



清华大学高等研究院

Institute for Advanced Study, Tsinghua University

物理学学术报告 Physics Seminars (biweekly)

Title: Energetics of three particles at a three-body resonance

Speaker: Shina Tan
(*Georgia Institute of Technology*)

Time: 4:00pm, Wednesday, Dec 30, 2015
(3:30~4:00pm, Tea, Coffee, and Cookie)

Venue: Conference Hall 322, Science Building, Tsinghua University

Abstract

Ultracold atoms, by definition, have tiny collision energies. It is then natural to develop a systematic perturbation theory in which the collision energy, rather than the interaction potential, is treated as a small parameter. One can expand the N-body wave function in powers of the energy. In this talk I will illustrate this general idea with the three-body system at a three-body resonance, where there is a three-body bound state with zero binding energy. The most important effective three-body parameter at such a resonance is a quantity which we call three-body effective range. If such a system is placed inside a LARGE cubic box with side length L , and the periodic boundary condition is imposed, one would expect a low energy state whose energy goes to zero faster than $1/L^2$ at large L . To our surprise, however, there seems to be TWO such low energy states. Their energies both scale like $1/L^3$. The theory discussed here is relevant to both ultracold atomic physics and low-energy nuclear physics.