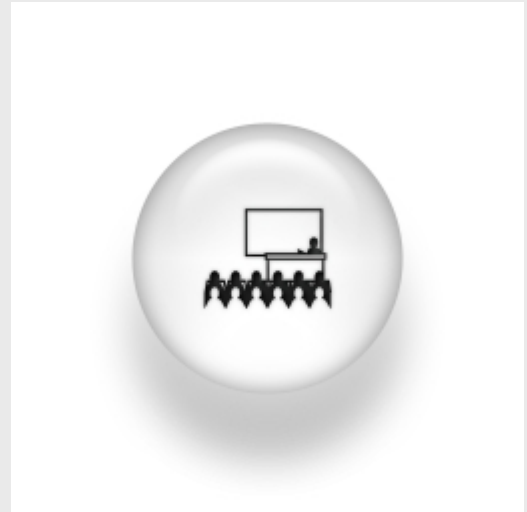


Tunable superfluids in ultracold atomic gases

Wednesday, 12 November 2008, 12:00-13.00



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Thanks to the recent experimental advances, ultra-cold atomic gases now provide the ultimate playground in which to realise and study a large variety of condensed matter phenomena. In particular, the ability to manipulate and control ultra-cold atomic gases provides a unique experimental system in which to explore pairing phenomena and superfluidity. Following the successful realisation of the crossover from the BCS state of Cooper pairs to the Bose Einstein condensation of diatomic molecules, attention has turned to the consideration of more exotic superfluids. A subject that has attracted particular theoretical and experimental interest is that of Fermi condensates with imbalanced spin populations, owing to the potential relevance of polarised Fermi condensates to QCD and magnetised superconductors. Even richer scenarios are expected for heteronuclear resonances in Bose-Fermi mixtures. I will discuss the work I have carried on both subjects and the relevance of our findings to recent experiments.