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Relativistic effects on the orbits of the closest stars to the black hole at the center of the Galaxy

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In this presentation, we investigate the detection of the spin and quadrupole moment of the black hole at the center of the galaxy called Sgr A. *These parameters affect the astrometric and spectroscopic observations of stars in the close vicinity of the black hole (S stars). Here, we consider putative stars that are closer to Sgr A*, and thus much more affected by the spin effects. Such stars might exist if they are too faint to have been already detected by GRAVITY. It is possible that either future observations of this instrument, or of its update GRAVITY+ that is under development, might detect such faint inner stars. In order to reach our objectives, we use different relativistic models in order to generate the orbit of S stars and analyze how they can be affected by the spin and quadrupole moment of Sgr A*. This, allows us to study the detectability of these quantities enabling us to test the no-hair theorem and thus general relativity.

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