

Honours project for 2008

Two-component Bose condensate on an atom chip

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Atom chips, or microfabricated atom optical elements on a substrate, provide an excellent platform for the coherent manipulation of matter waves and in particular for the production and quantum control of Bose-Einstein condensates. The Swinburne atom chip uses a combination of miniature wires and a permanent magnetic film to integrate a number of elements into a single device. We routinely produce from one up to ten condensates on the chip, which opens numerous opportunities for studies of “giant matter waves”.

The aim of the project is the investigation of coherence properties of a Bose condensate. The project involves the production of a coherent superposition of two quantum states in the condensate using two-photon microwave/radiofrequency fields and studies of coherent evolution of the states in the running Atom Chip I setup. You will learn about quantum mechanics, laser physics and atomic physics through the direct involvement in the project that is placed at the forefront of Australian physics. The project is a part of the ARC Centre of Excellence for Quantum-Atom Optics and is very well equipped with top-performance lasers, a versatile computer control and a sophisticated imaging CCD system.