

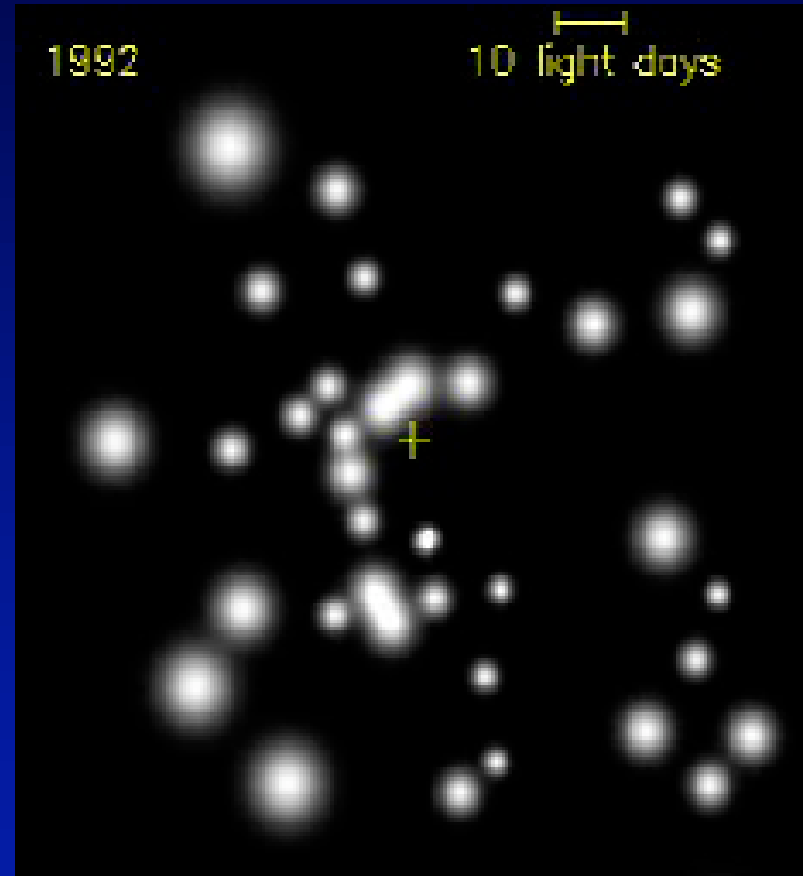


Flares in our Galactic Center Supermassive BH, Sgr A*: A Glimmer of AGN-like Activity?

Sera Markoff (MIT)

Sgr A*

- Stellar proper motions have revealed a dark mass in the Galactic Center.
- **Mass = $4 \times 10^6 M_{\odot}$**
- **Distance = 8 kpc**
- **$L \ll 10^{-8} L_{\text{Edd}}$!**



(Genzel et al. 2002)

Sgr A*

- Until *Chandra* detection, only known as a radio source
- Now identified in IR as well as X-rays, in two distinct types of states:

Flaring:

- Once a day on average, 5-10x increase in X-ray flux
- Large 50x flare seen only once
- Largest change seen in X-rays, lower frequencies still not simultaneously determined but not as prominent

Quiescent:

- Very robust state, returns after each flare
- *Chandra* sees extended emission of $\sim 1''$ \square likely due accretion flow processes, \square 10% variability

X-ray flaring reveals nonthermal processes

(Baganoff et al. 2001, Nature)

- Spectral hardening

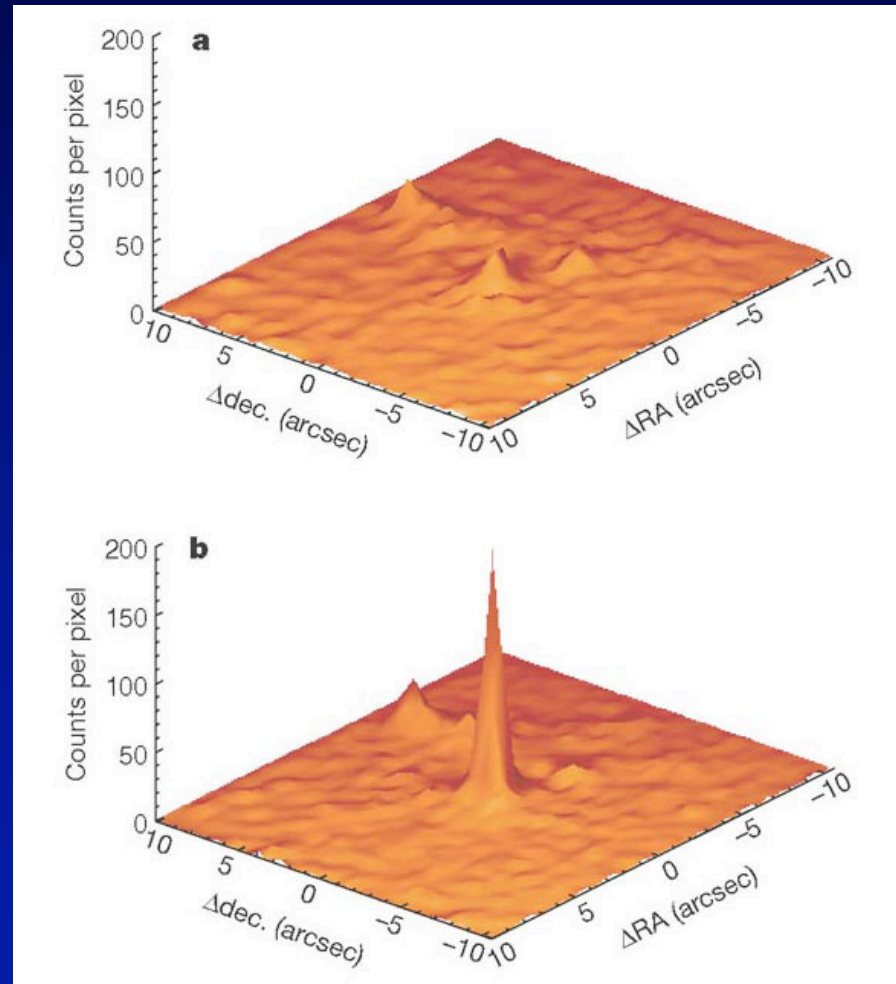
→ $\Gamma \sim 1.3$

($\Gamma \sim 2.2$ in quiescence)

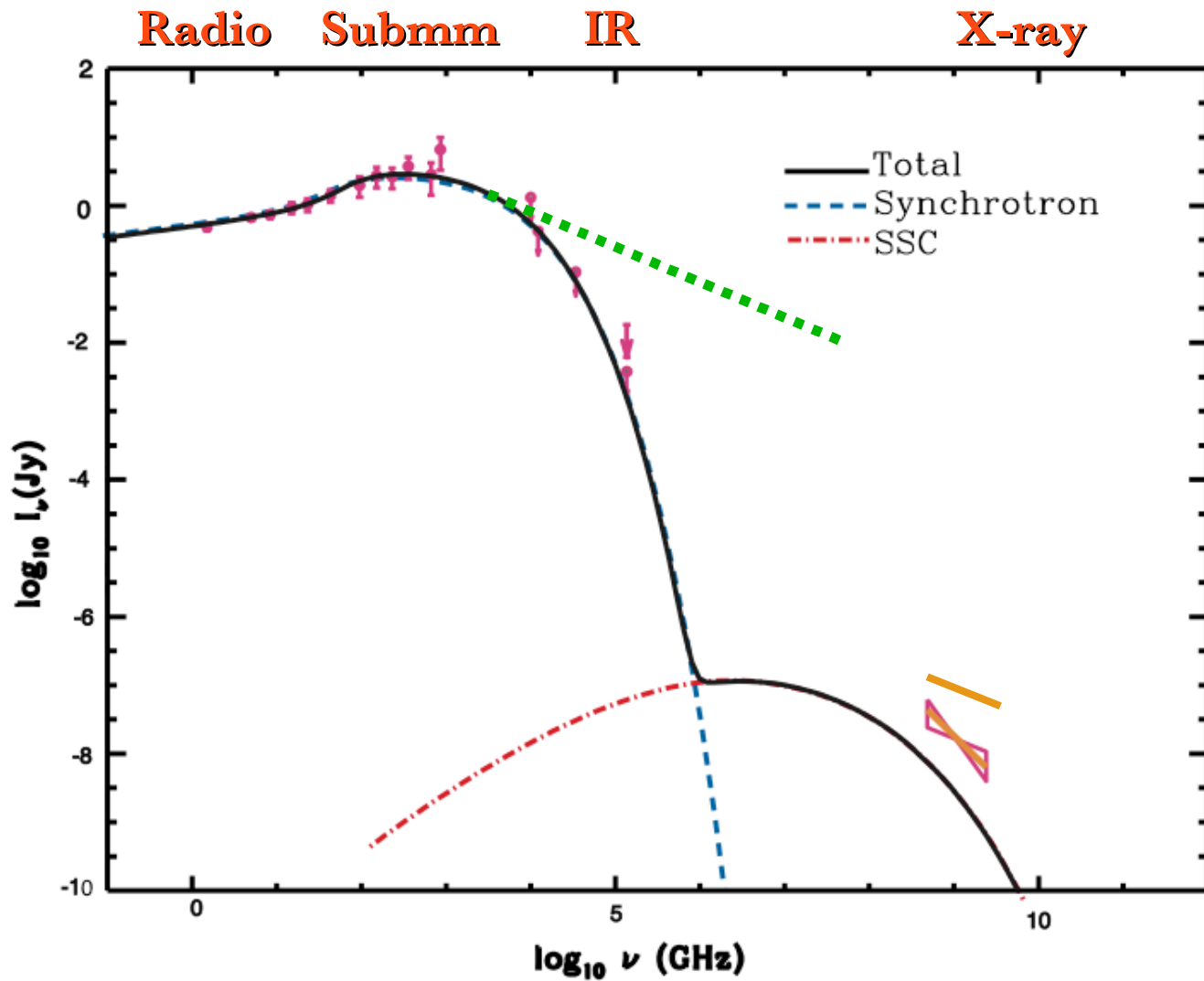
- Shortest timescale:

$\sim 600\text{s}$

→ $20 R_s$ scale

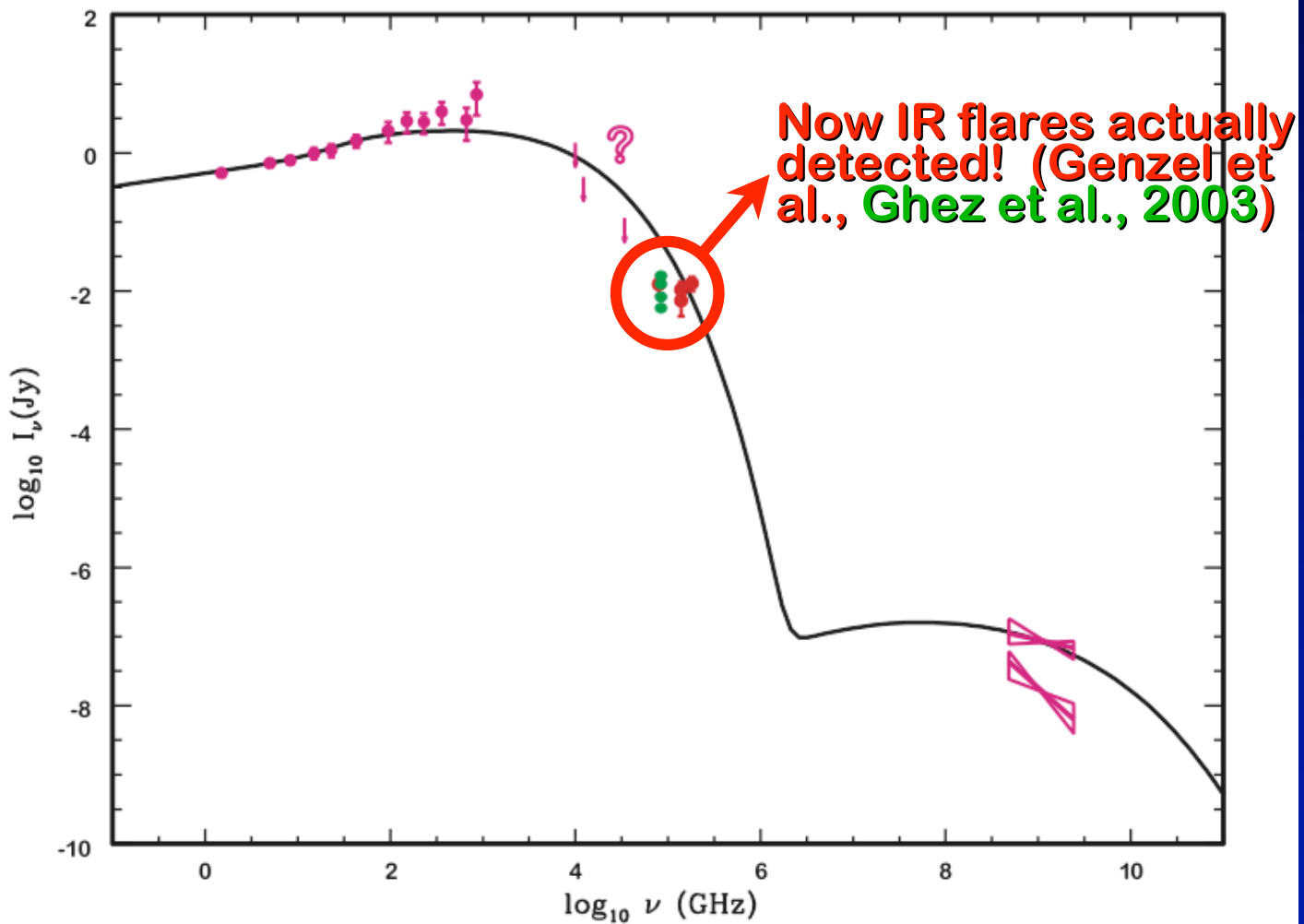


Sgr A*-Quiescence



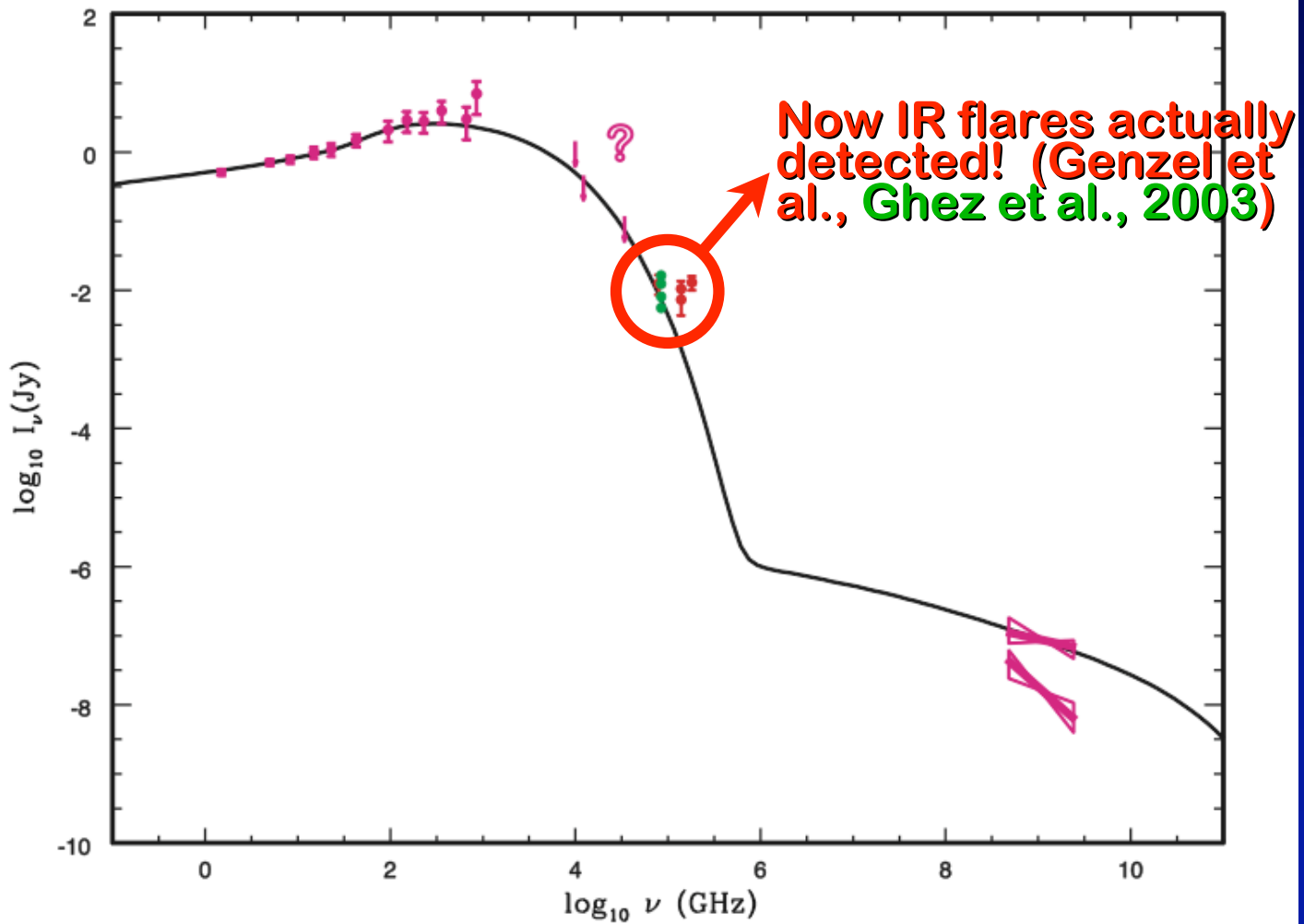
Falcke & Markoff 2000, Markoff & Falcke, in prep.

Average Daily Flares ($\sim 10x$)



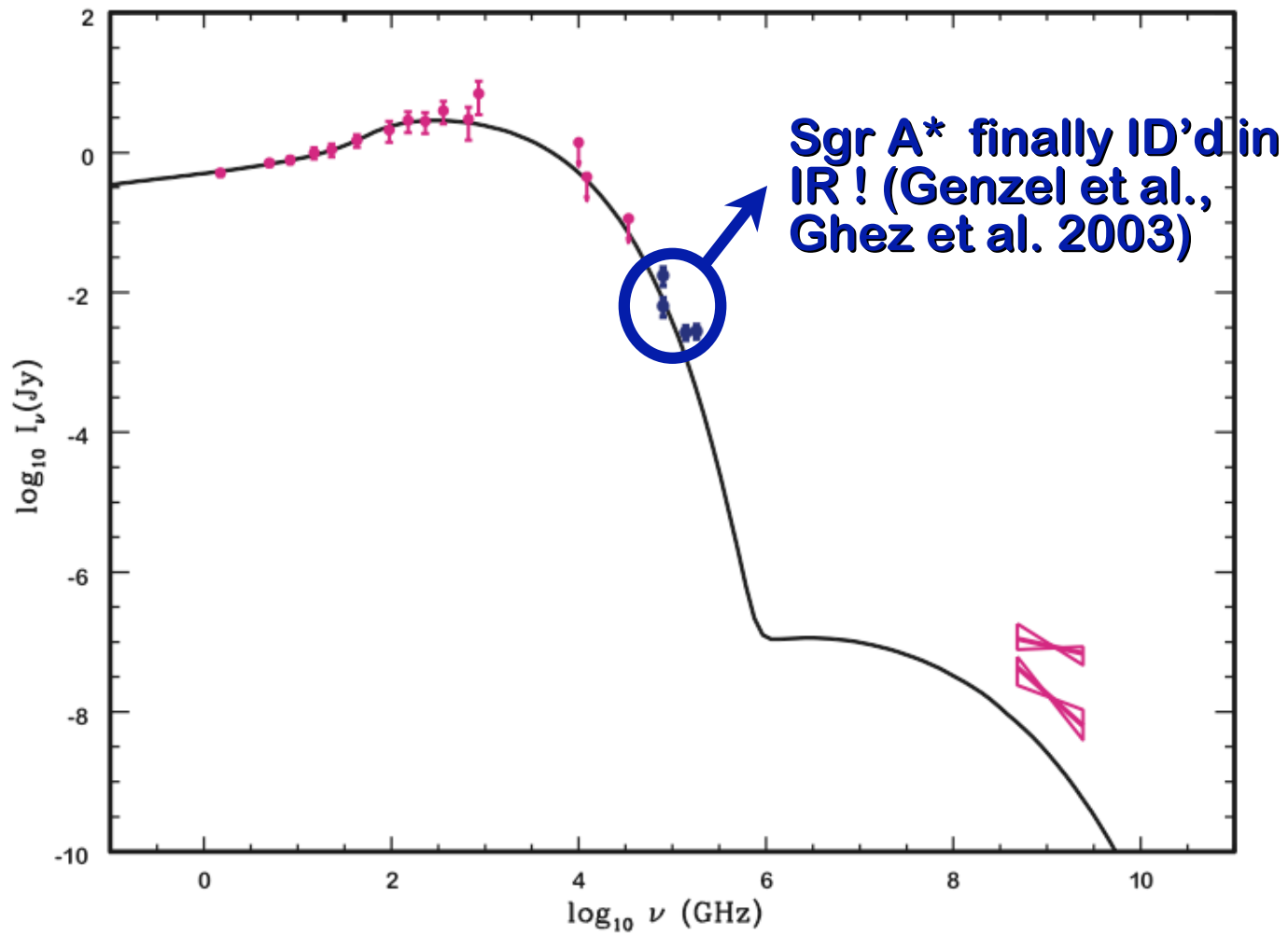
Markoff & Falcke 2004, in prep.

Average Daily Flares ($\sim 10x$)



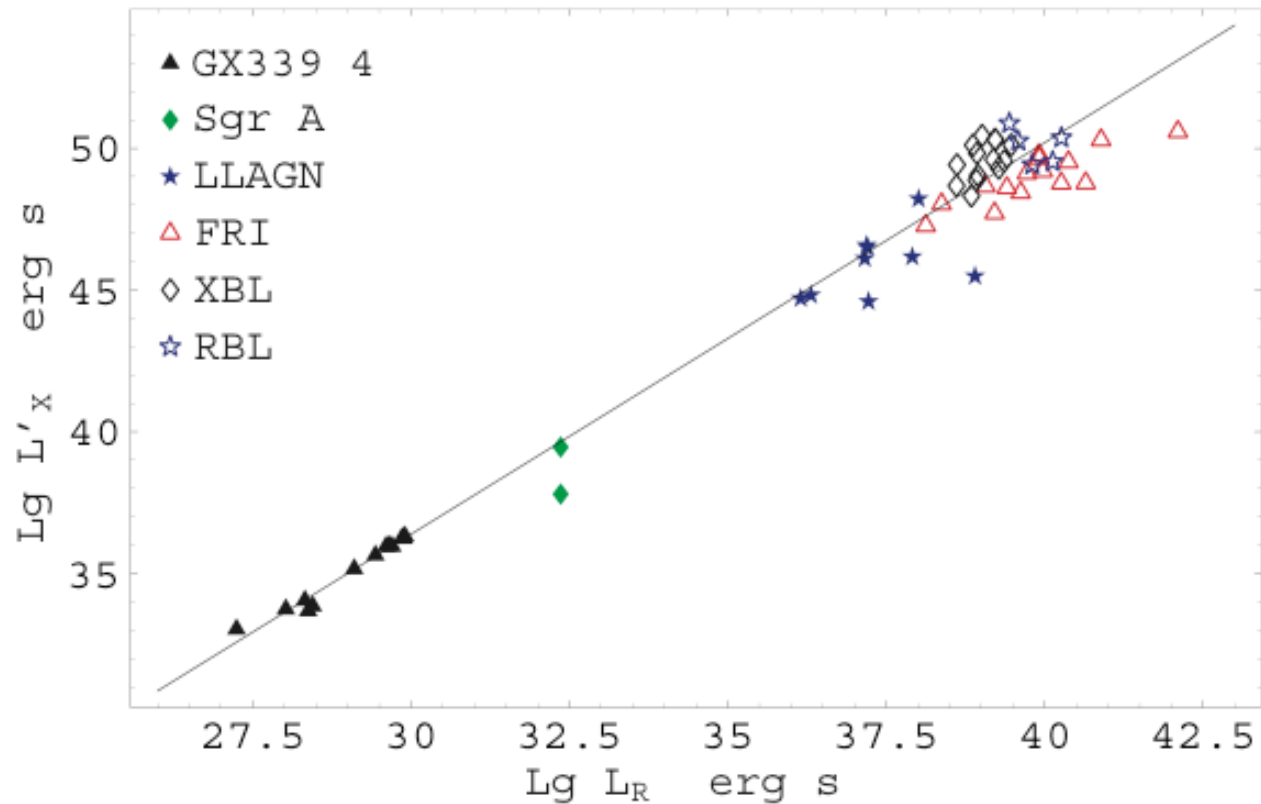
Markoff & Falcke 2004, in prep.

New IR data



Markoff & Falcke 2004, in prep.

Sgr A* vs. low luminosity jet sources



(Falcke, Körding & Markoff, A&A, in press. Also Merloni, Heinz & di Matteo, MNRAS, in press)

Outlook

- Whatever happens during Sgr A* flares seems to make Sgr A* lie closer to the radio/X-ray correlation that other active jet sources follow
 - ▮ strongly suggests radio emission in Sgr A* is from a jet, as in the other sources on correlation
 - ▮ flares may help us understand jet acceleration/heating processes in brighter sources
 - ▮ need better simultaneous data to discern the exact processes and where they originate, but we are finally starting to converge on a physical model