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Center of Mass Momentum Dependent Interaction Between Ultracold Atoms. JIANWEN JIE, PENG ZHANG, Renmin University of China — We show that a new type of two-body interaction, which depends on the momentum of the center of mass (CoM) of these two particles, can be realized in ultracold atom gases with a laser-modulated magnetic Feshbach resonance (MFR). Here the MFR is modulated by two laser beams propagating along different directions, which can induce Raman transition between two-body bound states. The Doppler effect causes the two-atom scattering length to be strongly dependent on the CoM momentum of these two atoms. As a result, the effective two-atom interaction is CoM-momentum dependent, while the one-atom free Hamiltonian is still the simple kinetic energy.

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