



School of Nano Science



IPM Condensed Matter &
Statistical Physics Group

Weekly Seminar

Optomechanical properties of ultracold atoms trapped inside the optical lattice of a cavity

Invited Speaker:

Dr. Ali Dalafi

Laser and Plasma Institute of Shahid Beheshti University

In this lecture, I investigate the interaction of light with an ultracold atomic ensemble in the regime where their quantum properties are manifested in the same level. Such an interaction is inherently nonlinear where the root of this nonlinearity is in the mutual matter-light interaction. On the other hand, if the density of the atomic ensemble is high enough, then another kind of nonlinearity manifests itself which is due to the atom-atom interaction. A Bose-Einstein condensate (BEC) trapped inside the optical lattice of a cavity is the best candidate for studying such effects. A BEC is an ensemble of identical bosons which are cooled down to very low temperatures (about nano Kelvin) and have been trapped inside a magneto-optical trap. It is shown that in the weak interaction regime, the BEC behaves as a single-mode quantum oscillator which interacts with the radiation pressure of the optical mode of the cavity. This so-called optomechanical interaction is one of the most important features of the optomechanical systems which are optical cavities with a moving end mirror or with a membrane in the middle.

Wednesday, 19 Mehr 1396 (October . 11, 2017), 14:00-15:00

Seminar Room (classroom A), Farmanieh Building, IPM