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Interaction of ultracold atoms with walls and nanostructures

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Abstract

The description of low-energy scattering processes involving atoms, molecules, and Bose-Einstein condensates has become a topic of considerable interest. One important effect observed in recent experiments is quantum reflection, which refers to the reflection of particles by attractive long-range potentials in nonclassical regions of coordinate space without reaching a classical turning point. The probability of quantum reflection tends to unity at threshold, therefore, it is always important in the interaction of ultracold atoms with surfaces and nanostructures. We discuss the possibility of exploiting such effect to probe atom-surface potentials or to trap atoms without the help of auxiliary fields.

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