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Testing Gravity with pulsars at the Galactic Center

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To date, the most precise tests of General Relativity have been achieved through pulsar timing, albeit in the weak-field regime. Since pulsars are some of the most precise and stable “clocks” in the Universe, present observational efforts are focused on detecting pulsars in the vicinity of supermassive black holes (most notably in the Galactic Centre), enabling pulsar timing to be used as an extremely precise probe of strong-gravity regime.

In this work, test-particle dynamics is described in general black-hole spacetimes and used to study binary systems comprising a pulsar orbiting a black hole. It is shown that, by adopting a fully general-relativistic description of test-particle motion, independent of any particular theory of gravity, observations of pulsars give reliable constraints on alternative theories of gravity.

Summary

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