

Constraining the dark matter density profile and the fifth force with the orbits of stars in the Galactic Center

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A dense and luminous star cluster exists in the central parsecs of the Milky Way. S2 is one of the most interesting targets whose pericenter is about $\sim 5 \times 10^{-3}$ pc from the supermassive black hole. Recently both the GRAVITY and Keck groups have published their observations on the S2 star around its closest approach, which provides us a good chance to probe the properties of dark matter (DM) around the Galactic center. In this presentation, we introduce our preliminary studies on two kinds of DM models using the orbital motions of S stars in the Galactic center. The first one is the density spike of a general DM scenario, and the other is the coupling between the standard model particles and the hypothetical bosonic DM.

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