Cold atom scattering by cavity fields in a two-dimensional geometry

John Martin, Thierry Bastin

(Submitted on 1 Feb 2010)

The quantum theory of the cold atom scattering by cavity fields in a two-dimensional geometry is presented. A distinct regime from the usual Raman-Nath, Bragg and Stern-Gerlach regimes i investigated, considering the situation where the cavity light field acts as a repulsive and an attractive two-dimensional potential. General expressions for the scattering lengths (the two-dimensional analogues to the three-dimensional scattering cross-sections) of finding the atoms deexcited or not after their interaction with the cavity are derived. The connection with the classical Rabi limit when the incident atomic kinetic energy is high compared with the atom-field interaction energy is made. In the cold atom regime characterized by much lower incident atom kinetic energies, the scattering process exhibits very peculiar properties in connection with quasibound states of the atomic motion induced by the attractive potential of the cavity light field.

Comments: 9 pages, 9 figures
Subjects: **Quantum Physics (quant-ph)**; Quantum Gases (cond-mat.quant-gas)
Cite as: **arXiv:1002.0257v1 [quant-ph]**

Submission history

From: John Martin [view email]
[v1] Mon, 1 Feb 2010 14:24:47 GMT (802kb)

Which authors of this paper are endorsers?