Exploring Strong Gravity in the Galactic Center

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The Galactic center black hole, Sgr A*, provides a remarkable opportunity to study strong gravity using either orbiting stars or accreting gas. Very long baseline interferometry observations at millimeter wavelengths are now spatially resolving gas emission from event horizon scales around Sgr A*, and near-infrared astrometry with the VLTI instrument GRAVITY will achieve similar resolution in the next few years. I will discuss the construction of relativistic emission models from numerical simulations of black hole accretion flows and jets, what we've learned from their comparison with current data, and the prospects for detecting signatures of strong gravity (e.g., the black hole "shadow") in future observations. I will also argue that the recent discovery of a rare magnetar outburst near Sgr A* implies the presence of an unusual pulsar population in the Galactic center, and assess the prospects for studying strong gravity with stellar orbits.