

# Quantum-enhanced screened scalar field detection

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Screened scalar field models arise naturally from low energy limits of many models beyond General Relativity and the Standard Model, including string theory and Higgs portal “hidden sector” dark energy models. A screening mechanism alters the properties of the scalar field (such as effective mass or matter coupling strength) near matter, and thus matches experimental data both at the solar system scale and cosmological scales. Some of the best bounds on these models currently come from atom interferometry experiments. We propose an experiment to use a Bose-Einstein condensate phononic interferometer to improve these bounds and potentially entirely eliminate the simplest screening models. These improvements stem from quantum metrology techniques, which we may take advantage of since the quantum state of a Bose-Einstein condensate can be experimentally measured and controlled. These improvements are achievable within current experimental capabilities.