

Giovanni Fazio and the Early Years of Ground Based Infrared Astronomy

E.E. Becklin

SOFIA Chief Science Advisor

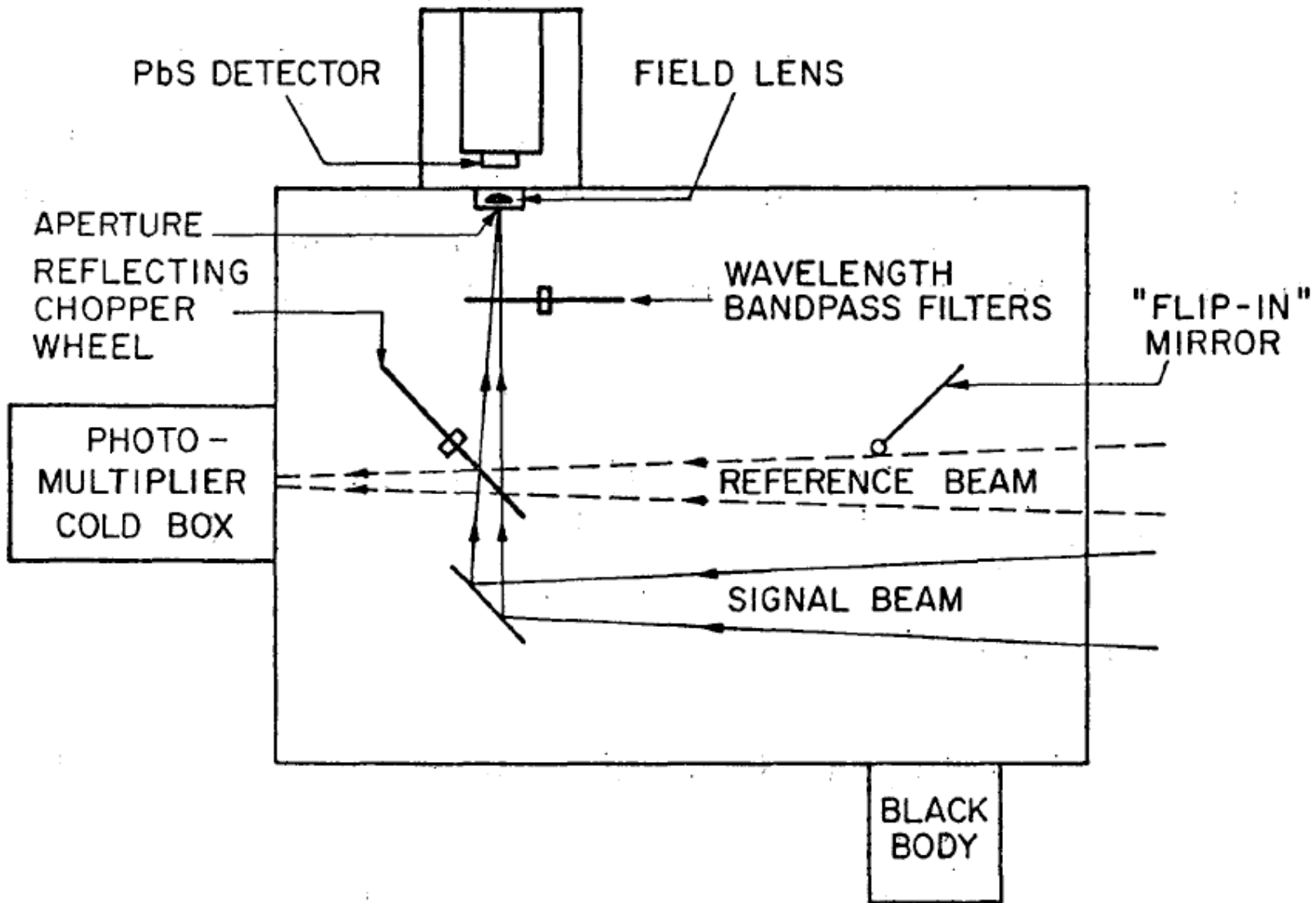
Symposium in Honor of Giovanni Fazio
May 27 & 28, 2009

Outline of Material

- The Early Years at SAO and meeting Giovanni
- The SAO Photometer
- The Galactic Center and the Influence of Giovanni
- Summary

The Early Years of IR Astronomy at SAO/Harvard Observatory

- In July 1969, I came to SAO to start an IR program with Bob Noyes.
- We built a Ground Based Infrared Photometer much like the one we had at Caltech.
- Once a week we would have lunch with Jim Wright, Giovanni, and his group.
- Giovanni would tell us about Gamma Ray Astronomy.
- We would tell him how easy it was to make discoveries in the IR.



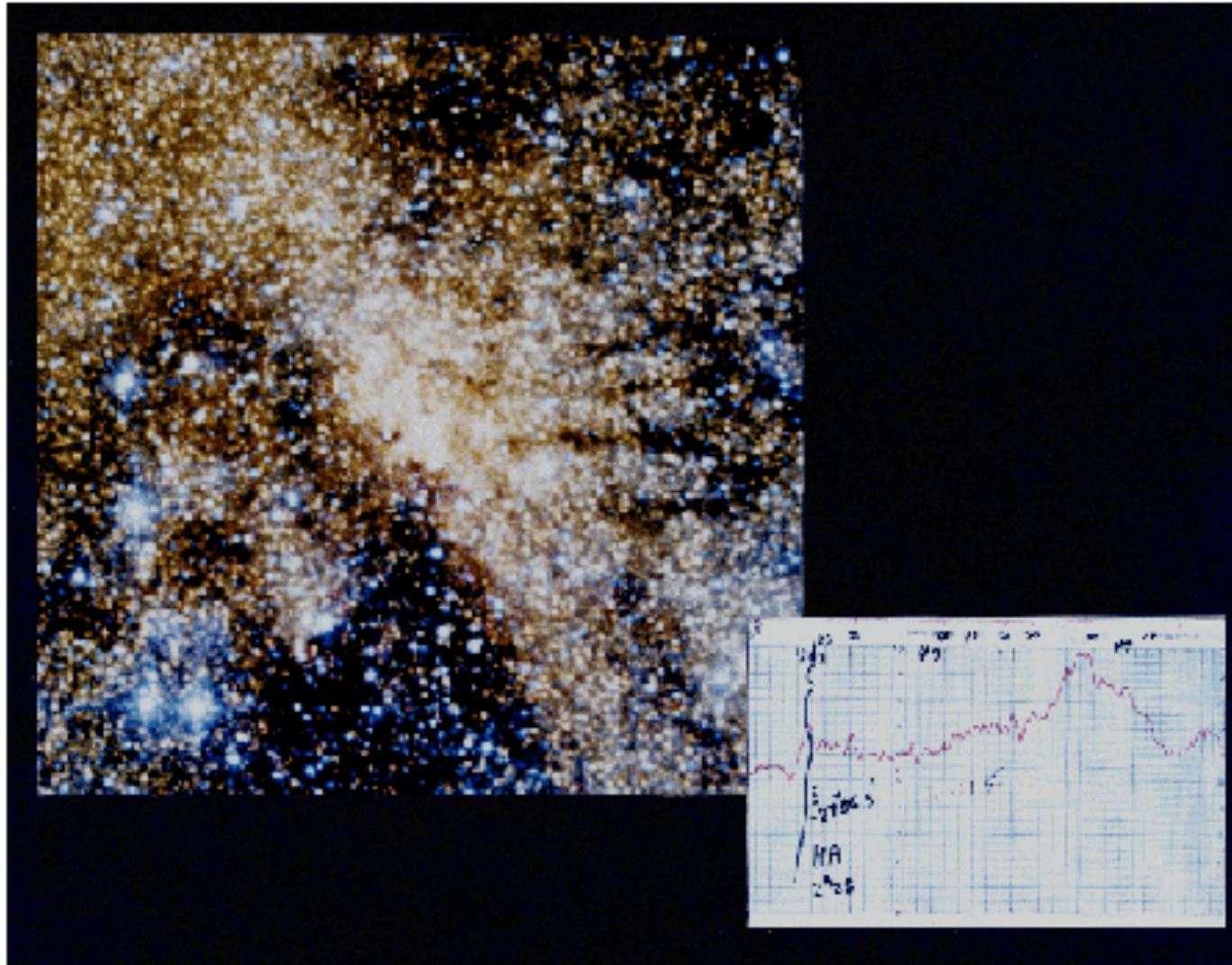
The SAO Photometer

- With Giovanni's encouragement, Bob Noyes and I finished the Photometer in the spring of 70 and a young undergraduate, Steve Willner, used it at Kitt Peak to make measurements of Planetary Nebula.
- I left SAO in 1970 and went back to Caltech and Doug Kleinmann took my SAO position.
- Doug upgraded the photometer and with graduate student, Ned Wright, used it to discover a IR point source in M-17.
- Further upgrades by Frogel, Persson and Aaronson with a InSb detector allowed the first systematic near IR observations of External Galaxies, including the CO band.

The Galactic Center and Giovanni's Influence

- In late Spring of 1970 I went back to Mount Wilson to look for variations in the 2.2 micron radiation from the Galactic Center.
- This suggestion came from Giovanni through his high energy work on the Crab Nebula and other sources.
- Giovanni was correct, but we were off by a factor of 10,000.

The Galactic Center: 1967-1994

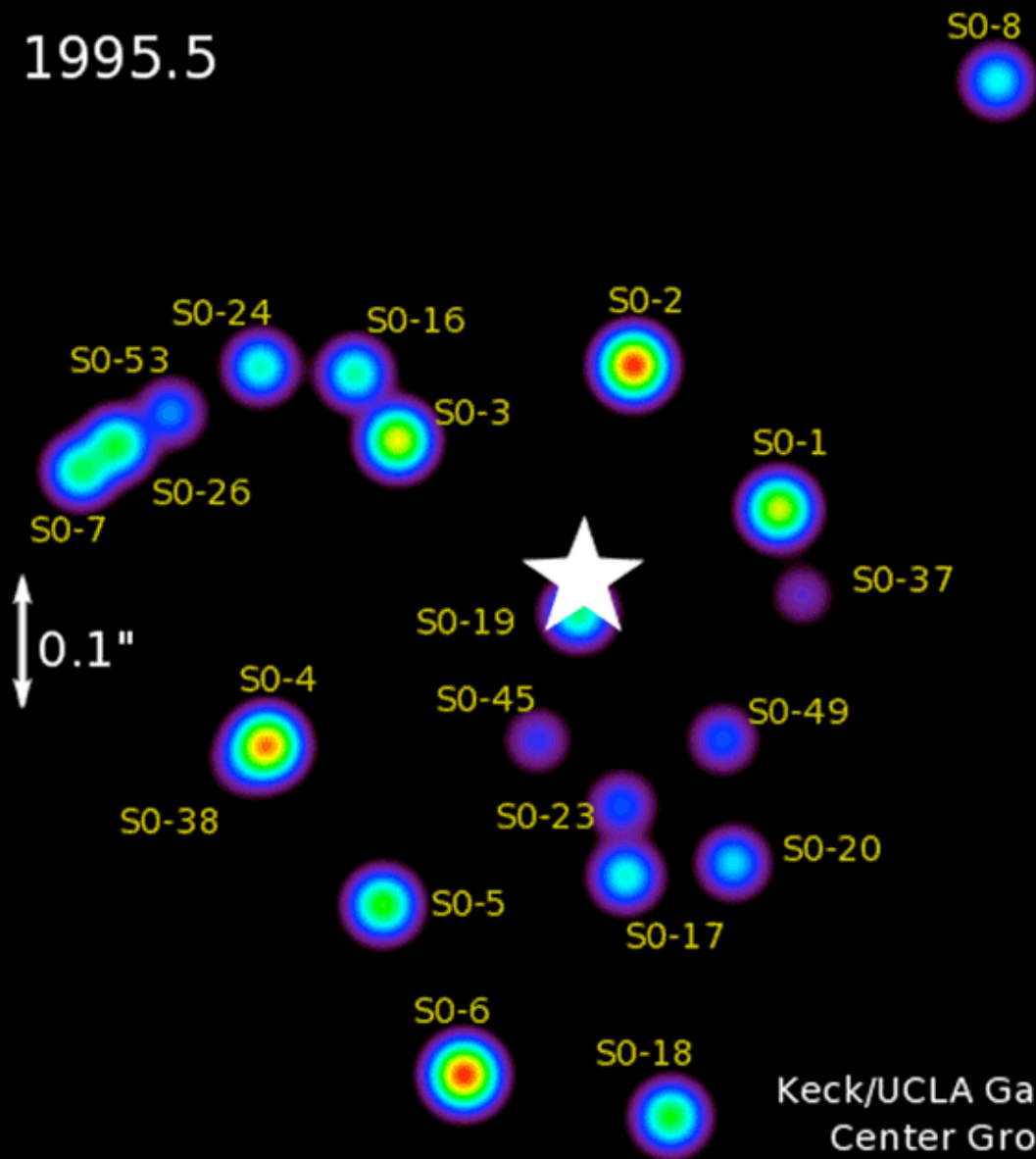


I. Gatley/NOAO/KPNO, (inset) G. Neugebauer & E. E. Becklin/Caltech

We Needed to Know Where to Look

- There was a lot of stellar background and we needed to know where to look.
- This took much development with large sensitive detector arrays, large telescopes, and Adaptive Optics.
- Giovanni and his collaborators Pipher and Forrest, produced the InSb array detectors that made it possible.
- Genzel et al and Ghez et al determined where to look.

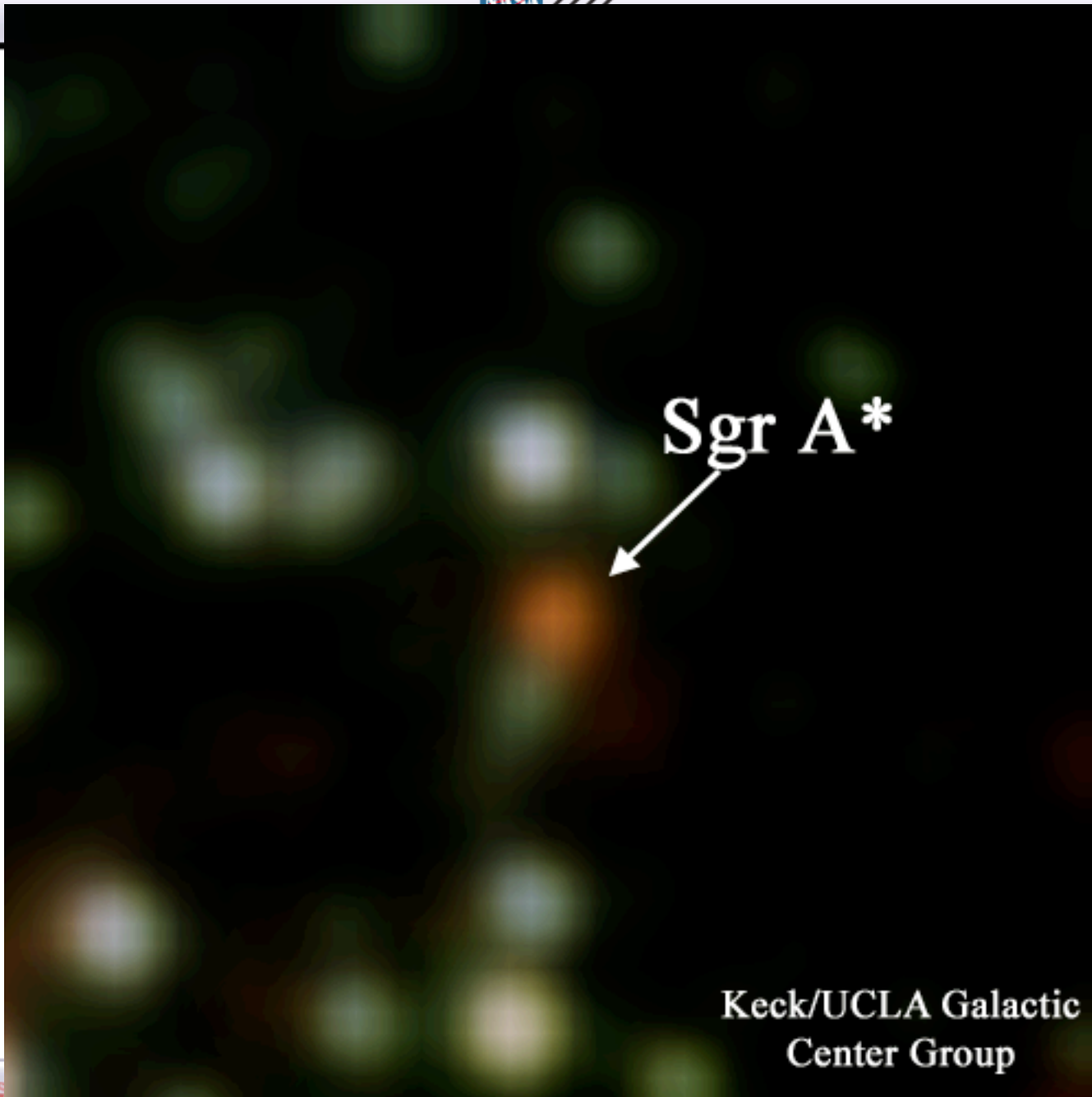
1995.5



Keck/UCLA Galactic Center Group

Adaptive Optics Really Made a Difference

- Once the position of the Black Hole was determined, it was possible to look for variations
- This was done by both Genzel et al (VLT) and Ghez et al (Keck) using Advanced Adaptive Optics



Sgr A*

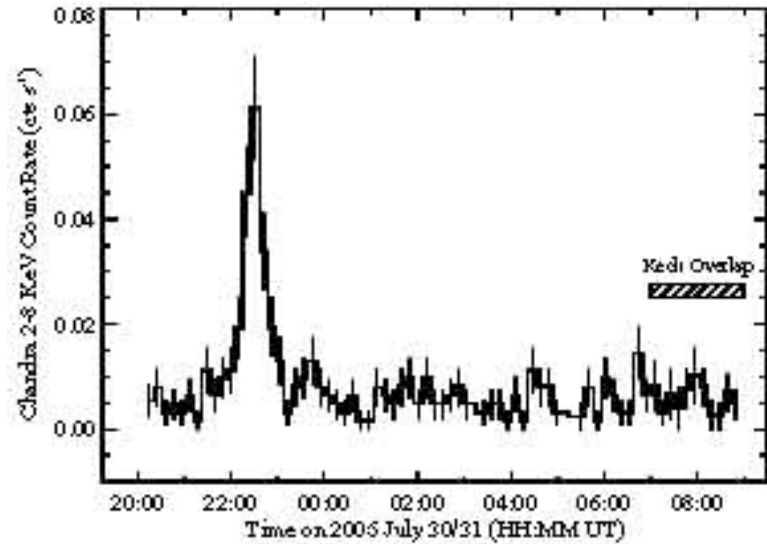
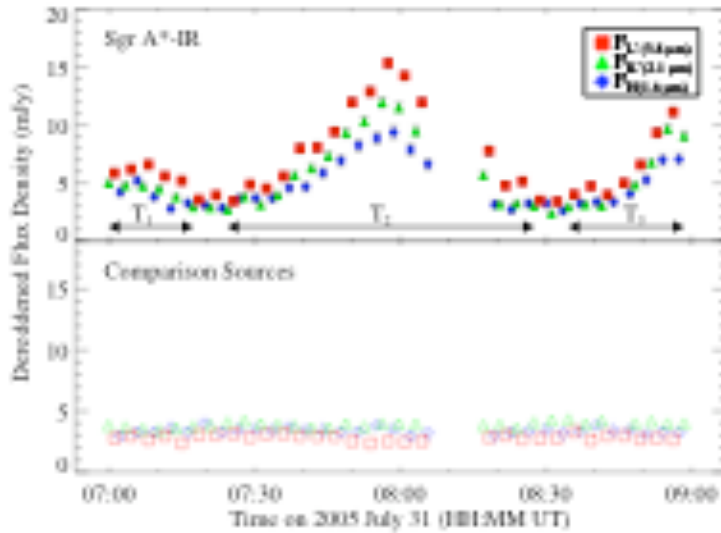


Keck/UCLA Galactic
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There are Still Questions to be Asked

- What are the nature of the variations?
- Are there correlations with X-rays and Radio?
- Is there a Gamma Ray Source?
- Will there be a big outburst in the future?

Variability of Sgr A* in IR and X-ray



Hornstein et al, GC06 Conference Proceedings, 2006

Giovanni Fazio has Made a Big Difference in Ground Based Infrared Astronomy

- Support of the developing Students, Post Docs and Staff
- Development of Large Format IR Detectors
- Thank You!!