

Plenary Talk

TOWARDS IMAGING THE EVENT HORIZON IN THE GALACTIC CENTER

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Gravity is successfully described by Einstein's theory of general relativity, governing the structure of our entire universe. Yet gravity remains the least understood of all forces in nature, e.g., resisting unification with quantum physics. One of the most fundamental predictions of general relativity are black holes. Their defining feature is the event horizon, the surface that even light cannot escape and where time and space exchange their nature. So, does general relativity really hold in its most extreme limit? Do BHs exist or are alternatives needed? Gravitational waves are now probing the merger of two black holes, providing some tests of GR. Another approach would be to directly image the event horizon of black holes. The best place to do this is in the center of our own Milky Way. Here a massive and compact radio source, Sgr A*, provides by the far the best case for a supermassive black hole. Very long baseline radio observations are now probing the smallest scales of this source, making it soon possible to image the shadow of the event horizon of a black hole for the very first time. Moreover, with the help of advanced numerical general relativistic magneto-hydrodynamic simulations emission and appearance of the source can be successfully modeled almost from first principles. The comparison of detailed simulations, VLBI images as well as measurements of the gravitational potential with stars and perhaps also pulsars, makes the Galactic center a promising laboratory for probing black hole astrophysics and general relativity.