清华大学高等研究院

Institute for Advanced Study, Tsinghua University

Informal Talk

Title: **Beyond the Gaussian fluctuation theory for two- and three-dimensional Fermi gases**

Speaker: **Hui Hu 胡辉**
Swinburne University

Time: **4:00pm, Monday, Dec 28, 2015**

Venue: **Conference Hall 322, Science Building, Tsinghua University**

Abstract

Strongly correlated Fermi systems play a fundamental role in many different areas of physics and are of great interest to the condensed matter community. Though weakly interacting fermions are understood, strongly-correlated systems are difficult to understand theoretically as there is no small interaction parameter to expand about.

In this work we expand upon previous results found from the ϵ-expansion theory, a systematic expansion around four and two spatial dimensions, developed by Nishida and Son. We find this expansion can be understood from the functional path-integral approach. In particular, the next-to-leading contribution (NLO) is captured by the well-known NSR Gaussian fluctuation term. This reformulation suggests that we may work out the higher order ϵ-expansion terms (next-to-next-to-leading order, NNLO) within the functional path-integral approach and extend beyond the Gaussian fluctuation term for two- and three-dimensional Fermi gases.

Our preliminary results for a unitary Fermi gas in three dimensions show a remarkable agreement with the recent measurement at MIT on equation of state (EoS) in the normal phase. We also compare theoretical predictions of a two-dimensional Fermi gas with the EoS measurement at Swinburne University.