

Long Distance Transport of Ultracold Atoms using a 1D optical lattice

We demonstrate horizontal transport of a Bose-Einstein condensate / ultracold atoms over macroscopic distances of up to 20cm with a moving 1D optical lattice. By using an optical Bessel beam to form the optical lattice we can achieve almost homogeneous trapping conditions over the full transport length. Fast transport velocities of up to 6 m/s (corresponding to about 1000 photon recoils) and accelerations of up to 2600 m/s^2 are reached. The precisely defined momentum of the atoms with an uncertainty of less than 1 photon recoil allows us to construct an atom catapult which might have applications for novel collision experiments.