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Magneto-optical trap - First step towards BEC

Thursday, 14 July 2011 17:00 (2 hours)

<p>The experimental demonstration of Bose-Einstein Condensation (BEC) is one of the most exciting developments of recent years. It has enabled researchers to study a macroscopic quantum object with well controllable parameters. This has sparked a lasting flurry of experiments covering an enormous range of fields, which have made significant contributions to our understanding of atomic and molecular physics, precision metrology and future technologies in quantum optics and quantum information science. The success of these experiments has led to the award of several Nobel Prizes in recent years.

The first step in the construction of an experiment for realizing a Bose-Einstein condensation is obtaining an appropriate reservoir of cold atoms with sub-microKelvin temperatures. In our experiment, we cooled and trapped Rubidium atoms by using a combination of lasers and magnetic fields known as a magneto-optical trap (MOT) [2]. The MOT will be used as a reliable and robust source of cold atoms that will be cooled further to create a BEC. We report here on the construction of the MOT, in particular we describe the absorption saturation spectroscopy used for locking the lasers, the type of lasers used as well as the construction of the magnetic coils needed for generating the field used for spatial trapping of the atoms. We also describe the design and construction of the glass cell we used as the vacuum chamber and finally report on our main objective of realizing a BEC through evaporative cooling.

Level (Hons, MSc,
   PhD, other)?

PhD

Consider for a student
   award (Yes / No)?

Yes

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

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