

Bounds on graviton mass from astrometric data of S-stars

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Here we use a Yukawa-like correction of the Newtonian gravitational potential, proposed by C. Will (see Ref. Jovanović et al. 2024a) in order to obtain new bounds on graviton mass from the observed orbits of S-stars around Sgr A*. We assumed that the orbital precession of these stars is close to the prediction of General Relativity (see the results of GRAVITY Collaboration in 2020 and 2022) for Schwarzschild precession, but with a possible small discrepancy from it. By comparison of the observed orbits of bright stars (Gillessen et al. 2017) in the Galactic center with their simulated orbits in Yukawa-like gravitational potential, we estimated the constraints on the parameters of this modified theory of gravity. With this approach, we were able to constrain the parameter λ of the potential. Moreover, assuming that λ represents the graviton Compton wavelength, we also found the corresponding upper bound of graviton mass. The obtained results were then compared with our previous estimates (Jovanović et al. 2023, Jovanović et al. 2024b), as well as with the estimates of other authors. Also, obtained results are in a good agreement with the corresponding LIGO results.

References

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