

TWO ALTERNATIVES FOR A GALACTIC CENTER MODEL: RAR–DARK MATTER VS SUPERMASSIVE BLACK HOLE

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Choosing suitable models for galactic centers is an extremely important astrophysical task. The Galactic Center is the closest object for astronomers for which a large amount of observational data has been obtained. Observations of the trajectories of bright stars in the vicinity of the Galactic Center have shown that there is a compact distribution of matter, which is interpreted as a supermassive black hole with a mass of the order of $M = 4.3 \times 10^6 M_{\odot}$. In 2015, Ruffini, Argüelles, Rueda (RAR) proposed a model for the distribution of dark matter with a dense core and a diluted halo, while in the Galactic Center there is not a supermassive black hole, but a core of dark matter with constant density. In 2020 – 2021, claims were made that the RAR model could better fit the trajectories of bright stars than the traditional model involving a supermassive black hole. The RAR-model was actively promoted instead of the supermassive black hole at the Galactic Center. In our work, we showed that the trajectories of stars considered in the framework of the RAR model are elliptical, but the properties of these trajectories are different from those observed and the traditional model of the Galactic Center, which includes the supermassive black hole, is preferable.

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1. A. F. Zakharov, // Mon. Not. R. Astron. Soc. Lett. (in press); DOI:10.1093/mnrasl/slab111 arXiv:2108.09709.