

IMS Public Lecture

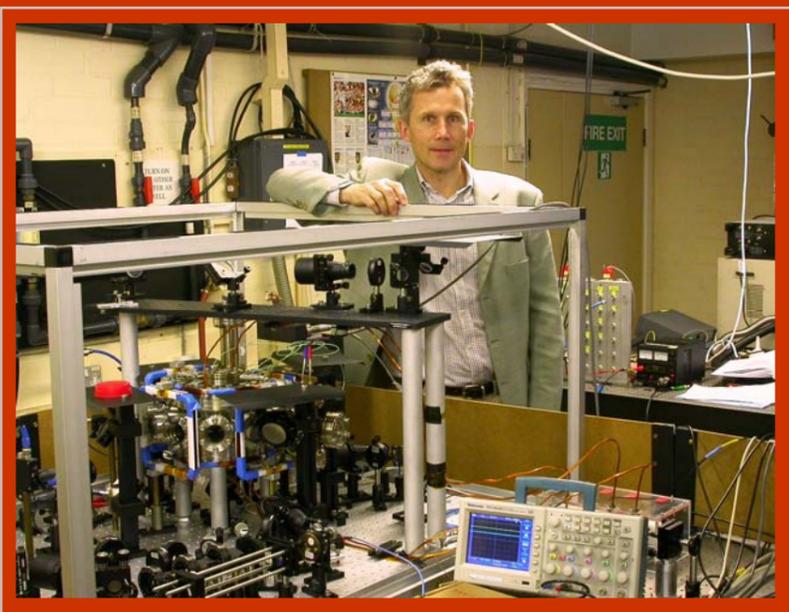
Quantum World of Ultra-Cold Atoms

Speaker: Professor Christopher Foot
University of Oxford, UK

Date: Tuesday, 13 November 2007

Time: 6:30pm - 7:30pm

Venue: LT31, Block S16,
Science Drive 1, Singapore 117543



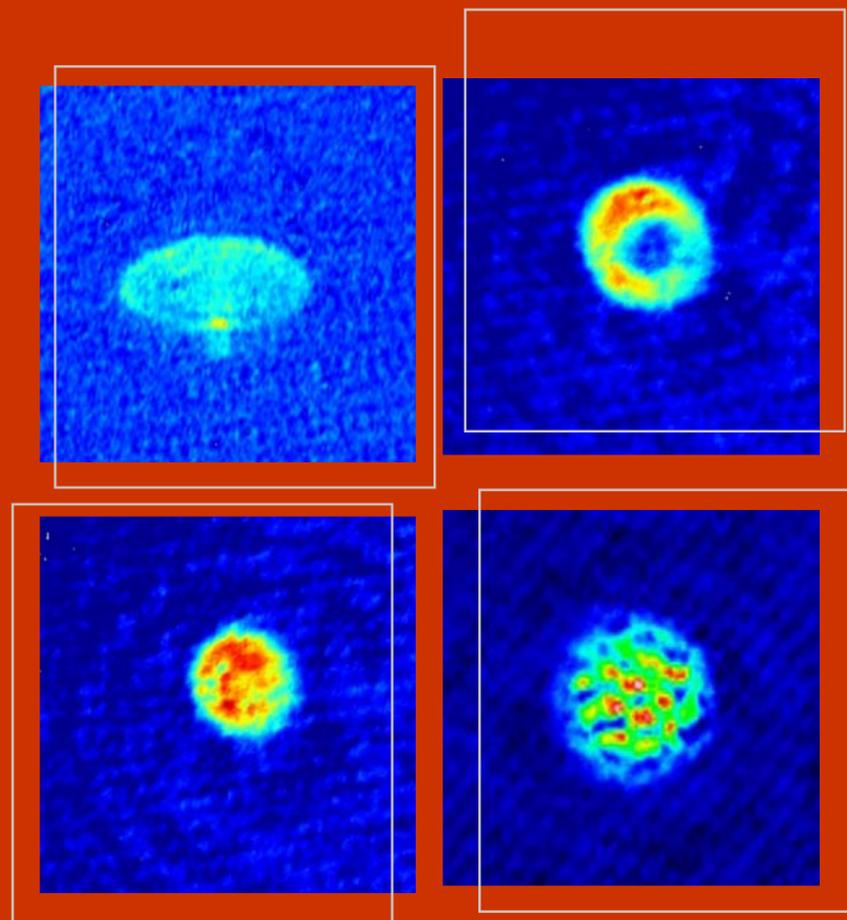
About the Speaker

After having begun his physics career with a first-class honours degree and doctorate from the University of Oxford, Professor Christopher Foot spent several years working at Stanford University, supported for part of that time by a Lindemann Trust Fellowship. He returned to the Oxford Physics Department and started research on laser cooling and trapping of atoms. Since 1991 he has been a tutorial fellow at St. Peter's College, Oxford. His current research interests include the study of the superfluid properties of ultra-cold atomic gases (Bose-Einstein condensates), and experiments on ultra-cold atoms held in arrays of optical traps formed by laser light to study the quantum properties of many-particle systems. Such atomic physics techniques give very precise control over the cold-atom systems so that they can be used to simulate phenomena that occur in condensed matter physics and, in the future, for quantum information processing.

Abstract

Nowadays it is possible to cool atoms to temperatures less than a millionth of a degree (microkelvin) above absolute zero and this enables us to study the many fascinating quantum mechanical properties of atomic systems at such extremely low temperatures. The lecture will describe the tremendous advances in physics that have made such experiments possible, and which led to the Nobel prizes in physics for the “development of methods to cool and trap atoms with laser light” in 1997, and for the “achievement of Bose-Einstein condensation in dilute gases of alkali atoms” in 2001. It seems counterintuitive that shining laser light on atoms cools them and this will be explained, together with the way that laser beams are used to hold the cold atoms at fixed positions in space and arrange them into regular patterns to construct ultra-cold quantum matter.

The concepts will be explained without mathematics in a manner suitable for a general audience.



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