



Contribution ID : 49

Type : **Contributed talk**

Inferring the Black Hole and Accretion Parameters of Sagittarius A* from EHT Observations Using a Semianalytic Model

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The Event Horizon Telescope (EHT) Collaboration produced the first image of the apparent shadow of the central black hole of Sagittarius A* (Sgr A*). Sgr A* source structure varies significantly on timescales shorter than the duration of an observation, preventing improved data coverage through Earth rotation aperture synthesis. This rapid variability provides the opportunity to quantify intrinsic variability and separate time-variable emission features from stable signatures of strong gravity and the accretion environment. To infer unknown properties of Sgr A* and its surrounding accretion flow, we perform Bayesian inference on a series of EHT data segments ("snapshots"). We directly fit parameters of a semianalytic emission model jointly with complex station gains to snapshot visibilities, then extract estimates of the time-averaged, persistent source structure and temporal variability by stacking snapshots in a Bayesian hierarchical model. This approach successfully reproduces parameters of general relativistic magnetohydrodynamic simulations using synthetic EHT observations. Even with physically motivated assumptions about the Sgr A* environment, black hole spin and magnetic field parameters are poorly constrained by 2017 EHT observations. Our inference constrains other parameters, favoring a nearly face-on observer inclination ($\theta_o = 9.2^\circ \pm 3.6^\circ \pm_v 11.6^\circ$), an emission peak near the horizon ($R_{\text{peak}} = 4.9 \pm 0.1 \pm_v 0.5 GM/c^2$), near-northern projected spin position angle ($p.a. = 7.3^\circ \pm 7.08^\circ \pm_v 43.5^\circ$ counterclockwise from vertical), and dominant emission $43.4^\circ \pm 2.0^\circ \pm_v 5.9^\circ$ above the equatorial plane, where we separate average structure uncertainty ($\pm$) from the impacts of temporal variability and model misspecification ($\pm_v$).

Did you give a contributed talk at CASCA 2026?

No

If you are selected for a poster, would you be interested in giving a short flash talk on your work?

Yes

What is your career level?

MSc

Which keyword describes the area of focus of this talk?

Black holes

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Session Classification : Black holes & Instrumentation