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S-stars & G-stars orbiting a fermionic dark matter core

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The observations of the so-called S-stars together with the dust-enshrouded objects, the G-stars, can help to further corroborate Einstein's General Relativity theory and to better constrain the nature of the supermassive black hole (SMBH) candidate, SgrA. *In recent years, a novel dark matter (DM) model for galaxy haloes has been developed, the Ruffini-Argüelles-Rueda (RAR) model. It consists of self-gravitating fermions in hydrostatic and thermodynamic equilibrium, that develop a dense and degenerate core which is the central region of a continuous distribution of a more extended DM halo. In the case of the Milky way, for particle masses in the range 56–390 keV/c^2, the core can successfully explain the dynamics of the S-stars, leading to an alternative interpretation of Sgr A* to that of a Supermassive Black Hole (BH). Simultaneously, the extended halo agrees with the galaxy rotation curve data. In this talk we show how well such DM solutions can explain the astrometric data of the G-stars and S-stars, and compare with the BH paradigm. For the parameter space exploration of the different models, we use a Markov Chain Monte Carlo (MCMC) sampler and then perform a quantitative comparison via Bayes factors.

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