

# Sommerfeld Theory Colloquium

Prof. Anthony J. Leggett

**University of Illinois at Urbana-Champaign, USA**

## **Superfluidity, phase coherence and the new Bose-condensed alkali**

The phenomenon of superfluidity was discovered in liquid helium nearly sixty years ago, and ever since, following the almost immediate suggestion of Fritz London, it has been the almost universal belief in the condensed-matter community that it is due to the onset of the phenomenon of Bose-Einstein condensation which is theoretically predicted to occur in that system at sufficiently low temperature. However, for various practical reasons, it is extremely difficult even to establish unambiguously that BEC is occurring in 4-He, let alone to test directly some of the ideas which connect it to superfluidity. The recent attainment of BEC in dilute atomic alkali gases opens a new arena in this respect, allowing us to do many experiments which we would have loved to do in 4-He but which are in practice unfeasible in that system. In this talk I first review briefly the fundamental ideas developed in the helium context, then give a general introduction to the physics of the BEC alkali gases, and finally discuss some of the novel possibilities they open up, both already realized and still on the drawing-board.

**Wednesday, 18<sup>th</sup> April 07, 09.15 h , Room 348 / 349, Theresienstr. 37 / III**