
Contribution ID: **161** Type: **Oral Presentation**

# Novel Double MOT System for a BEC Experiment

*Thursday, 12 July 2012 11:00 (20 minutes)*

## Abstract content <br>   (Max 300 words)

The first demonstration of three-dimensional laser cooling and trapping of neutral atoms in the form of a magneto-optical trapping (MOT) was a major breakthrough in the advancement of experimetnal physics. These experimental techniques facilitated the routine production of a cold atomic sample, of various different atom species, in many laboratories around the world. This has also enabled further advancements in the creation of a Bose-Einstein Condensate (BEC). In order to create a large BEC, it is highly advantageous to create a double-MOT system. In such a configuration, the first MOT (usually a 2-D MOT) pre-cools atoms in a vacuum system where there is an adequate atomic background pressure (10-8 mbar). The atoms are then transported via differential pumping, to the second MOT (a 3-D MOT) where the atoms are recaptured in a vacuum system whose pressure is much lower (10-11 mbar). This allows a large number of cooled atoms as a starting point for a creation of the BEC.

Here we describe a novel magnetic coils design which generates a magnetic field suitable for a 2-D MOT. This coil design has the unprecedented advantage of being both compact and robust in a sytem that is typically much larger, while also outperfoming the standard techniques. The process of transferring precooled atoms from the 2-D MOT to the 3-D MOT will also be described in detail. In addition to this, the vacuum chamber, laser system, magnetic field production, necessary for such an experiment will also be described.

## Apply to be<br> consider for a student <br>   award (Yes / No)?

Yes

## Level for award<br> (Hons, MSc, <br>   PhD)?

PhD

## Main supervisor (name and email)<br>and his / her institution

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

Yes

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**Session Classification:** Photonics

**Track Classification:** Track C - Photonics