Invited talk

How one, two and many atoms scatter light

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Scattering of light is one of the most elementary processes for atoms and is discussed in many textbooks. We have performed several light scattering experiments which reveal fundamental quantum aspects. At ultralow temperatures, light scattering is suppressed or enhanced by Pauli blocking and bosonic stimulation, respectively. Light scattering can distinguish a superfluid from a Mott insulator. We have experimentally investigated whether light is coherent and incoherent when scattered by single atoms. For two atoms confined to less than 50 nm, we have observed a novel stimulated dipole-dipole interaction, and large momentum transfers exceeding ten photon recoil when single photons are emitted.