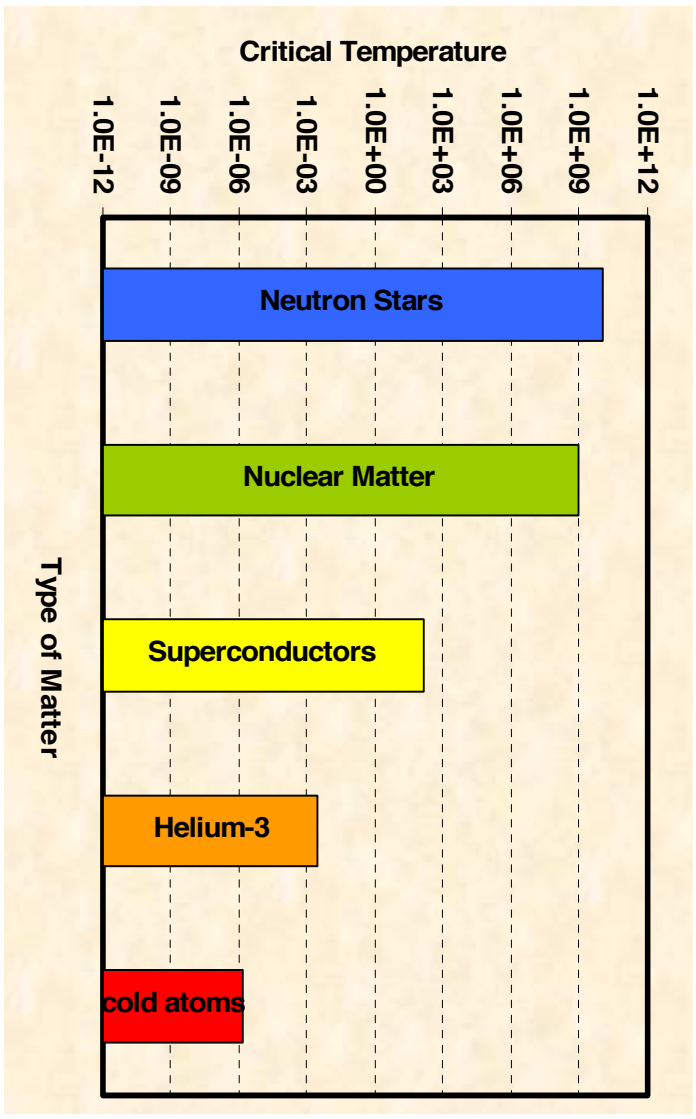
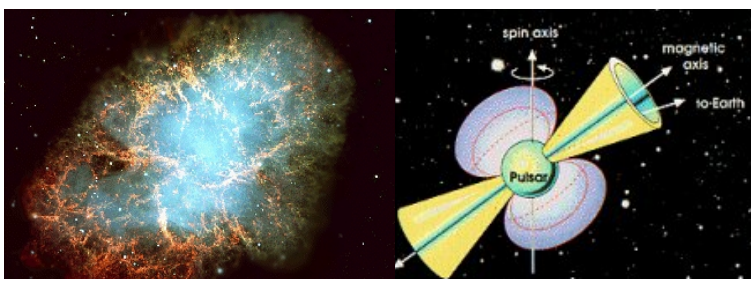
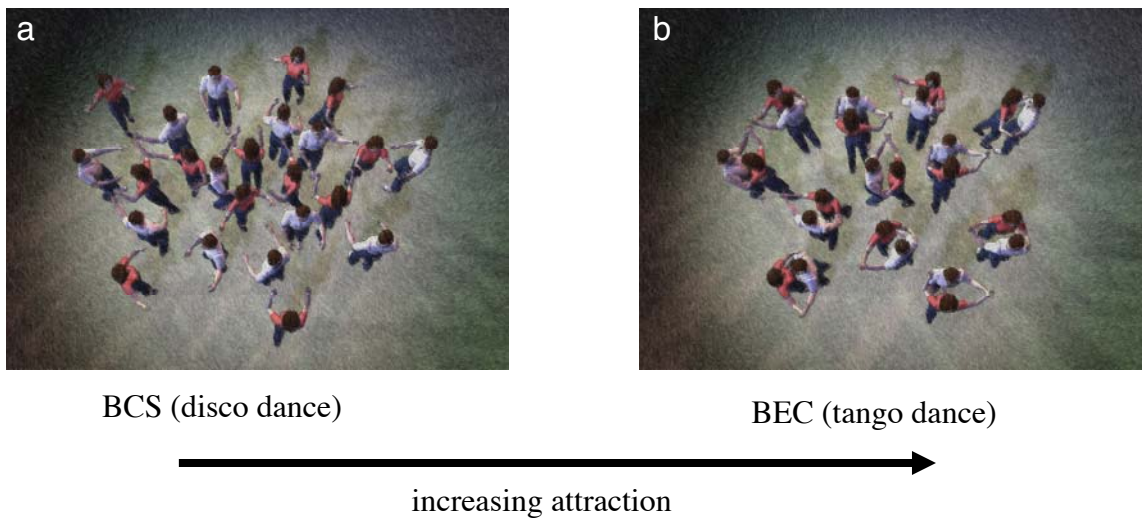
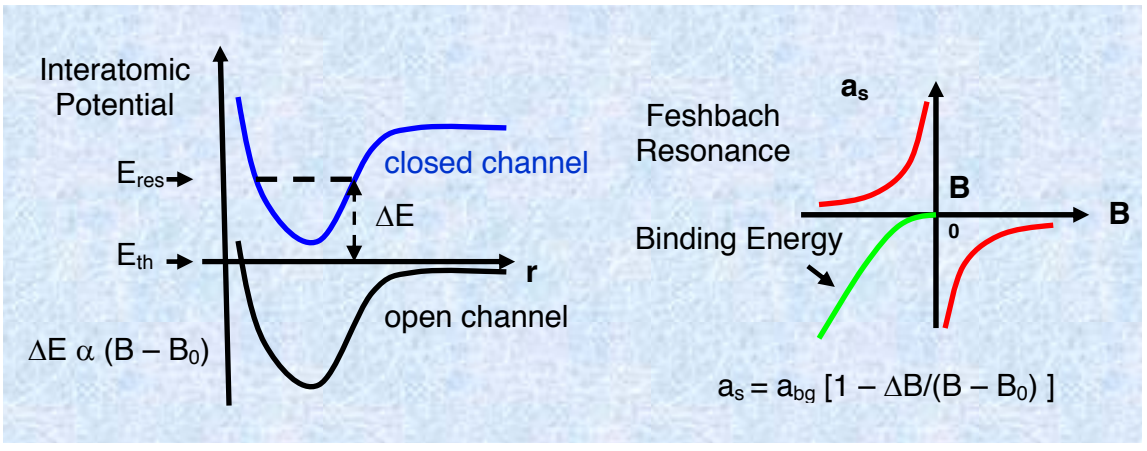
Boston University Physics Colloquium









The Evolution from BCS to Bose-Einstein Condensation: Superfluidity in Metals, Neutron Stars, Nuclei, and Ultra-Cold Atoms

Superfluidity is a very interesting phenomenon that has been found in metals, neutron stars, nuclei and more recently in ultra-cold atoms. For a given metal, neutron star, or nuclei there is essentially “zero” tunability of the particle density or interaction strength, and thus superfluid properties can not be controlled at the turn of a knob. However, in ultra-cold Fermi atoms the interaction strength and the particle density can be tuned to change qualitatively and quantitatively superfluid properties. This tunability allows for the study of the evolution from BCS (weak coupling) superfluidity of large Cooper pairs to Bose-Einstein condensation (strong coupling) superfluidity of tightly bound molecules. I will discuss the BCS to BEC evolution in s-wave and p-wave angular momentum channels, and will conclude that this evolution is just a crossover phenomenon for s-wave, while a quantum phase transition takes place for the p-wave case.

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Georgia Tech and Joint Quantum Institute University of Maryland/NIST

April 15, 2008 (Tuesday) at 3:30pm (Refreshments at 3:15pm)

SCI 107, Metcalf Science Center, Boston University

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Host: Antonio Castro Neto