

Spin and mass of the nearest supermassive black hole

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Abstract

A new method for exact determination of the masses and spins of accreting black holes from the observations of quasi-periodic oscillations is described. The detected signal from the hot spots in the accretion plasma must contain modulations with two characteristic frequencies: the frequency of rotation of the black hole event horizon and the frequency of the latitudinal precession of the spot orbits at the most bright inner edge of the accretion disk. The weak accretion activity of the dormant quasar Sgr A* at the galactic center occasionally shows up as quasi periodic X-rays and near-IR oscillations with the mean periods of 11 and 19 min. These oscillations can be interpreted as related to the rotation frequency of the Sgr A* event horizon and to the latitude oscillations of hot plasma spots in the accretion disk. Both these frequencies depend only on the black hole gravitational field and not on the accretion model. Using this interpretation it yields the most exact values for both the mass M and the spin a (Kerr rotation parameter) of the Sgr A*: $M=(4.2\pm 0.2)10^6M_{\odot}$ and $a=0.65\pm 0.05$.

Biography

Vyacheslav I Dokuchaev has completed his PhD from Moscow Institute of Physics and Technology and Post-doctoral studies from Lebedev Physical Institute at Moscow. He is the Leading Researcher at the Institute for Nuclear Research of the Russian Academy of Sciences. He has published more than 150 papers in reputed journals.

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