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Symmetric large momentum transfer for atom interferometry with BECs[1] SVEN ABEND, Institut fuer Quantenoptik, Leibniz Uni Hannover, MARTINA GEBBE, ZARM, Uni Bremen, MATTHIAS GERSEMANN, ERNST M. RASEL, Institut fuer Quantenoptik, Leibniz Uni Hannover, QUANTUS COLLABORATION — We develop and demonstrate a novel scheme for a symmetric large momentum transfer beam splitter for interferometry with Bose-Einstein condensates. Large momentum transfer beam splitters are a key technique to enhance the scaling factor and sensitivity of an atom interferometer and to create largely delocalized superposition states. To realize the beam splitter, double Bragg diffraction is used to create a superposition of two symmetric momentum states. Afterwards both momentum states are loaded into a retro-reflected optical lattice and accelerated by Bloch oscillations on opposite directions, keeping the initial symmetry. The favorable scaling behavior of this symmetric acceleration, allows to transfer more than 1000 $\hbar k$ of total differential splitting in a single acceleration sequence of 6 ms duration while we still maintain a fraction of approx. 25% of the initial atom number. As a proof of the coherence of this beam splitter, contrast in a closed Mach-Zehnder atom interferometer has been observed with up to 208 $\hbar k$ of momentum separation, which equals a differential wave-packet velocity of approx. 1.1 m/s for ^{87}Rb.

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