

武汉物数所理论交叉学术交流系列报告

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Center of Mass Momentum Dependent Interaction Between Ultracold Atoms

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About the speaker :

Peng Zhang received his PhD at the ITP, CAS in 2005, and then did postdoctoral research at the Georgia Institute of Technology and ERATO project at the University of Tokyo in Japan. From 2010 until now he works as a full professor at the Renmin University of China. He was awarded the "Excellent Youth" title. He also received an Excellent-Lecturer Award from this university. His research interest is mainly on few-body problems in ultracold gases and quantum optics.



Abstract:

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 $p^2/(2m)$.

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