

# Joint CQSE and CASTS Seminar

Weekly Seminar  
Sep. 28, 2012 (Friday)

TIME Sep. 28, 14:30 ~ 15:30  
TITLE A glance at the imaginary world of ultracold atoms  
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## Abstract

From ultracold atoms to quantum chromodynamics, reliable ab initio studies of strongly interacting fermions require numerical methods, typically in some form of quantum Monte Carlo. Unfortunately, (non-)relativistic systems at finite density (spin polarization) generally have a sign problem, such that those ab initio calculations are impractical. It is well known, however, that in the relativistic case imaginary chemical potentials solve this problem, assuming the data can be analytically continued to the real axis. Is this feasible for non-relativistic systems? Are the interesting features of the phase diagram accessible in this manner? Introducing complex chemical potentials, for real total particle number and imaginary polarization, the sign problem is avoided in the non-relativistic case. To give a first answer to the above questions, we perform a mean-field study of the finite-temperature phase diagram of spin-1/2 fermions with imaginary polarization.

