Polarization with the new 850 µm Camera

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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
New 850 \( \mu \text{m} \) Camera

- 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?

Austermann, 2017
Data Quality POL-2

30 minutes of data
32 detectors

5 seconds of data
Instrumental Polarization

- Main source of IP the wind blind
- Smaller contribution from optics (mirrors)
- The wind blind IP is orthogonal between 850 and 450 μm
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 now to spin the 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 is not 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 needs to be explored and we could use help from interested partners.
POL-2
Large scale mapping

Pilars of creation
Eagle Nebula
Pattle & Bistro team

Model Observations

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