

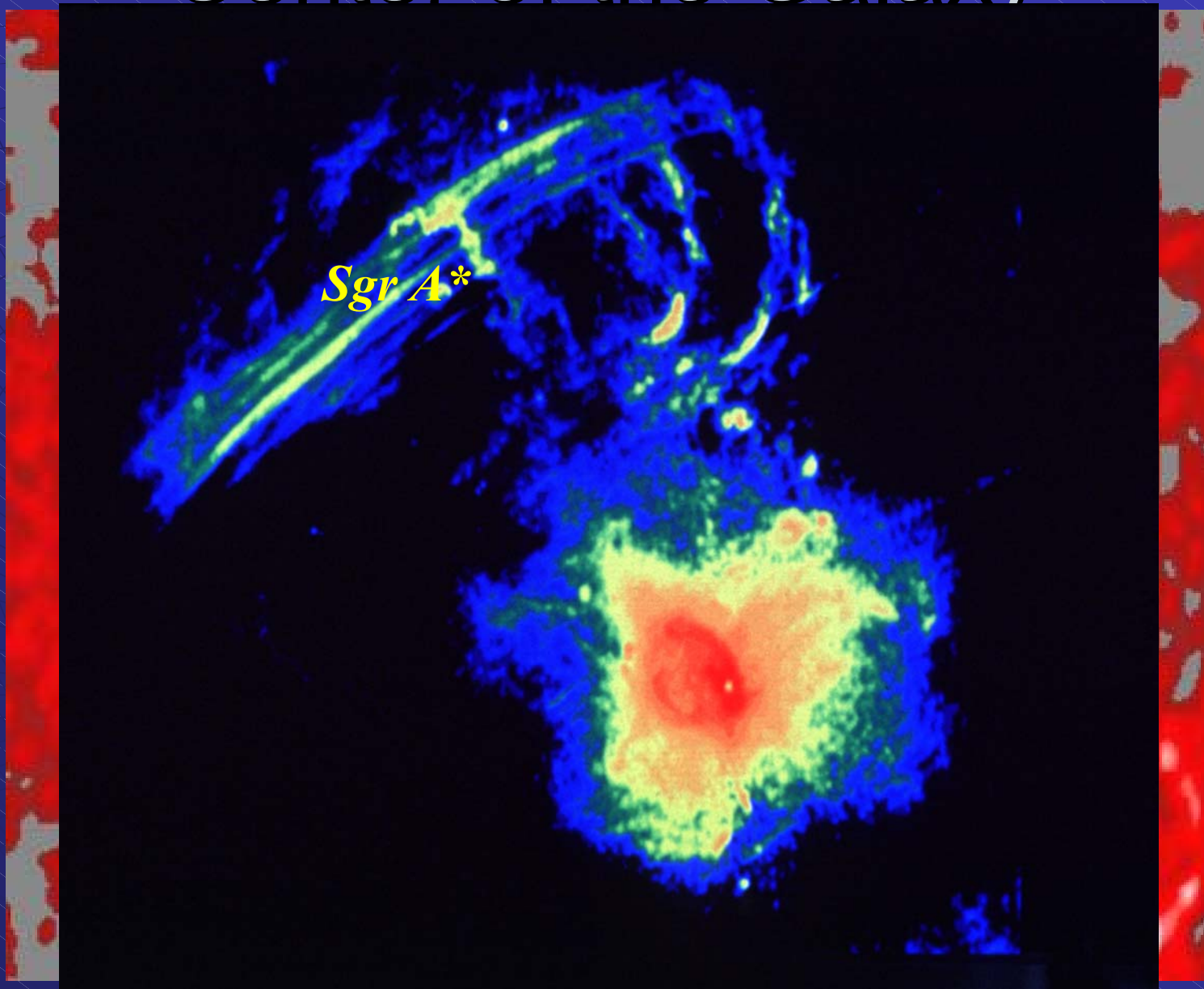
BLACK HOLE at the GALACTIC CENTER

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Center of the Galaxy



GSMT 04.28.2003



WHY the GALACTIC CENTER?

- ◆ Nearest Supermassive Black Hole
- ◆ Inflow and Accretion Rate
- ◆ Connection to the Galactic Disk
- ◆ Best Resolution and Sensitivity
- ◆ Paradigm for AGN's

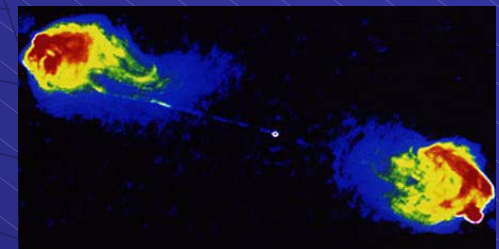
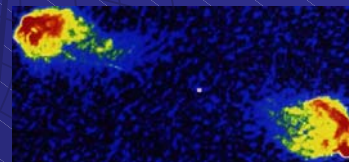
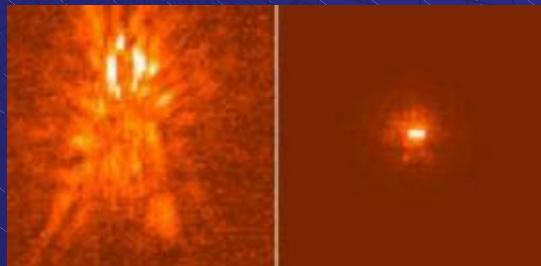
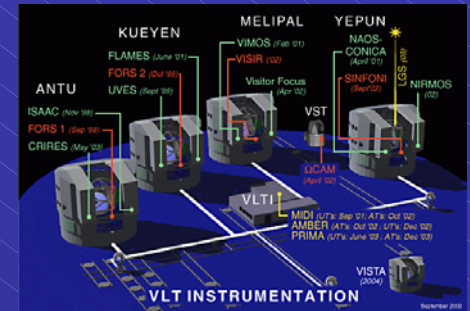


Orbital Motions Around SgrA*

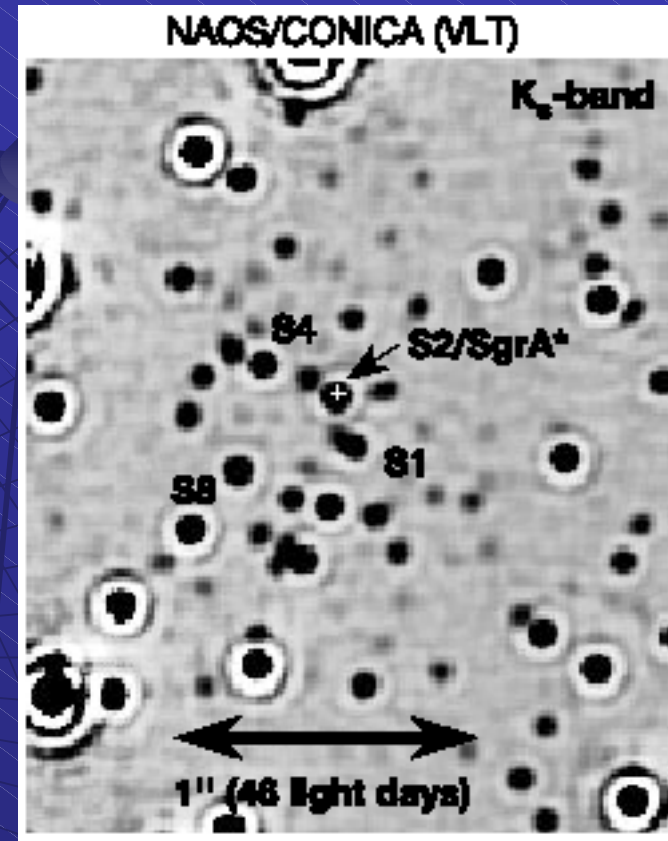
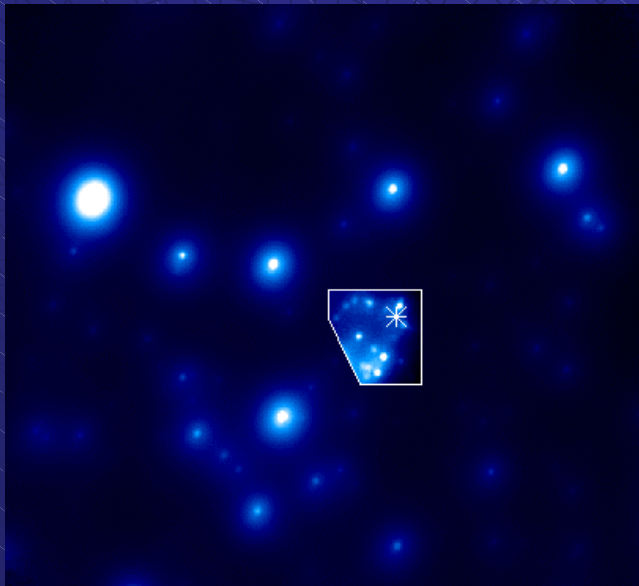
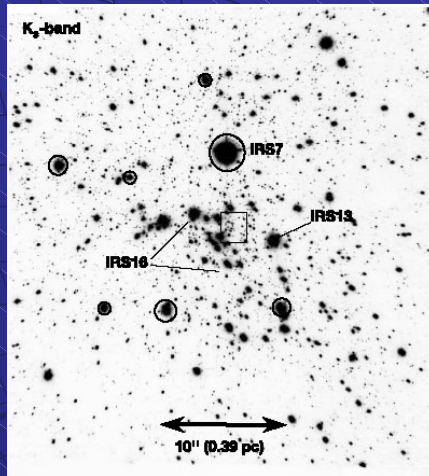


Schödel et al. Nature 419,694 (10.17.2002)

- ◆ VLT 8-m UT4: NAOS/CONICA
- ◆ Diffraction Limited : 56mas @ 2.18 μ m
- ◆ AOS closed on supergiant IRS7 (6" N): Strehl ratio over 40%
- ◆ Seeing Halos removed by Wiener Filter

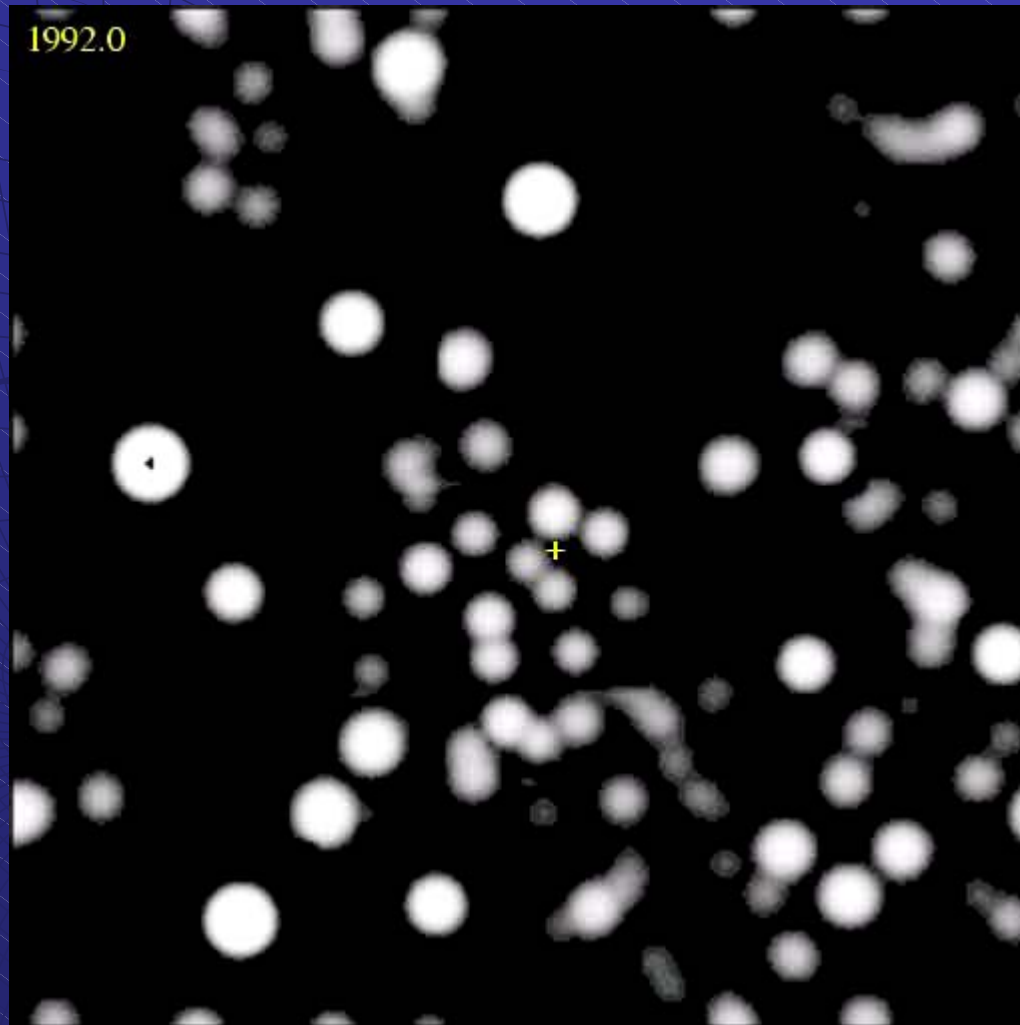


2.18 μm Images of Galactic Center

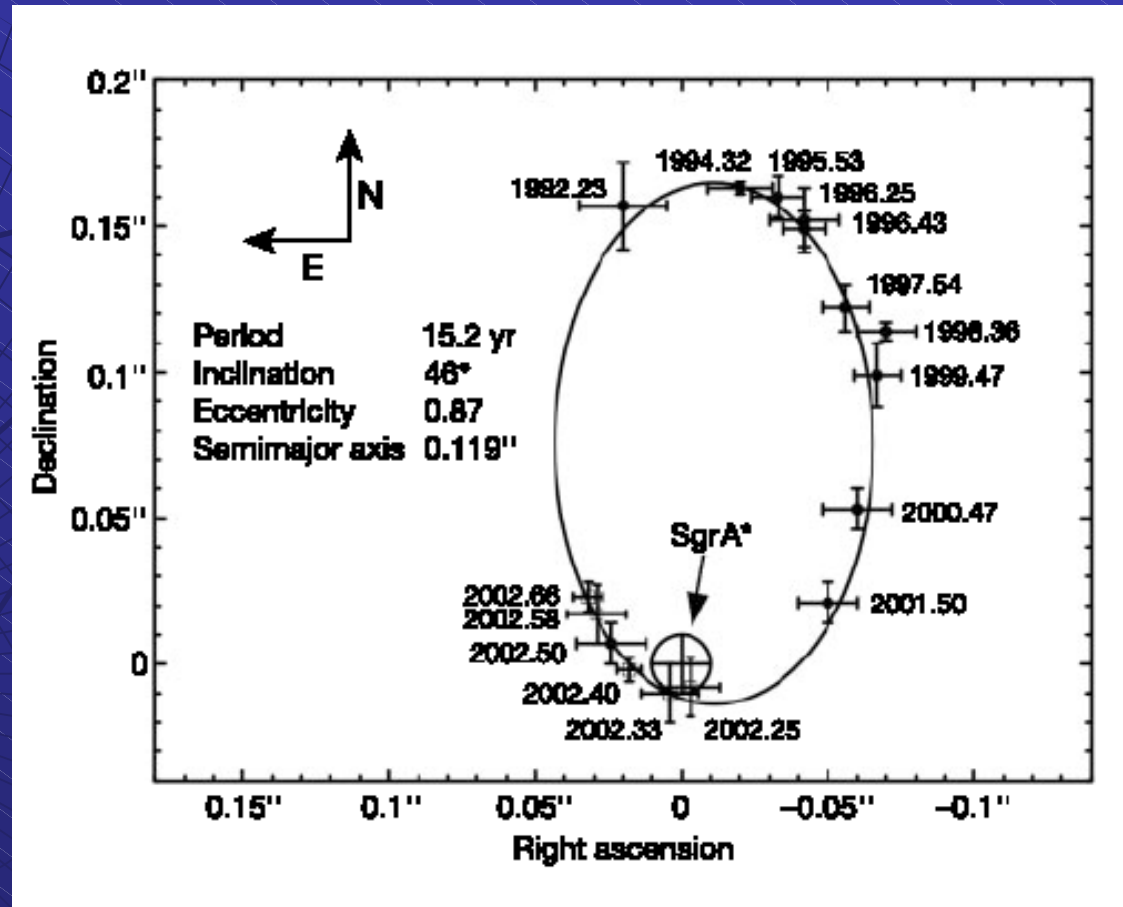
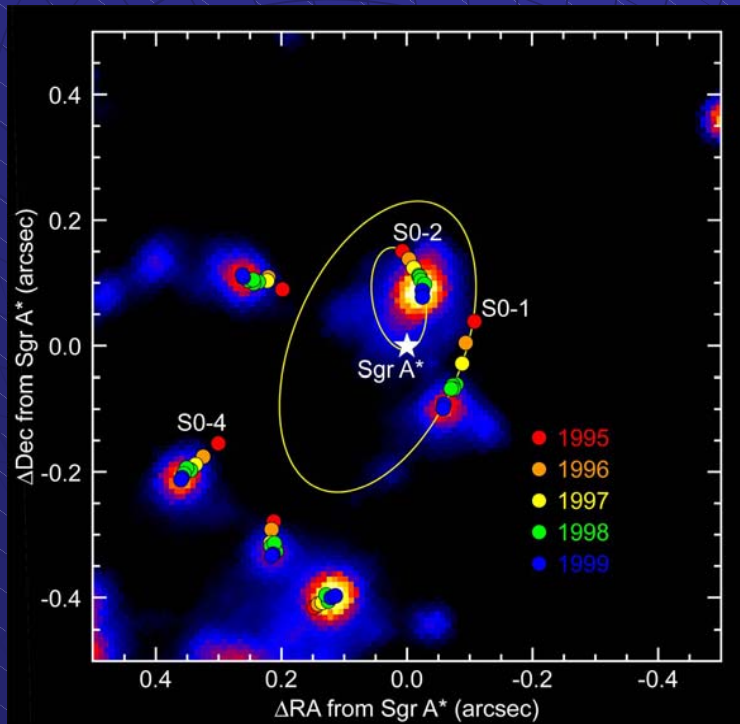




Galactic Center Proper Motions



Orbit of S2 Around SgrA*



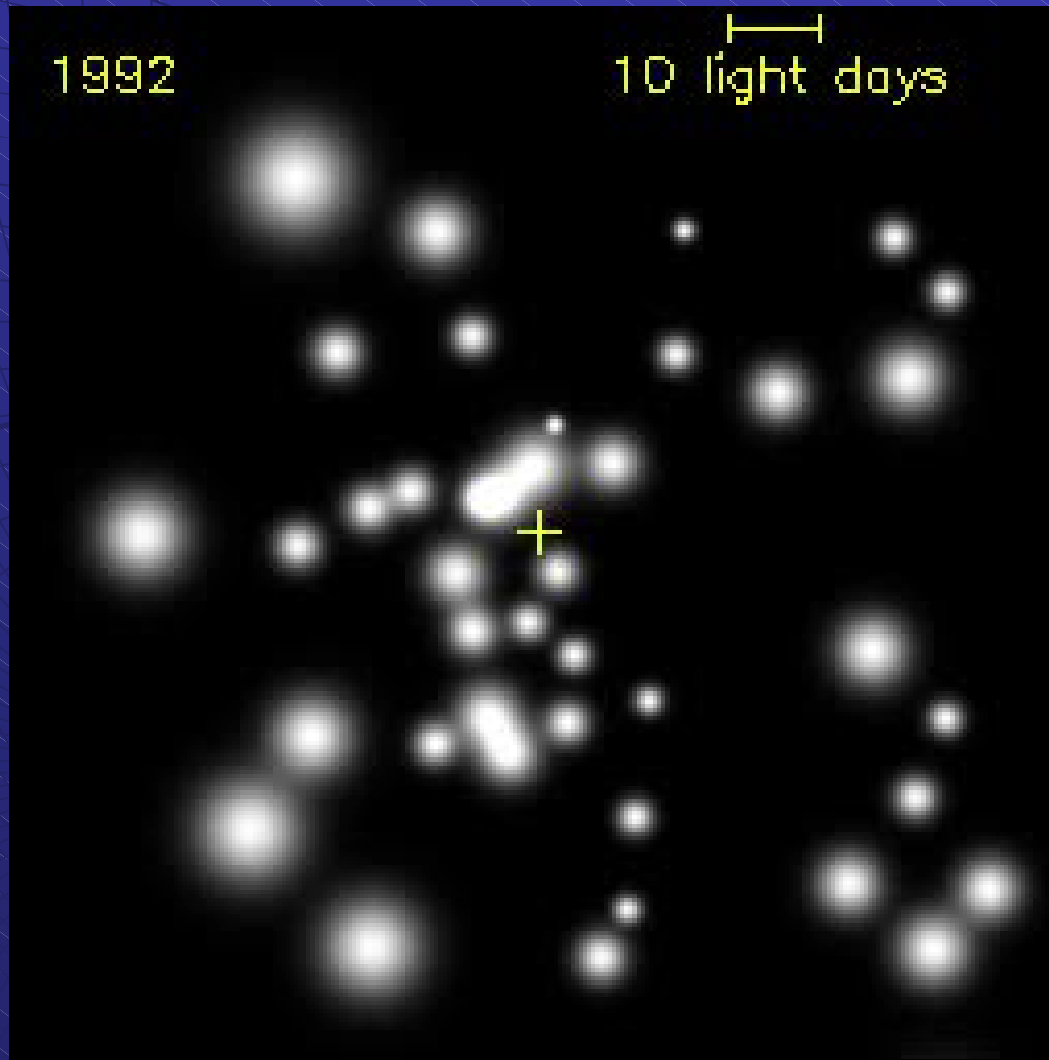


Orbit of S2 Around SgrA*

- ◆ **Semimajor Axis:** $0.119'' = 5.5$ lightdays
- ◆ **Orbital Period:** 15.2 years
- ◆ **Pericentre Distance:** $15\text{mas} = 17$ lighthours
 $= 124 \text{ AU} = 2100 R_{\text{sch}} = 70 R_{\text{tidal}}$
- ◆ **Binding Mass:** $3.7 \times 10^6 M_{\odot}$



Recap the Proper Motions





How Much Better ?

- ◆ **Increased Resolution and Sensitivity.**
- ◆ **Detect and Track Fainter Stars.**
- ◆ **Detect even Faster Motions?**
- ◆ **Better Constraints on Orbits, Accelerations.**
- ◆ **Detect Tidal Distortions?**
- ◆ **Detect Relativistic Motions at $100 R_{\text{sch}}$?**