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Constraining modified gravity with quantum optomechanics

Monday, 5 July 2021 18:00 (30 minutes)

In this talk, I will present some recent results on estimating the performance of quantum optomechanical sensors for searches of modified gravity. Specifically, I will show how we derive the best possible bounds that can be placed on Yukawa- and chameleon-like modifications to the Newtonian gravitational potential with a cavity optomechanical quantum sensor. We do so by modelling the effects from an oscillating spherical source on the optomechanical system from first-principles. To then estimate the sensitivity to chameleon-like modifications, we take into account the size of the optomechanical probe and quantify the resulting screening effect for the case when both the source and probe are spherical. Our results show that an optomechanical system in high vacuum could, in principle, further constrain the parameters of chameleon-like modifications to Newtonian gravity.

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