**Optimizing Hydrodynamic Simulations of Quantum Fluids**

CSCI 4576 Final Project Proposal 2014

Aniq Shahid -- Matthew Gross -- Li-yin Young – Jasmine Brewer

**Introduction**

The lattice Boltzmann method, first popularized by its success in mainstream computational fluid dynamics, has received interest in recent years as a method for simulating strongly-interacting quantum fluids. The proposed project

**Problem**

The naïve implementation of the lattice Boltzmann method which has been previously implemented is overly restrictive on the simulation sizes we are able to achieve with available resources, due at least in part to lack of parallelism and inefficient memory handling. We propose to remedy these problems by the following methods:

1. **Implement parallelization in MPI** to improve performance on distributed-memory architectures.

**Analysis**

1. We will do step-by-step benchmarking, e.g. we will optimize the serial code, benchmark, then implement MPI. Furthermore, we will benchmark the code at each step (e.g. for the file IO we will benchmark before and after)