Abstract Submitted
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Twin-lattice interferometry for infrasound gravitational wave detection with atoms[1] SVEN ABEND, Institut fuer Quantenoptik, Leibniz Universitaet Hannover, MARTINA GEBBE, Zarm, Universitaet Bremen, MATTHIAS GERSEMANN, CHRISTIAN SCHUBERT, ERNST M. RASEL, Institut fuer Quantenoptik, Leibniz Universitaet Hannover, QUANTUS COLLABORATION — Atom interferometry offers an interesting perspective for the detection of gravitational waves in a frequency band between eLISA and Advanced LIGO. We investigate a novel geometry for a ground-based device combining several a horizontal baseline with a single axis laser link between the atom interferometers, and suppressing errors sources otherwise implying very strict requirements onto the atomic source. It is based on recent developments in symmetric beam splitters with scalable momentum transfer in a twin-lattice, a lattice of two frequencies retro-reflected at a mirror. Combining Bloch oscillations and double Bragg diffraction we developed a novel coherent relaunch technique where atoms are coherently relaunched on a parabolic trajectory in a single laser beam. Based on symmetric and scalable momentum transfer in the twin-lattice, interferometry with a momentum separation of up to 408 photon momenta is demonstrated, which is to our best knowledge the largest in an interferometer reported to date. Achieving these large momentum splittings is one of the cornerstones to reach the necessary sensitivities of gravitational wave detector.

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