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Discriminating Accretion States via Rotational Symmetry in Simulated Polarimetric Images of M87[1] DANIEL PALUMBO, Center for Astrophysics — Harvard Smithsonian, GEORGE WONG, BENJAMIN PRATHER, University of Illinois — Polarized images of black holes have the potential to convey information about magnetic field morphology on event horizon scales. We describe a modal decomposition of linear polarized images into basis functions with varying polarization around a ring. We apply this decomposition to analyze ray traced images of general relativistic magnetohydrodynamics simulations of the Messier 87* (M87*) accretion flow. We show that the dimensionless Fourier coefficient associated with rotational symmetry, β_2, is a strong discriminator between accretion states for models of M87* that are consistent with the total intensity images produced by the Event Horizon Telescope (EHT). For simulated images viewed at the resolution of the EHT, we find that $|\beta_2|$ is greater than 0.2 only for models with dynamically important magnetic fields in the accretion flow. We also find that higher black hole spins produce increasingly radial polarization patterns.

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