



# 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:** Self-bound droplets of a dipolar Bose-Einstein condensate:  
stabilized by the Lee-Huang-Yang corrections
- Speaker:** Blair Blakie (*University of Otago, New Zealand*)
- Time:** 4:00pm, Monday, May 8, 2017  
(3:30~4:00pm, Tea, Coffee, and Cookie)
- Venue:** Conference Hall 322, Science Building, Tsinghua University

### Abstract

Recent experiments with Bose-Einstein condensates of dysprosium and erbium atoms have observed the formation of droplets that can preserve their form, even in the absence of any external confinement [1]. These droplets occur in the regime where the long-ranged dipole-dipole interaction between the atoms dominates over the short-ranged contact interaction. In this regime meanfield theory predicts that the condensate is unstable to collapse. However, as the collapse begins, and the density increases, the Lee-Huang-Yang corrections to meanfield energy [2] become important and stabilizes the system as a finite sized droplet. I will discuss our recent theoretical work predicting the existence and properties of self-bound droplets [3] and their excitations [4].

[1] M. Schmitt, M. Wenzel, F. Bottcher, I. Ferrier-Barbut, and T. Pfau, *Nature* 539, 259 (2016).

[2] T. D. Lee, K. Huang, and C. N. Yang, *Phys. Rev.* 106, 1135 (1957)

[3] D. Baillie, R. M. Wilson, R. N. Bisset, and P. B. Blakie, *Phys. Rev. A* 94, 021602(R) (2016).

[4] D. Baillie, R. M. Wilson, P. B. Blakie, arXiv:1703.07927