John E. Thomas received his B. S. degree in Physics at MIT in 1973 and his Ph. D. in Physics at MIT in 1979. John joined the Physics Department at Duke University in 1986 and was named the Fritz London Distinguished Professor in 2004. He gave the Dasari Lecture at MIT in 2010. In 2011, John received the Jessie Beams Award for Research from SESAPS and moved his research group (JETlab) to North Carolina State University. He received an Outstanding Referee Award from APS in 2013 and is currently the John S. Risley Distinguished Professor of Physics. He was a divisional editor for Physical Review letters (2005-2010) and was on the Board of Reviewing Editors for Science Magazine (2011-2017). John is a Fellow of the American Physical Society, a member of the Optical Society of America and a Fellow of the American Association for the Advancement of Science. He received the 2018 Davison-Germer Prize from the American Physical Society for his research on unitary Fermi gases.

Scale Invariant Strongly Interacting Fermi Gases

John E. Thomas
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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 hydrodynamics of a quark-gluon plasma, a state of matter at 2 trillion degrees 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 a scale-invariant, strongly-interacting fluid: Shock waves are produced when two clouds collide. Remarkably, the ratio of the shear viscosity to the entropy density of such clouds is comparable to that of a quark-gluon plasma, close to the minimum ratio conjectured for a “perfect fluid” using scale-invariant conformal field theory methods. I will describe our recent observations of scale-invariant expansion, our latest results on quantum shear viscosity, and preliminary data on hydrodynamic flow from an optical box potential into a channel.

Physics Colloquium
October 18, 2018
4:10PM
316 Lewis Lab.

Refreshments at 3:45PM