

General Relativity and Quantum Cosmology

Sources and technology for an atomic gravitational wave interferometric sensor

Michael Hohensee, Shau-Yu Lan, Rachel Houtz, Cheong Chan, Brian Estey, Geena Kim, Pei-Chen Kuan, Holger Mueller

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We study the use of atom interferometers as detectors for gravitational waves in the mHz - Hz frequency band, which is complementary to planned optical interferometers, such as LIGO and LISA. We describe an optimized atomic gravitational wave interferometric sensor (AGIS), whose sensitivity is proportional to the baseline length to power of $5/2$, as opposed to the linear scaling of a more conservative design. Technical challenges are briefly discussed, as is a table-top demonstrator AGIS that is presently under construction at Berkeley. We study a range of potential sources of gravitational waves visible to AGIS, including galactic and extra-galactic binaries. AGIS should be capable of detecting type Ia supernovae precursors within 1 kpc, up to 200 years beforehand. An optimized detector may be capable of detecting waves from RX J0806.3+1527.

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