Bichromatic Collimation to Make an Intense Helium Beam

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- Bichromatic force overcomes limits of normal monochromatic radiative force by coherent control of the momentum exchange between atoms and light field.

- Large force magnitude and velocity range yield short interaction lengths allowing simple and compact source design.

- A single diode laser is used to derive four bichromatic interaction regions and an additional optical molasses.

- Collection of atoms with transverse velocities up to +/- 87 m/s (50 times greater than regular optical molasses)

- Collimation results in an increase by factor of ~4000 in the brightness of the source.

- Future plans for source: neutral atom lithography

figures: "Optical molasses-like" force resulting from two bichromatic pushes (top) 3D visualization of atomic flux distribution after collimation (bottom)