

- Next step is to solve the system at the presence of a harmonic trap with numerical diagonalization method.
- Harmonic oscillator eigenstates as the basis, the free Hamiltonian was rewritten in terms of ladder operators
- My goal is to study the ground state ($T = 0$) profile in momentum space and expect condensations at finite momentum.
- I will lift the ground state degeneracy manually with external perturbation and calculate the tendency of spontaneous symmetry breaking in the limit of zero perturbation.
- I will also study how interactions drive the symmetry breaking.

ACADEMIC
ACTIVITIES

Attended workshops and lectures

- Serial lectures *Quantum Many-Body Correlation Functions and Applications to BEC* (Tsinghua, April, 2012) by Professor ALEXANDER FETTER and volunteered to edit the lecture notes.
- Serial lectures on *Superfluidity* (Tsinghua, April, 2012) by Professor GORDON BAYM.
- Talk *The Interplay between Magnetism, Superconductivity and Spin-Orbit Coupling in Topological Insulators* (CAS, May, 2012) by Professor TAYLOR HUGHES.
- Summer workshop *Critical behavior of lattice models in atomic and molecular, condensed matter and particle* (KITPC, Summer, 2012), organized by Professor XIAO-GANG WEN, *et al.*

My talks and presentations

- A blackboard talk on dual gauge theory and dual superconductivity during our group meeting.
- Held an informal discussion session centered around *topological insulators with interactions* at KITPC under kind permission and instructions of Professor WEN
- Delivered a concise presentation on the generalization of the second law to the realm of non-equilibrium thermodynamics during the course *Introduction to Biological Physics*.

Miscellaneous

- **Freshman** Took the course *Differential Geometry and General Relativity* intended for graduates and senior undergraduates.
- Read and finished problems (chapter 1-7) of *Atomic Physics* by Christopher J Foot, in exchange for the contents of freshman physics course *Quantum Physics* taught by Professor MEI ZHANG.
- **Sophomore** Joined the theoretical condensed matter group led by Professor SUPENG KOU and have been attending weekly group meetings regularly (including talks of my research progress).

EXTRA-CURRICULAR
ACTIVITIES

- Co-director and participant of the university held “12-9 Chorus Competition.”
- Participant of the university held “Student’s Fashion Show.”
- Granted the “excellent design” title for T-shirt design by department of physics.