# Research Highlights

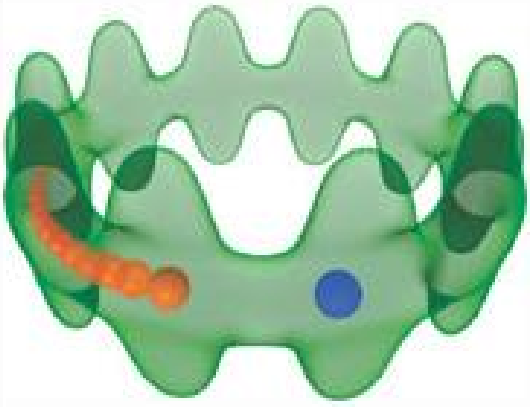
*Nature Photonics* **3**, 426 - 427 (2009)
doi:10.1038/nphoton.2009.120

# Our choice from the recent literature

**Optical lattices**

**Quantum motors**

*Phys. Rev. Lett.* **102**, 230601 (2009)





Alexey Ponomarev and co-workers in Germany have devised a new type of engine that works as an AC-driven quantum motor. It is made from two ultracold atoms that are trapped in a ring-shaped lattice by laser light. Although much is known about motors that rely on classical physics, much less is known about ones that are fully quantum mechanical. It turns out that the dynamics of ultracold atoms positioned in optical potentials are ideal for driving a quantum motor. Ponomarev *et al.* use laser light to form a 100-μm-wide ring-shaped optical potential that holds two interacting atoms — the 'carrier' and the 'starter' — in place. Both atoms are submerged in a pulsating magnetic field. Although the carrier atom carries a current as a result of the field, the starter atom remains unaffected, but provides a 'kick' to the carrier atom to set it in motion. The engine can, under certain conditions, be used to 'drive' a load. Ponomarev and co-workers suggest that if lithium atoms are used with an optical lattice spacing of ~10 μm, then the driving frequency should be less than 2 Hz. In such a case they predict that the motor could be started in approximately 1 minute. However, they say that this could be potentially reduced to around 10 s by further focusing of the laser beam, thus reducing the lattice spacing.