Condensed Matter Theory Center Seminar

Thursday, April 28
11:00 am – 12:30 pm
2205 Toll Physics Building

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"Toward Majorana Fermions in Fermi Superfluid of Ultracold Alkali-Earth Atomic Gases"

Abstract: Spin-orbit coupling and fermion superfluidity are two essential ingredients toward topological superfluid and Majorana fermions. Spin-orbit coupling has been simulated by using the Raman process in alkali atoms, but it suffers from the heating problem due to spontaneous emission. Using very precise clock transition, spin-orbit coupling can also be realized in alkali-earth atoms between the ground and the clock state, in which hopefully the heating problem can be greatly suppressed. While to realize Fermi superfluid in alkali-earth atoms, Feshbach resonance is a necessary tool. Recently proposed and experimentally observed "orbital Feshbach resonance " (OFR) changes the conventional view that there is no magnetic field tunable resonance between these states, and makes the realization of Fermi superfluid in alkali-earth system possible. We further show that OFR has a flavor of narrow resonance because of which the Fermi superfluid transition temperature is even higher. Combining these two developments, we argue that it is quite promising to achieve topological Fermi superfluid with Majorana edge state in alkali-earth atomic gases.

Host: Dong-Ling Deng

Web: http://www.physics.umd.edu/cmtc/seminars.html