SMA Observations of Sgr A*

Jim Moran
SMA Observations of Sgr A*


• Rotation measure determined and found to vary by less than 30 percent.

• Intraday intrinsic polarization variations measured.

• Peak of the “Submillimeter Bump” is at about 500 GHz

• First detection of a submillimeter flare associated with an X Ray flare.
Some Scales in the Galactic Center

radio source

black hole

stellar orbits

$\frac{r}{r_s}$
Star

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Polarization at Various Wavelengths

230 GHz

345 GHz

690 GHz
SED for Sgr A*
Radio-Submillimeter Wavelength Part of SED

Falcke et al. (1998)
An et al. (2005)
This work
A HUNGRY BLACK HOLE
Accretion Rate and Faraday Rotation

\[ \chi(\lambda) = \chi_0 + \lambda^2 RM \]

\[ RM = 8.1 \times 10^5 \int n_e B \cdot dl \]

- \( RM = -5.1 \times 10^5 \) rad/m²

Assumptions:
- equipartition
- density power law
- inner radius cutoff of Faraday screen

- Accretion Rate = \( 10^{-9} \) – \( 10^{-7} \) M\(_{\text{Sun}}\)/yr
2005 SMA Measurements of Faraday Rotation in Sgr A*
230 GHz Light Curve for Sgr A*, July 30, 2005
Polarization Event of July 30, 2005 in Sgr A* (3 hours)
a0 256

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Flare in Sgr A* on July 17, 2006

![Graph showing x-ray (Chandra) and submillimeter (SMA/CSO) flux rates over UT hours.]
July 17, 2006 Flare
July 17, 2006 Flare

![Graph showing data over UT Hour]

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Sep 4-5, 2007

SMA Advisory Committee
Sgr A*

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Polarization of Sgr A* at 230 GHz (1.3 mm) (SMA)