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Michael Werner

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Atom interferometers (IFs) are highly accurate sensors of gravitational fields and their gradients, and are increasingly important for applications in industry and geodesy. Asenbaum et al. [2017] have investigated the 'tidal phase' that arises in a Mach-Zehnder interferometer (MZI) from the interplay of the gravitational gradient and atomic recoil. The tidal phase was extracted in a differential measurement with and without a test mass lead block causing the gravitational gradient. Since then, the tidal phase has attracted growing attention for its potential to measure spacetime curvature and to observe the 'gravitational Aharonov-Bohm effect', cf. Overstreet et al. We present a novel interferometer scheme that provides the tidal phase – due to the Earth or any additional test mass – as the dominant phase contribution, without the need to perform differential measurements with and without a test mass. Competing finite speed of light (FSL) phase shifts can be mitigated by appropriate adjustment of the final IF pulse.

Session Classification: Poster Session & Wine & Coffee