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Trapped delta-kick collimation in painted optical potentials[1] HENNING ALBERS, ALEXANDER HERBST, ASHWIN RAJAGOPALAN, WOLFGANG ERTMER, ERNST MARIA RASEL, DENNIS SCHLIPPERT, Leibniz University Hannover, Institute of Quantum Optics, THE PRIMUS COLLABORATION
— Atom interferometers precision depends on the center-of-mass motion and the expansion rate of the atomic ensemble. By reducing the latter, systematic effects, e.g. through wavefront aberration, can be lowered. In our setup we utilize a dynamic time averaged optical dipole trap, generated by spatial modulation of the trapping beams in the horizontal plane. Via evaporation we produce Bose-Einstein condensates (BEC) of 2×10^5 condensed atoms with an effective temperature of about 30nK after 3s. Subsequently we carry out delta-kick collimation (DKC), performed in a trapped scheme. Contrary to pulsed DKC, we relax the trap confinement and release the atoms from the final trap at the minimum of their kinetic expansion. DKC can be performed at any stage of evaporative cooling, thus short-cutting the generation of ultra-cold radial expansion temperatures. In this talk we will show the results of fast BEC production and discuss the DKC results as well as limitations and the perspective of generating up to 10^6 delta-kicked condensed atoms within 1s.

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Henning Albers
Leibniz University Hannover, Institute of Quantum Optics

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