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Dark energy interactions near the Galactic Center

We investigate scalar-tensor theories, motivated by dark energy models, in the strong gravity regime around the black hole at the center of our galaxy. In such theories general relativity is modified since the scalar field couples to matter. We consider the most general conformal and disformal couplings of the scalar field to matter to study the orbital behavior of the nearby stars around the galactic star center SgrA$*$. Markov chain Monte Carlo simulation yields a bound on the parameters of the couplings of the scalar field to matter. Using Bayesian analysis yields the first constraints on such theories in the strong gravity regime.

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