**The Event Horizon Telescope**

The Event Horizon Telescope (EHT) is a global 1.3-mm VLBI array achieving angular resolutions of tens of microarcseconds — sufficient to image the event horizons of nearby supermassive black holes. Results include:
- Measuring the size of the event horizon of Sgr A*¹
- Detecting time variability in the Schwarzschild-radius scale emission of Sgr A*²
- Measuring the size of the accretion disk powering the jet of M87, providing an estimate of black hole spin³

Polarization with the EHT can probe the magnetic field structure in these environments and is also sensitive to relativistic effects that are not apparent in unpolarized flux, such as parallel transport in the curved spacetime.⁴⁵

**Magnetic Fields at the Event Horizon**

The submillimeter emission from Sgr A* is⁷⁸⁹
- Energetically dominant (the “submillimeter bump”)
- Synchrotron
- Partially optically thin

Yet, connected-element arrays measure only a ~7% linear polarization fraction at these frequencies.¹⁰,¹¹ These comparatively low polarization fractions could indicate a disordered magnetic field within the turbulent emitting plasma or unresolved ordered magnetic fields with a low beam-averaged polarization.

Addressing these questions requires angular resolution matched to the emission region. Preliminary EHT results (see above Figure) suggest a highly ordered field threading the emission region, with significant structural variations.

**Polarimetric VLBI**

Cross-hand visibilities carry linear polarization information. Fractional polarization estimates then phase reference these measurements to parallel-hand visibilities, providing:⁶
- A good VLBI observable: amplitude and phase
- Two measurements per baseline: \( \langle R_L L_2 \rangle \) and \( \langle L_1 R_2 \rangle \)
- Immunity to scatter broadening and gain fluctuations

**References**


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