School of Physics and Astronomy

QUANTUM GASES SEMINAR

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Interacting Fermi gases: from dynamical many-body phases to quasi-1D p-wave resonances

Using ultracold atoms, we investigate a variety of interacting strengths in Fermi gases near s- and p-wave Feshbach resonances. In the first series of experiments I will discuss, we probe the non-equilibrium dynamics of weakly-interacting 3D clouds. In this regime, the collective dynamics reveal a transition between dynamical phases, and is well modeled by a collective Heisenberg spin lattice model. For sufficiently strong interactions, the collective magnetization of the cloud is protected against dephasing by an energy gap. Below a critical interaction strength, the magnetization decays quickly, revealing a nonequilibrium transition analogous to that predicted in quenched s-wave superconductors.

In a second set of experiments, we investigate the collision dynamics in quasi-1D Fermi gases with p-wave interactions. Using rf spectroscopic techniques, we measure Tan's contact for p-wave interactions to probe the correlations near a Feshbach resonance. Comparing to 3D and 2D clouds, we investigate the confinement-induced shift in the resonance location, and search for evidence of a universal regime, similar to the 3D s-wave case. I will discuss the importance of the effective range, and will also comment on the search for signatures of Bose-Fermi duality in this quasi-1D system.

Date:	Friday 28 February
Time:	11am
Venue:	L1, Seminar Room 107 10 College Walk, Clayton