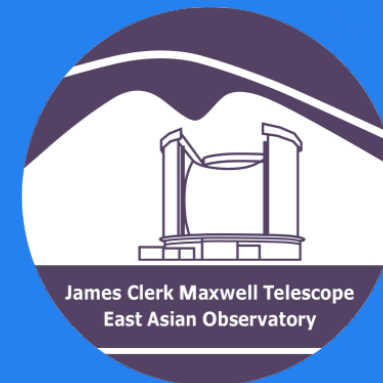
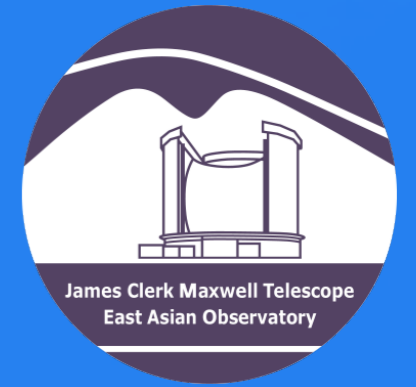


# Polarization with the new 850 $\mu\text{m}$ Camera



Per Friberg EAO/JCMT

JCMT Future Nanjing 2019



# POL-2

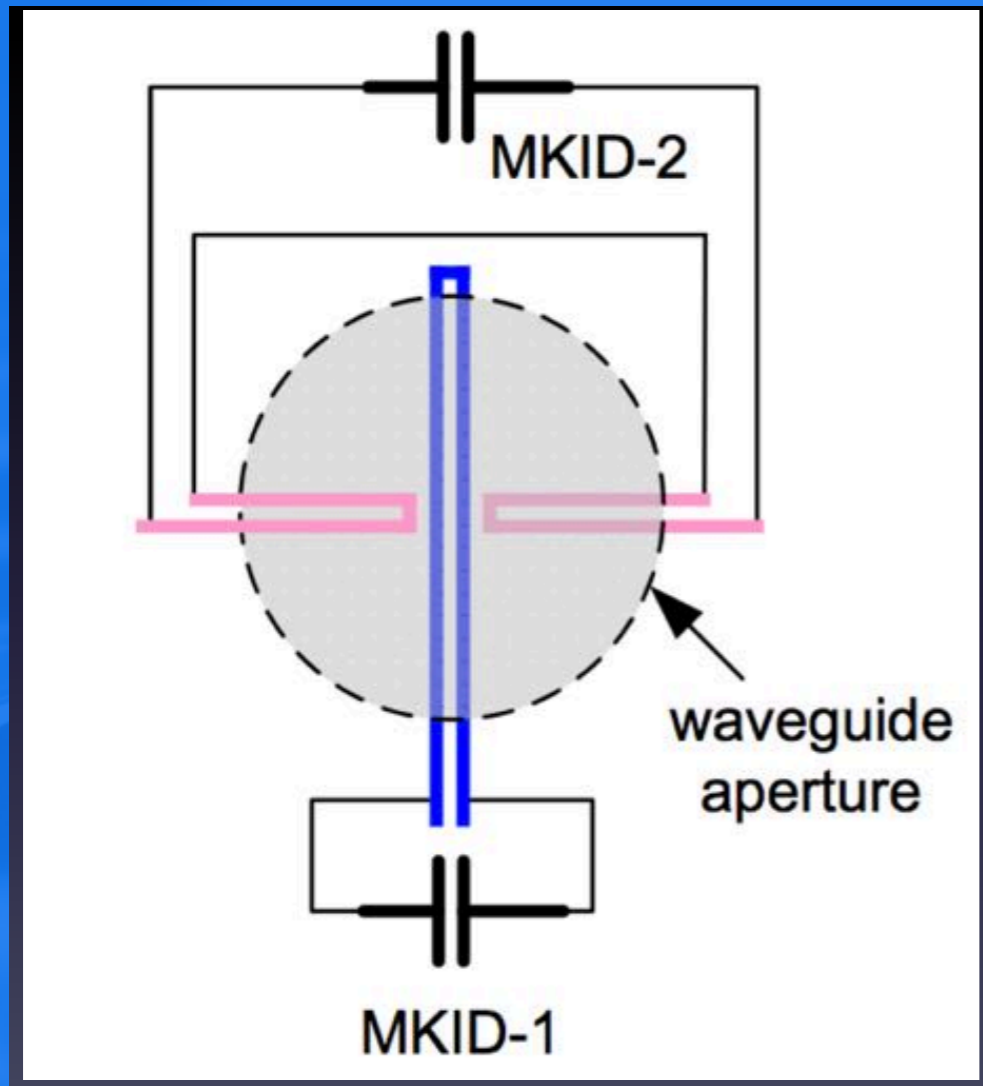
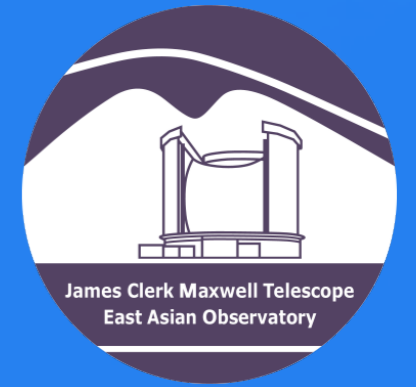
SCUBA-2 not polarization sensitive

POL-2 design

- Calibrator grid (normally out)
- Achromatic  $\lambda/2$  wave plate (spinning at 2 Hz)
- Analyzer grid

Per Friberg EAO/JCMT

# New 850 $\mu\text{m}$ Camera

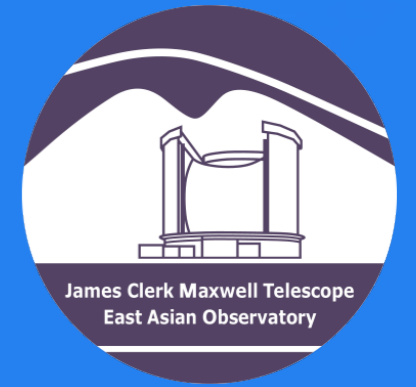


Austermann, 2017

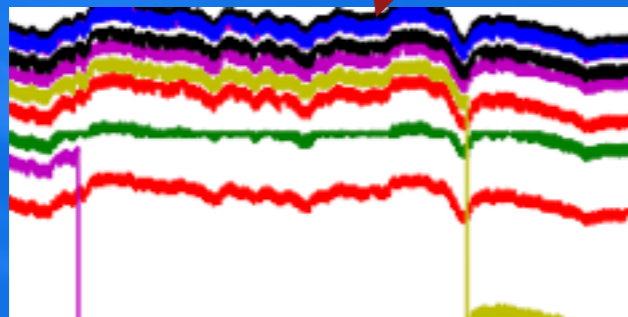
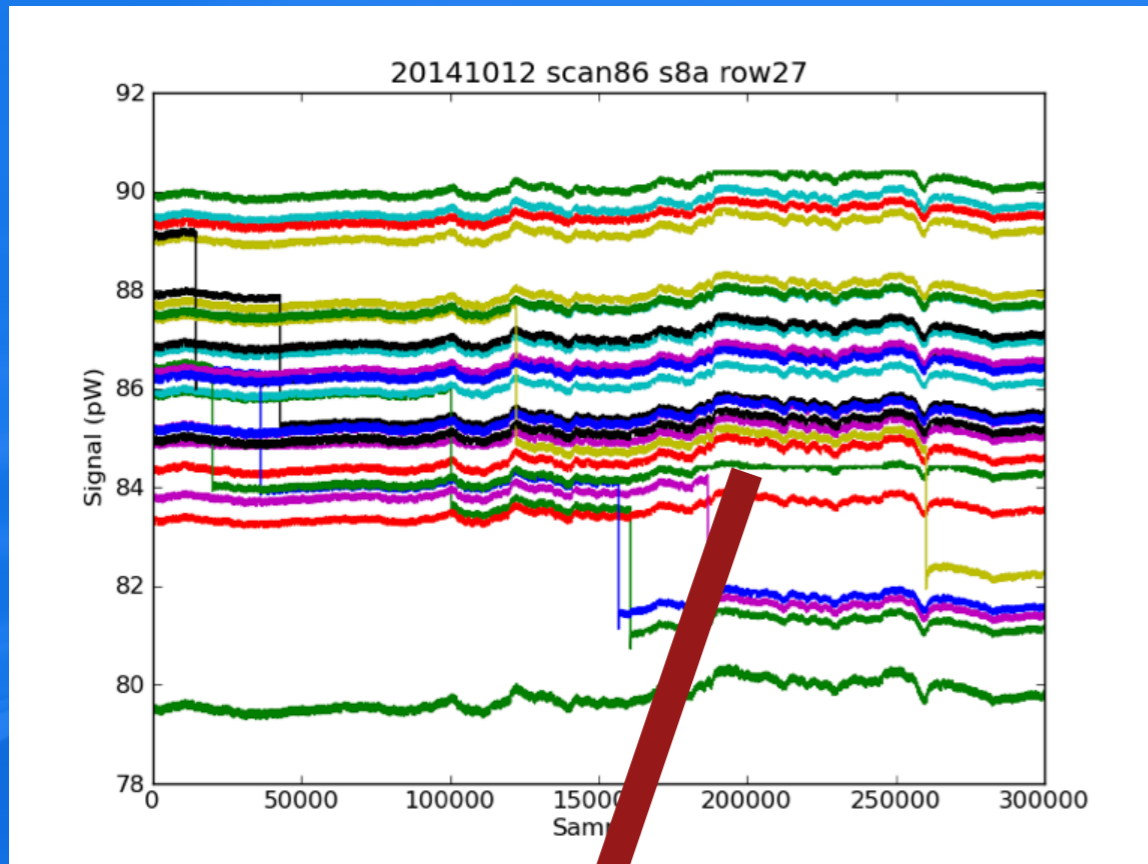
- MKID detectors
- Sensitive to two orthogonal linear polarizations
- Still need to rotate the plan of polarization to get Q & U or use rotated pixels to get 4 orientations.
- Base plan to use a spinning  $\lambda/2$  plate
- MKID more stable than TES?

Per Friberg EAO/JCMT

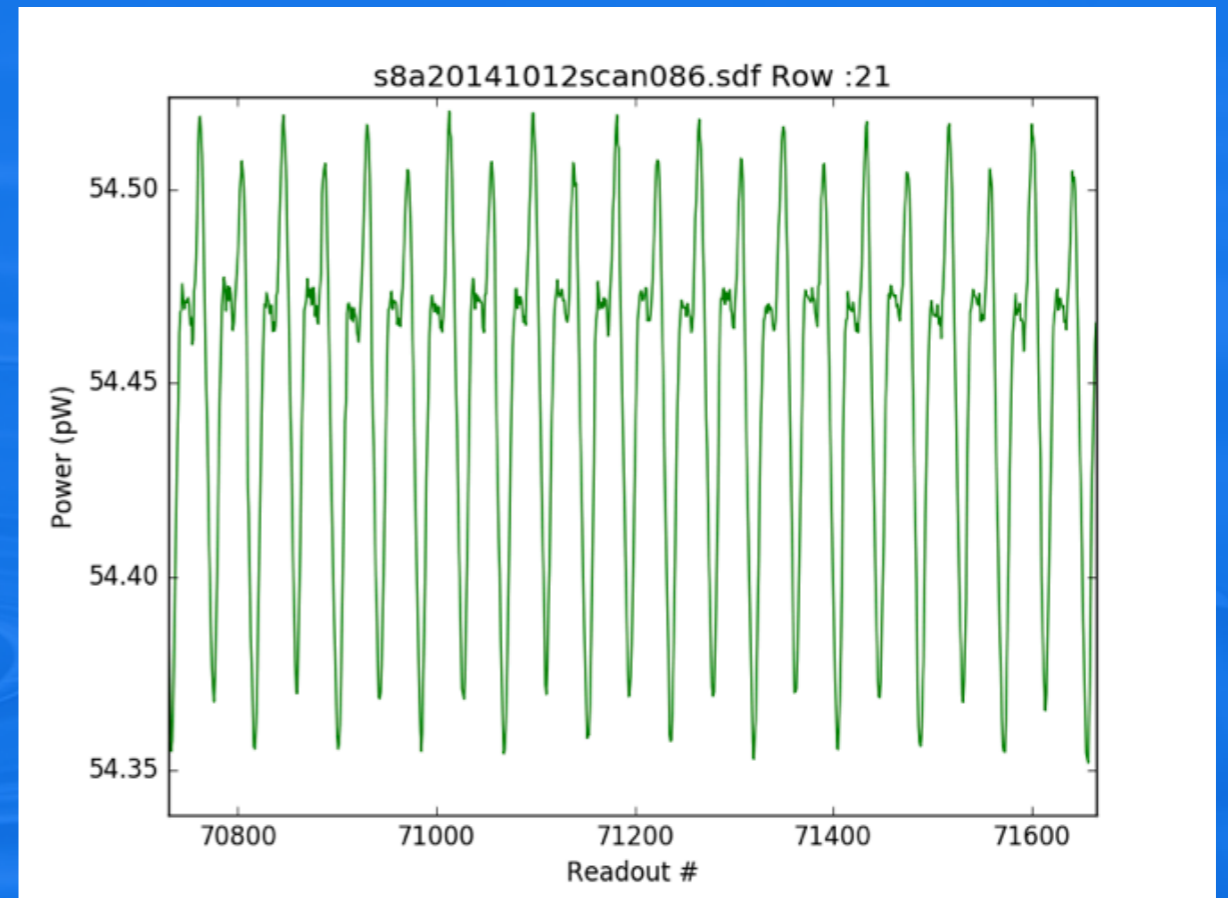
# Data Quality POL-2



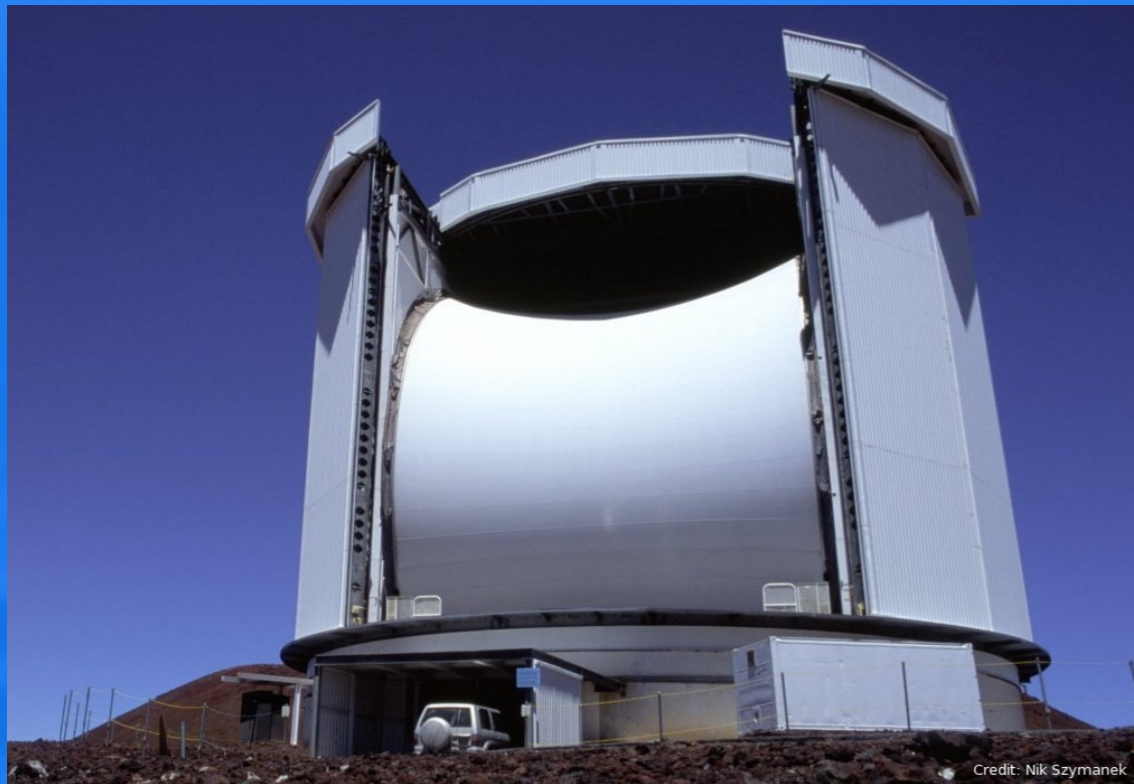
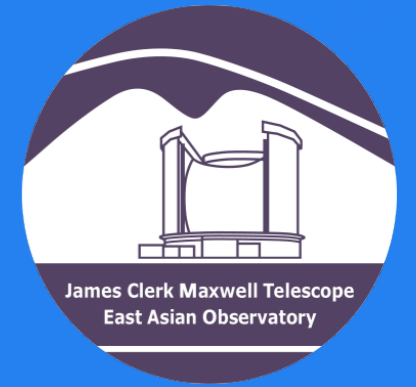
30 minutes of data  
32 detectors



5 seconds of data

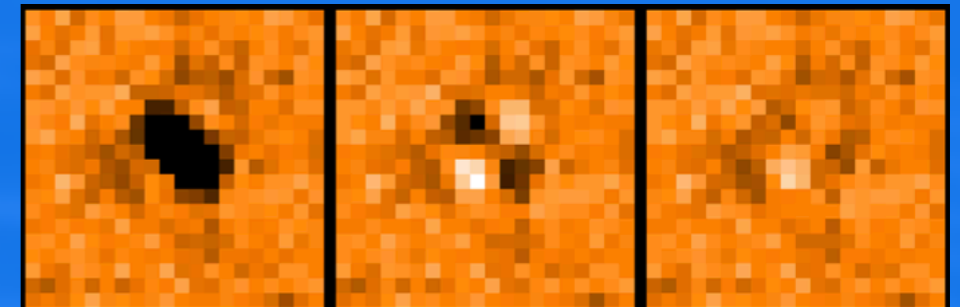


# Instrumental Polarization

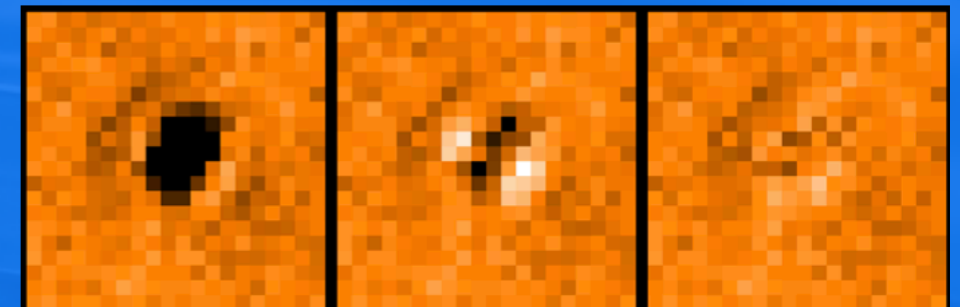


## Uranus

Q



U



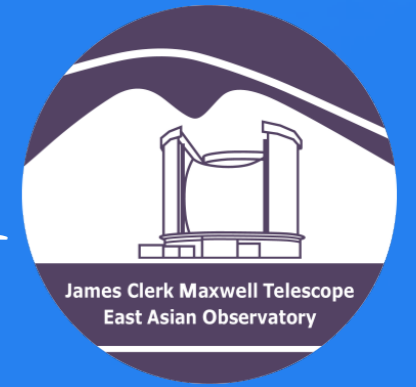
Un-Corr

Corr 1

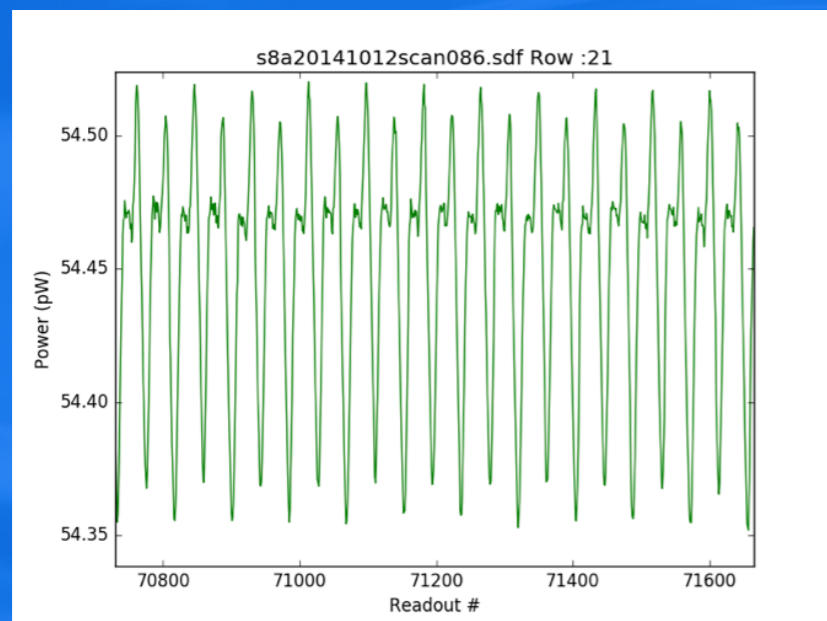
Corr 2

- Main source of IP the wind blind
- Smaller contribution from optics (mirrors)
- The wind blind IP is orthogonal between 850 and 450  $\mu\text{m}$

# Observing Modes and Data Reduction

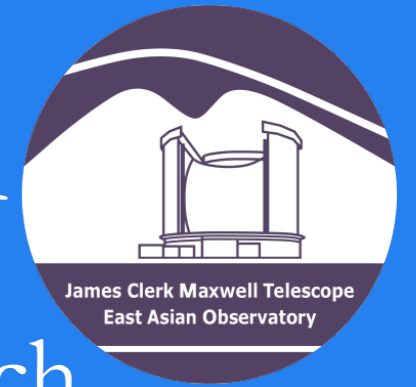


- Currently we are spinning faster than scanning. This allows us to calculate Q and U before the telescope moves on.
- Signal dominated by the atmospheric emission polarized by the membrane.
- The stream of Q and U value are used as input to a modified SCUBA-2 reduction

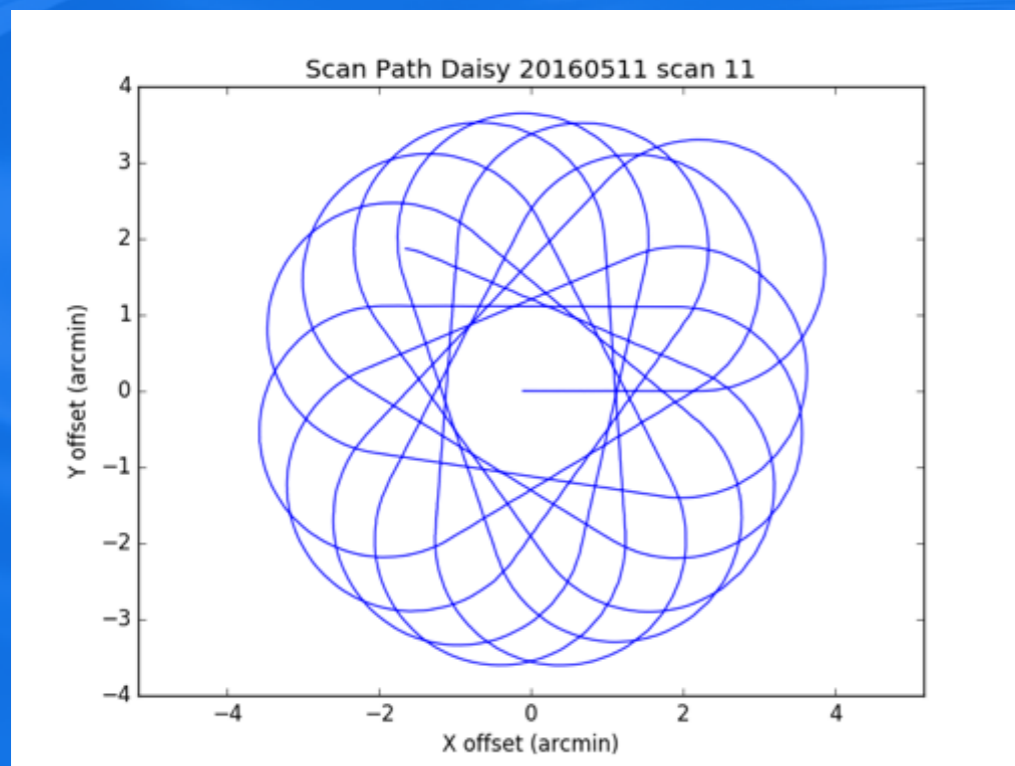


The data reduction removes common mode signals and looks for small non common mode deviations that is the real signal.

# Observing Modes and Data Reduction

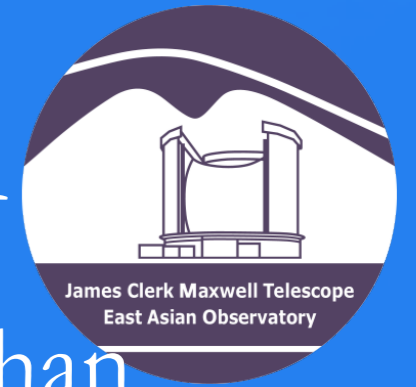


- Using quasi circular pattern as do SCUBA-2 but much slower  $8''/s$  compared to  $100-600''/s$  for SCUBA-2 only mapping.
- Quasi circular scanning needed for fast SCUBA-2 maps due to the weight of the antenna.
- Could consider more regular patterns as rater for the slow POL-2 scanning.

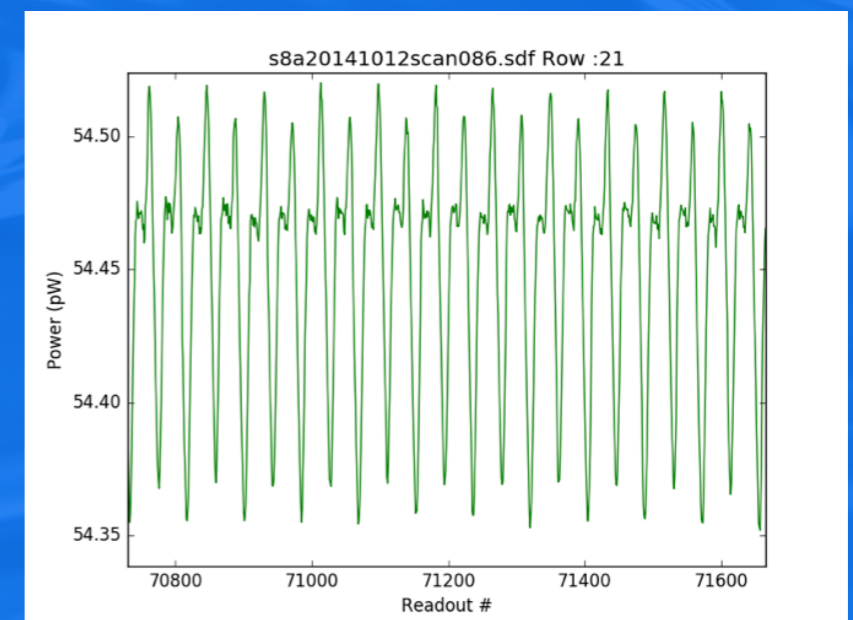


- However, the data reduction is help by non regular intervals between hitting the same pixel.

# Observing Modes and Data Reduction

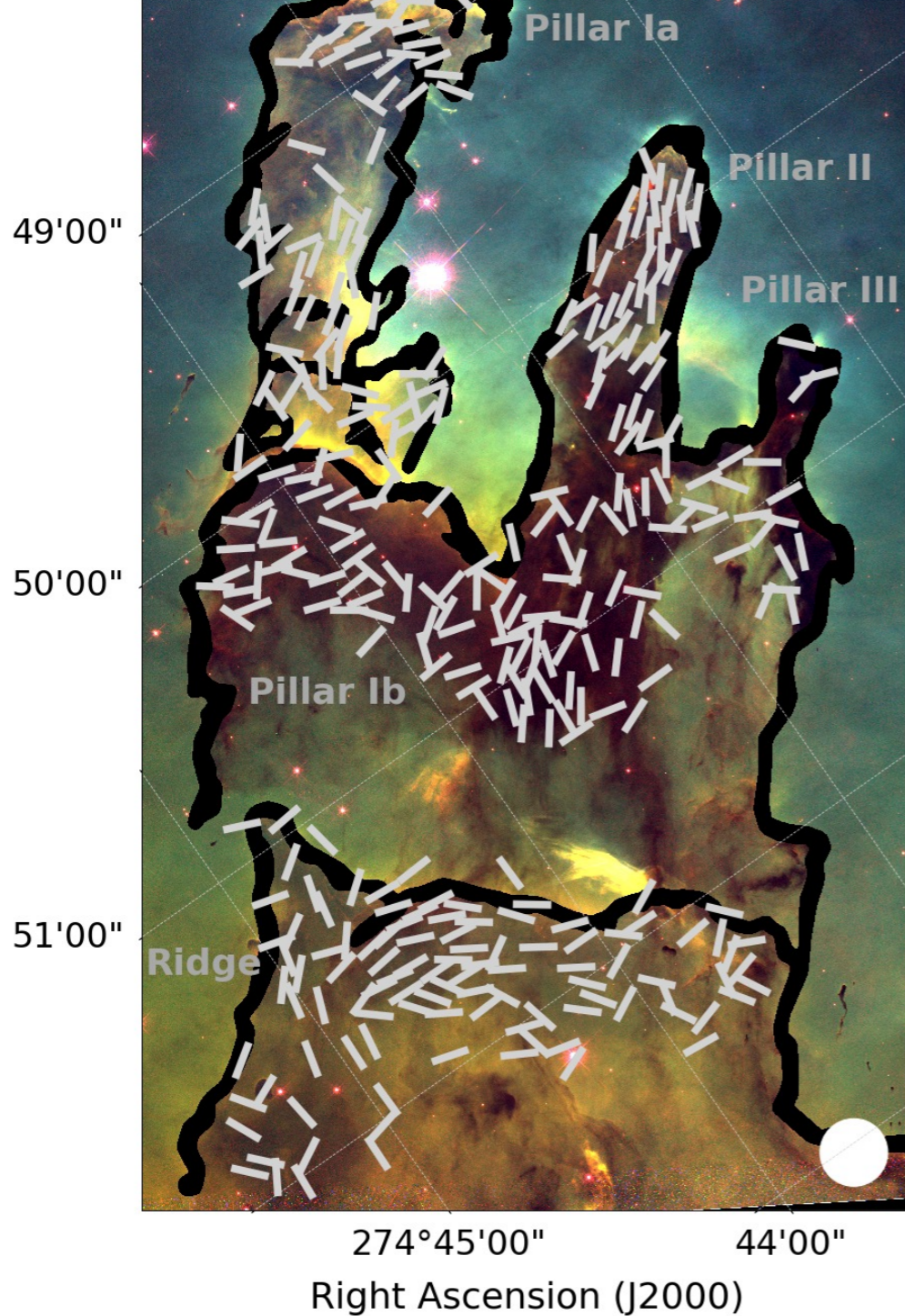


- Base plan is as now to spinning wave plate faster than scanning.
- Faster scanning would make it simpler to map larger areas and to be sensitive to more extended emission.
- But we would need a different data reduction since it not would possible to compute Q and U before the telescope moves to another pixel. Unless we spin much faster and read out much faster.
- This is an area that need to be explored and we could use help from interested partners.

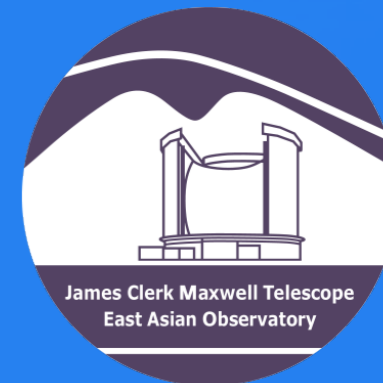




-13°48'00"



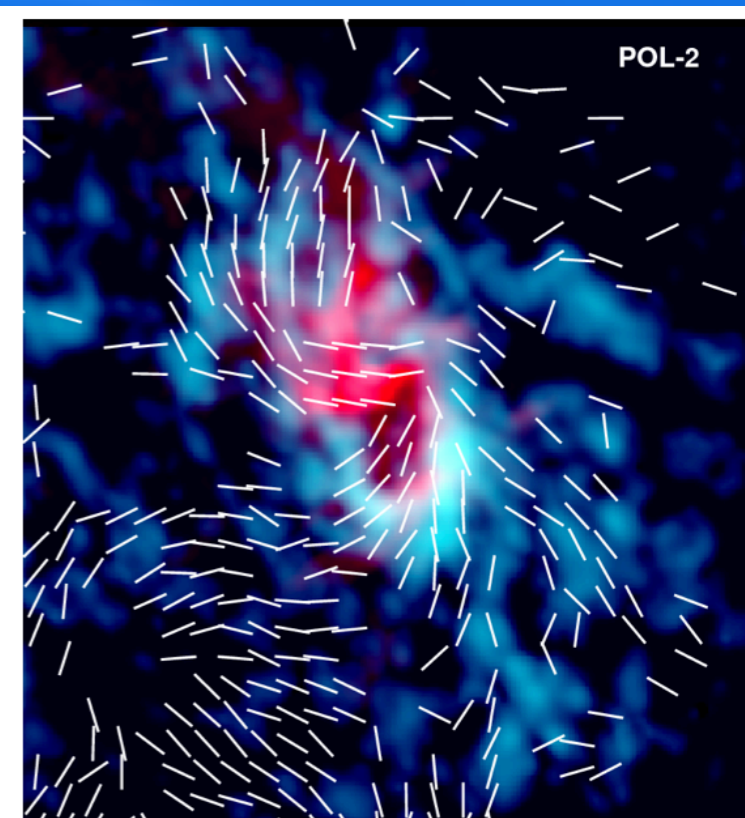
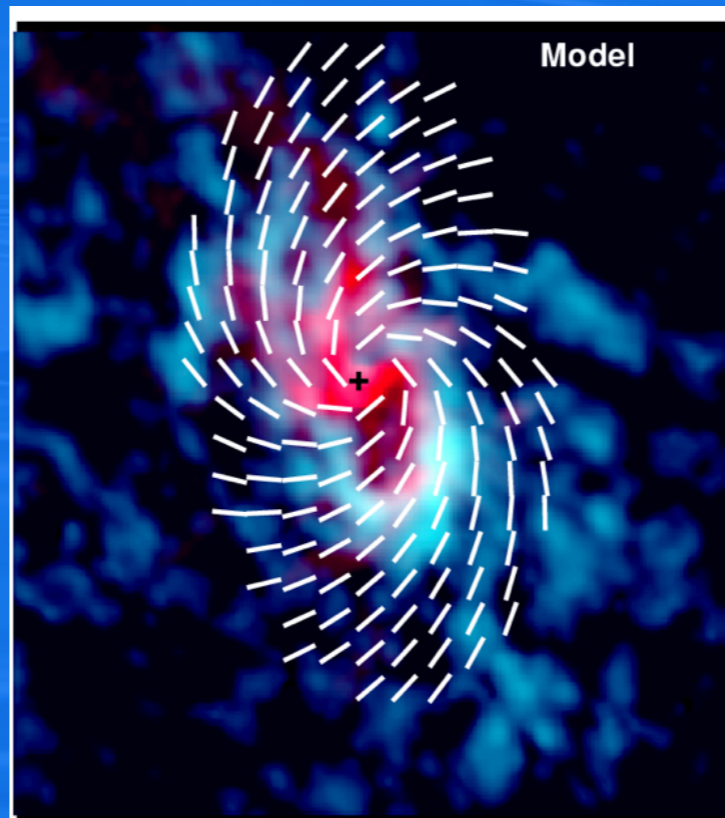
# POL-2 Large scale mapping



Pilars of creation  
Eagle Nebula  
Pattle & Bistro team

Model

Observations



SgrA\* magnetic field  
(Pei-Ying Hsieh et.al.)