

## 2nd Terrestrial Very-Long-Baseline Atom Interferometry Workshop



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Atom interferometers are powerful new tools for probing many aspects of fundamental physics including searches for gravitational waves and dark matter. The construction of several long-baseline terrestrial atom interferometer experiments is underway and thus fully characterising the noise these experiments are subject to is of paramount importance. Gravity gradient noise (GGN) from seismic waves has long been known as a leading source of noise for long-baseline laser interferometer experiments such as LIGO. In general, this noise scales inversely with frequency also making it a challenge for atom interferometer experiments which operate at lower frequencies. Recent studies of GGN for atom interferometers have primarily focussed on seismic effects; however, atmospheric density perturbations from temperature and pressure fluctuations will also be a significant source of noise. In this work we characterise the spectrum of atmospheric pressure and temperature GGN, building on previous investigations for laser interferometry and generalising the results to low frequency, vertical atom interferometer experiments. We evaluate how this noise depends on an experiment's location on the Earth's surface and estimate a high and low noise model for atmospheric GGN to complement the existing Peterson models for seismic effects.

**Session Classification:** Poster Session & Wine & Coffee