Large scale atom interferometry with the MIGA gravity antenna

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Currently, several gravitational waves (GWs) are detected by optical GW interferometers (such as LIGO, VIRGO) which have a bandwidth of 10Hz to 10kHz. To address the low-frequency sensitivity gap of optical GW interferometers, we introduce the **M**atter-wave laser **I**nterferometry **G**ravitation **A**ntenna (MIGA) project[1,2]. MIGA will enhance our understanding of the evolution of the gravitational field and provide a novel tool for sub-Hz GW detection. Utilizing matter-wave interferometry, MIGA can measure the phase variation of the interrogation laser imprinted on the atomic phase. Presently, MIGA I (with an 80 cm chamber) and MIGA II (with a 6.5 m chamber) serve as test benches. The MIGA setup at LSBB, including a chamber 150 m long, will be completed soon to be as a test bench in the future GW measurement.

With MIGA I, we successfully loaded and launched atoms at temperatures of a few μK and achieved Bragg transitions in a marginally stable resonator with n=4 momentum transfer[3].

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