An ultra-high Brightness Matter Wave Laser

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I will present a novel, ultra-bright atom-laser and ultra-cold thermal atom beam. Using rf-radiation we strongly couple the magnetic hyperfine levels of Rubidium atoms in a trapped Bose-Einstein condensate. The resulting time-dependent adiabatic potentials forms a trap, which at low rf-frequencies opens up just below the condensate and thus allows an extremely bright well-collimated atom laser to emerge. As opposed to traditional atom lasers based on weak coupling of the magnetic hyperfine levels, this technique allows us to outcouple atoms at an arbitrarily large rate. We achieve a flux of $4x10^7$ atoms per second, a seven fold increase compared to the brightest atom lasers to date. Furthermore, we demonstrate by two orders of magnitude the coldest thermal atom beam (200 nK).