



# 清华大学高等研究院

Institute for Advanced Study, Tsinghua University

## 物理学术报告 Physics Seminars (biweekly)

- Title:** Few-body and many-body physics in a resonantly interacting two-component Fermi system
- Speaker:** Shimpei Endo (遠藤晋平)  
*Laboratoire Kastler Brossel, Ecole Normale Supérieure*
- Time:** 4:00pm, Wednesday, September 23, 2015  
(3:30~4:00pm, Tea, Coffee, and Cookie)
- Venue:** Conference Hall 322, Science Building, Tsinghua University

### Abstract

Resonantly interacting Fermi system has attracted growing interests since its realization in ultracold atoms using the Feshbach resonance. One spectacular few-body phenomenon appearing at resonance is the Efimov states, an infinite number of 3-body bound states with discrete scale invariance. I first review 3-body physics in a two-component Fermi system, and show when 3-body bound states, such as the Efimov states, can appear. I then show how such few-body knowledge can give new insights into many-body physics in a two-component Fermi system. I first show that there exists a stable many-body ground state composed of trimers. This trimer many-body phase is found to be a three-component Fermi liquid with  $SU(3)$  symmetry. It is robust against recombination losses and can be realized in future cold atom experiments. Finally, I talk about our recent study on the virial expansion in the unitary Fermi gas.