model for the ISM



Turbulence Anisotropy

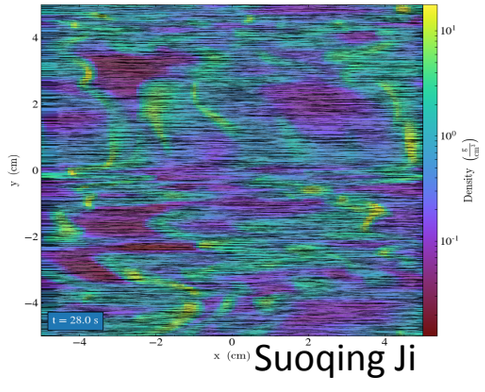
Parallel low-density filaments



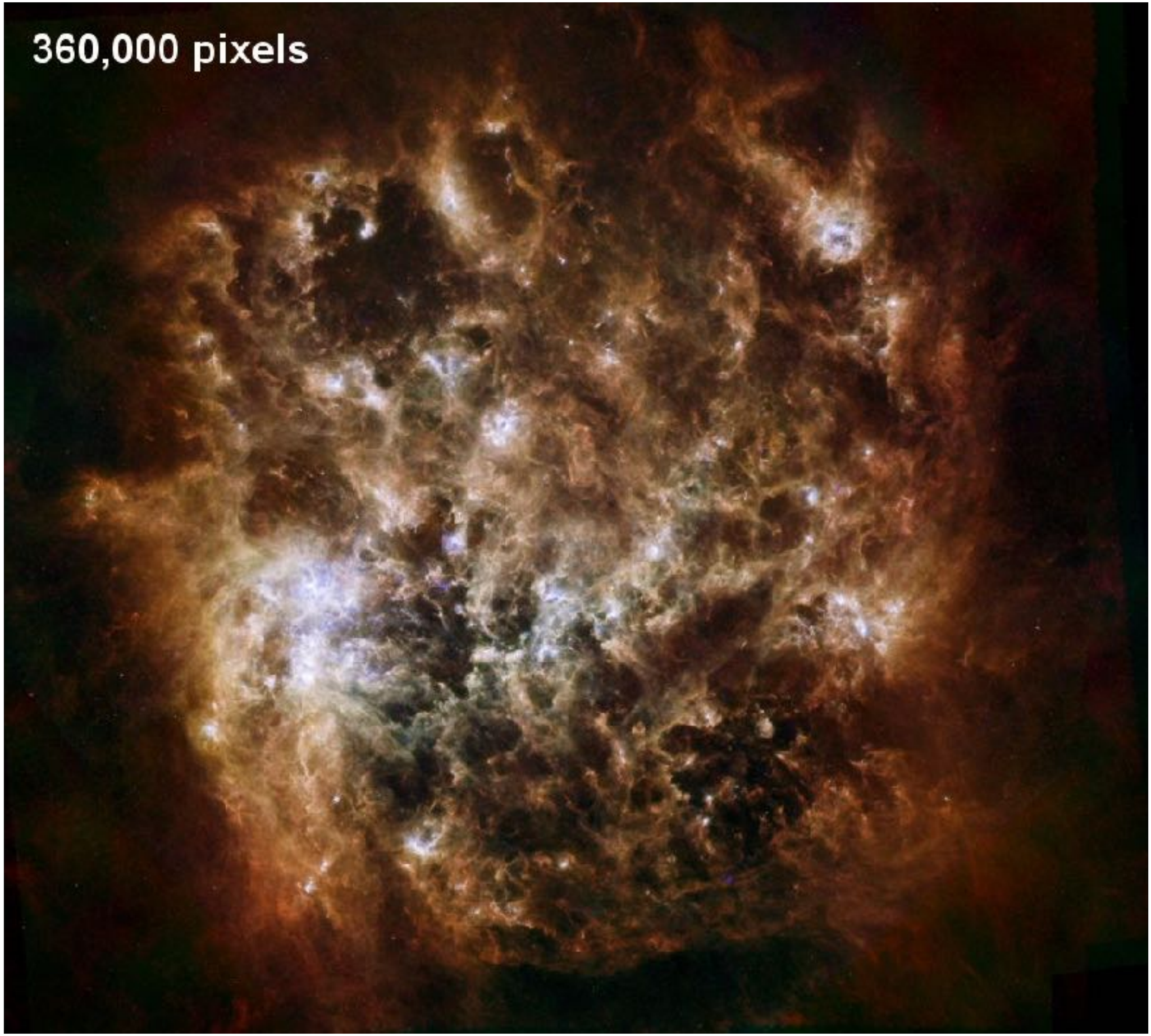
Suoqing Ji

Turbulence Compression

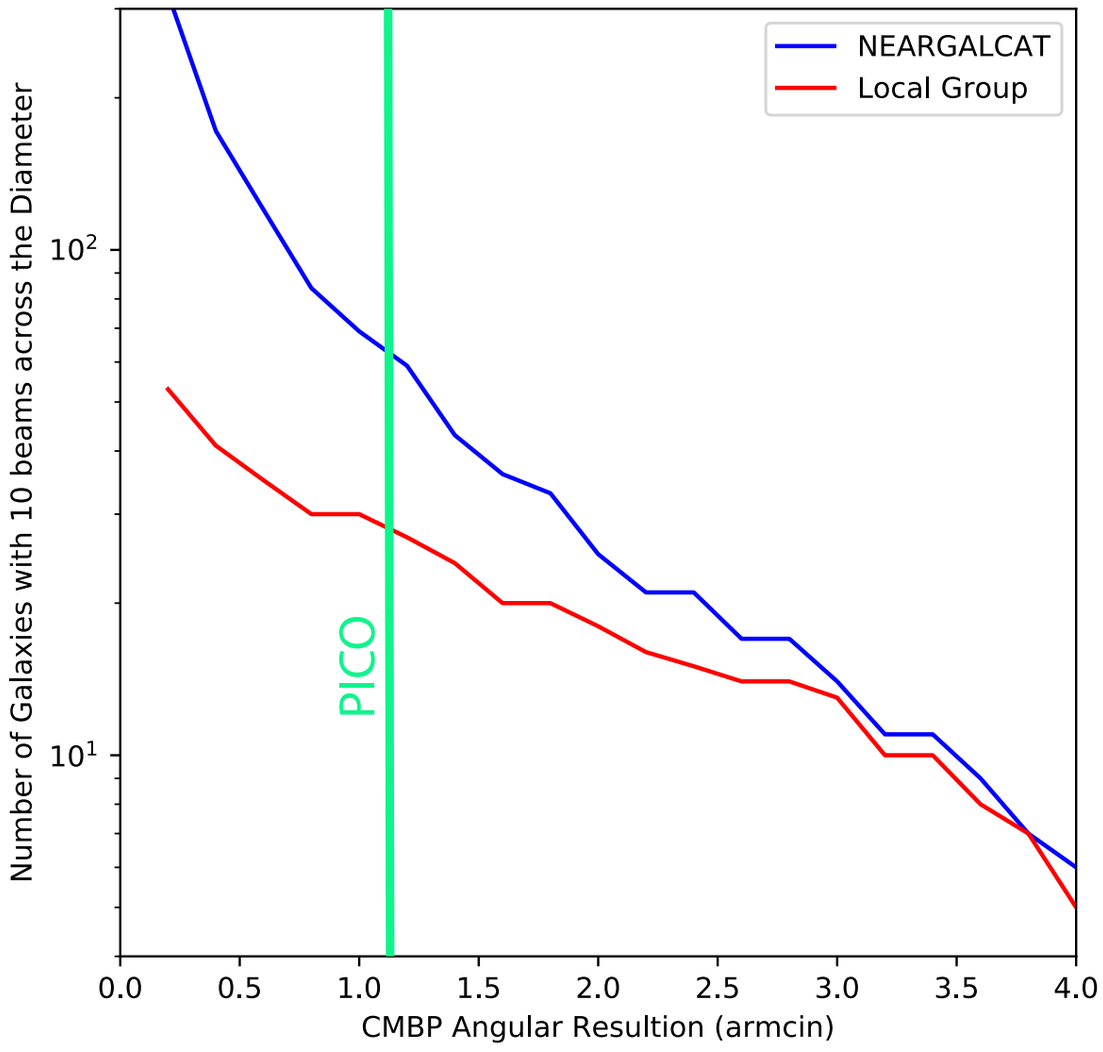
Perpendicular dense filaments

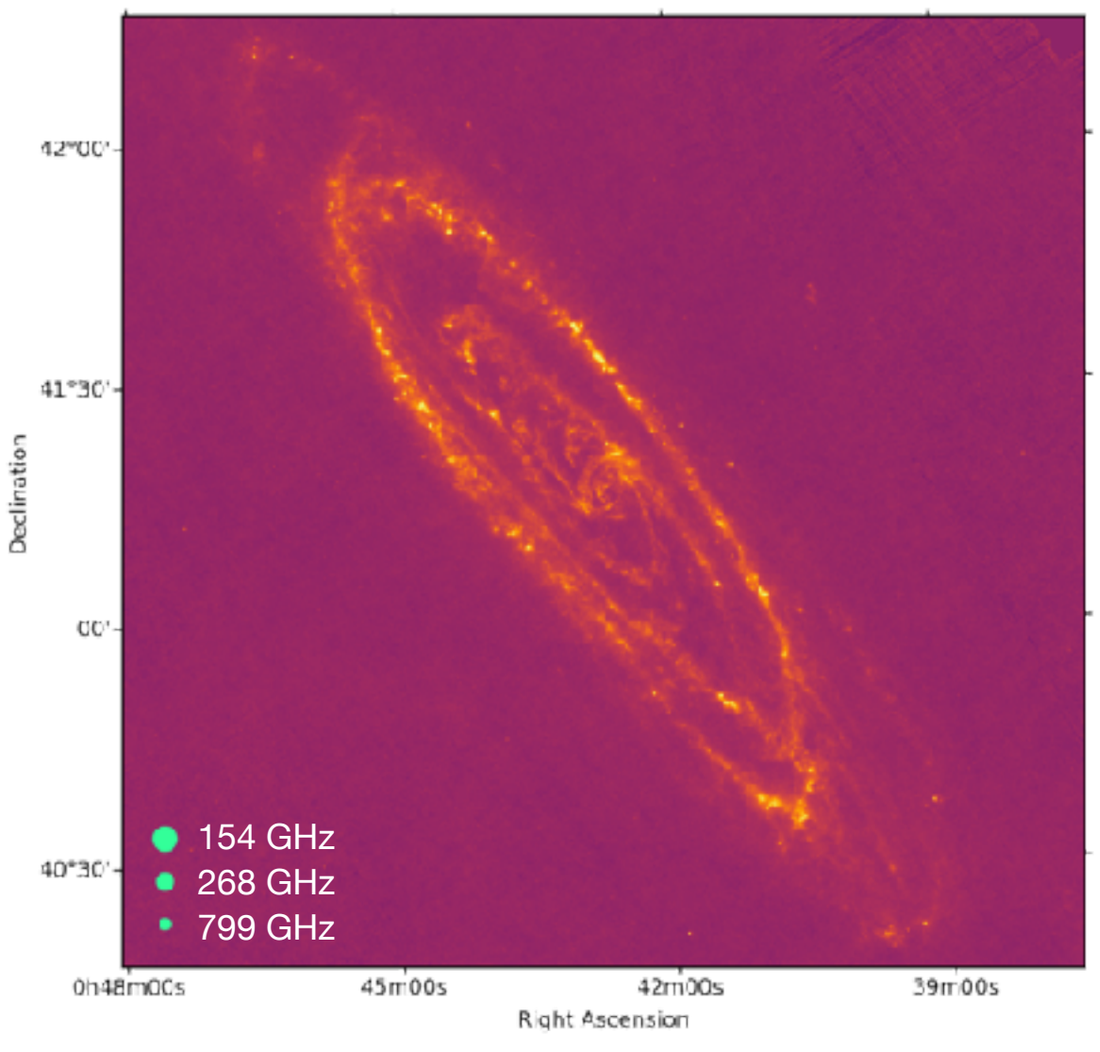


Suoqing Ji


360,000 pixels

External Galaxies





7. Determine if magnetic fields are the dominant cause of low star formation efficiency in our Galaxy.
8. Determine whether the interstellar medium of our galaxy is unique by comparing the ratio of energy in magnetic field to turbulence to that in nearby galaxies.
9. Determine whether radiative torque is responsible for the alignment of dust grains with magnetic fields
10. Determine the influence of the magnetic field on Galactic dynamics within the Milky Way.
11. Determine the level of magnetized turbulence in the Milky way, and use this knowledge to constrain models of cosmic ray propagation to understand the physics of the sources responsible for accelerating these high energy particles.