

清华大学  
Tsinghua University



清华大学高等研究院 - 冷原子物理系列讲座

# New Directions in Quantum Gas Experiments

地点: 高等研究院, 科学馆三楼322报告厅

报告人: Cheng Chin  
University of Chicago

## Lecture 1: Feshbach Resonances

8/13 Monday 10:00 a.m. - 12:00 a.m.

Feshbach resonance has emerged as a common tool to control atomic interactions. In typical experiments, one tunes the atomic scattering length with a magnetic Feshbach resonance to study the cross over from weak- to strong-interaction regimes. New applications have been uncovered in recent years to associate molecules, optically induce a resonance as well as to fast modulate atomic interactions. The fundamentals, applications and future of Feshbach resonances will be surveyed.

## Lecture 2: Floquet Quantum Systems: Inflation and Unruh Radiation

8/15 Wednesday 10:00 a.m. - 12:00 a.m.

What is the shortest cut to new quantum phenomena starting from a run-of-the-mill Bose-Einstein condensate? Beyond optical lattices and Feshbach resonances, a new tool has been developed to temporally modulate the quantum gas, which can immediately lead to exotic behavior even in the perturbation regime. I will discuss two examples by modulating the lattice potential and the atomic interactions. In both cases, surprising results connect cold gases to intriguing cosmological phenomena.

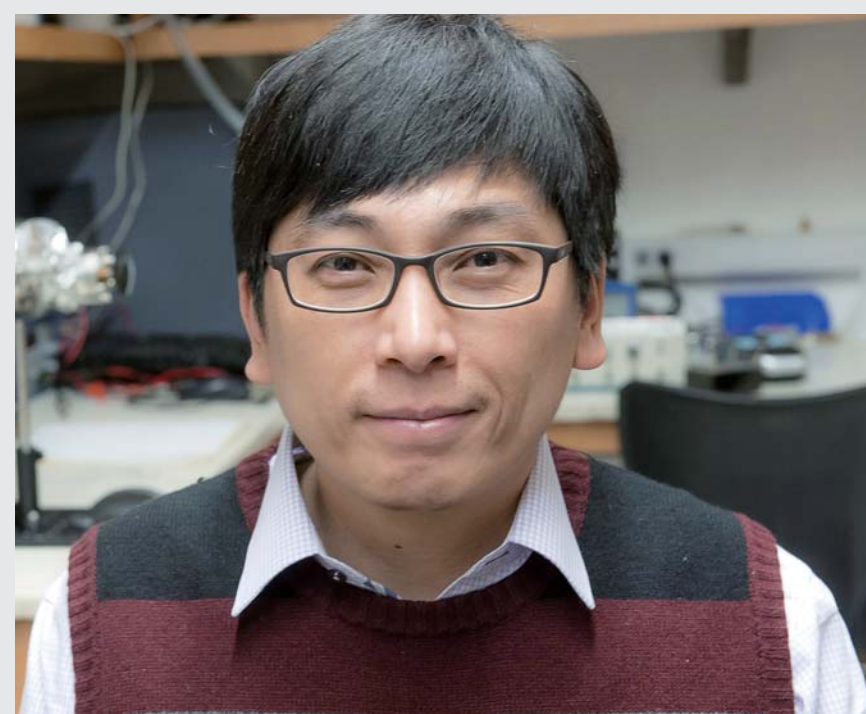
## Lecture 3: Quantum Simulation beyond Condensed Matter Physics Models

8/20 Monday 10:00 a.m. - 12:00 a.m.

Atomic quantum gases are frequently associated with condensed matter models, and many papers on quantum gas publish on arXiv under cond-mat. There are, however, celebrated and developing ideas that go beyond condensed matter physics. In addition to the cosmological models in Lecture 2, here I will discuss other interesting examples. Where did these ideas come from and, more critically, how do we identify new exciting topics for next generation quantum gas research.

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## Professor Cheng Chin



Cheng Chin is a professor of physics at the University of Chicago. He pursued his graduate studies with Steven Chu at Stanford University, receiving his Ph.D. degree in 2001. After a postdoctoral fellowship at Stanford University (2001-2003) and then at Innsbruck University (2003-2005), he joined the faculty of the University of Chicago, where he has been a full professor in the Physics Department, the James Franck Institute, and the Enrico Fermi Institute since 2013. He was a Lise-Meitner Research Fellow (2003-2005), an Alfred P. Sloan Research Fellow (2006-2008), a David and Lucile Packard Fellow (2006-2011) and an Alexander von Humboldt Fellow (2012-2015). He has been honored with the Overseas Chinese Physics Association Outstanding Young Researcher Award (2006), the National Science Foundation CAREER award (2008), the IUPAP Young Scientist Prize in AMO Physics (2008), the APS I.I. Rabi Prize (2011), and the National Taiwan University Distinguished Alumni Award in Physics (2014), Bose-Einstein condensate awarded (2017). Professor Chin is a Fellow of the American Physical Society.