Testing String Theory?
Scale Invariance in Expanding Strongly Interacting Fermi Gases

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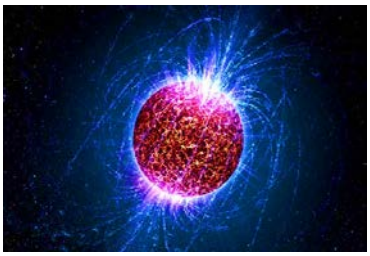
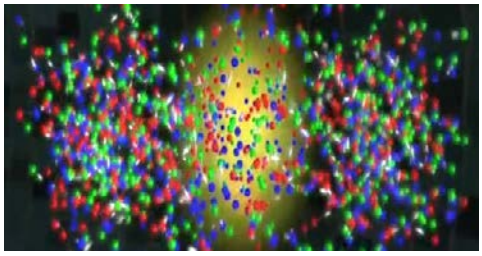
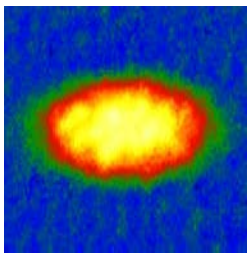
Optically-trapped, ultra-cold gases of spin ½-up and spin ½-down ^{6}Li atoms model high temperature superconductors, neutron matter, and even the quark-gluon plasma that existed microseconds after the Big Bang. A bias magnetic field tunes the gas to a collisional (Feshbach) resonance, where the dilute atomic cloud becomes the most strongly interacting, non-relativistic fluid known: Shock waves are produced when two clouds collide. I will describe our recent observations of scale-invariant expansion and measurements of quantum viscosity η and entropy *s* in such clouds. The η/*s* ratio obtained in the experiments is comparable to that of a quark-gluon plasma, close to the minimum conjectured for a "perfect fluid" using scale-invariant string theory methods.



Neutron Stars



Quark Gluon Plasmas



Ultra-Cold Fermi Gases