Physics Seminars (biweekly)

Title: **Strongly interacting Bose gas in two dimensions**

Speaker: **Prof. Cheng Chin**
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Time: **3:15pm, Tuesday, April 16, 2013**
(2:45~3:15pm, Tea, Coffee, and Cookie)

Venue: **Conference Hall 104, Science Building, Tsinghua University**

Abstract

We prepare and study strongly interacting two-dimensional Bose gases with dimensionless gas parameter as high as g=2.8 by Feshbach tuning and by loading the sample into an optical lattice. In the superfluid and BKT transition regimes, significant down-shifts from the mean-field and perturbation calculations are observed when g approaches or exceeds one. In the BKT and the quantum critical regimes, all measured thermodynamic quantities show logarithmic dependence on the interaction strength.

We also outline a prototypical approach to investigate quantum transport phenomena and quantum quenches. Starting with an almost pure bosonic superfluid, we quench the particle interactions and observe an oscillating density fluctuation in the time and momentum domains. These so called *Sakharov oscillations*, typically discussed in the context of early universe evolution, provide a common basis to understand the quantum quench dynamics of atomic superfluid and the anisotropy of the cosmic microwave background radiation.