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Determining black-hole's parameters from the shape of shadow

It is interesting to know whether or not we can determine black-hole's parameters such as the mass, spin, inclination angle, and distance only from the information of black-hole's shadow. In this work, assuming a non-spinning black hole, i.e., a Schwarzschild black hole, with an infinitely thin accretion disc for simplicity, we show that the system's parameters such as the angular gravitational radius GM/c^2r, where M is the black-hole mass and r is the distance between the black hole and observer, and the inclination angle can be determined only from the shadow's shape in principle. The crucial point of our analysis is to take into account the finiteness of the distance between the black hole and observer. We indicate that additional information such as the flux and accretion rate makes it possible to determine the mass, distance, and inclination angle without degeneracy.

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