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Atom interferometry provides a powerful tool to probe fundamental physics due to its incredible sensitivity to changes in local gravitational potential and atomic transition energies. New compact atom interferometry experiments such as AION-10 hope to constrain the presence of small oscillating signals from scalar ultra-light dark matter and other new physics by taking measurements over a long integration time. However, the sensitivity of this class of quantum sensors means that backgrounds from sources of nearby mass need to be considered carefully to ensure the success of the experiment. This poster will detail work we have done to calculate the simulated phase response of a differential atom interferometer taking measurements in a busy environment and how the backgrounds from local moving masses contribute to the spectral features of the signal. We also demonstrate a rudimentary method for mitigating these backgrounds by masking the noise to recover the characteristic features of an oscillating signal in the frequency domain.

Poster Abstract

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