A novel Ioffe Pritchard magnetic trap for BEC in tuneable elongated traps

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Abstract

The experimental demonstration of Bose-Einstein condensation (BEC) is one of the most exciting developments of recent years and has allowed researchers to study quantum effects on the macroscopic scale with well controllable parameters. The current interest of this experiment is to study, for the first time, the time-evolution of the phase of individual BECs. We expect to observe phase decoherence induced by the inherent interaction of the BEC with its thermal cloud. For such an experiment, the number of atoms in the BEC becomes an important figure of merit, given that the decoherence of the phase will manifest itself clearest for large BECs and dense thermal clouds.

One of the major challenges in performing such an experiment is to design an adequate and easy-to-use magnetic trapping system with appropriate trapping parameter to maintain large number of atoms. The focus of this poster will be on a novel configuration Ioffe-Pritchard magnetic trap which is designed to perform such a task. This magnetic trap consists of four pairs of coils which create a cigar-shaped, three dimensional harmonic trap at low energies and a linear trap at higher energies. Also presented in this poster will be the various aspects of the proposed experimental setup which will enhance the number of atoms prior to being magnetically trapped. This will include a 2D MOT section which will be used as a source of cold atom to load a standard six beam MOT resulting in a large number of laser cooled atoms.

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