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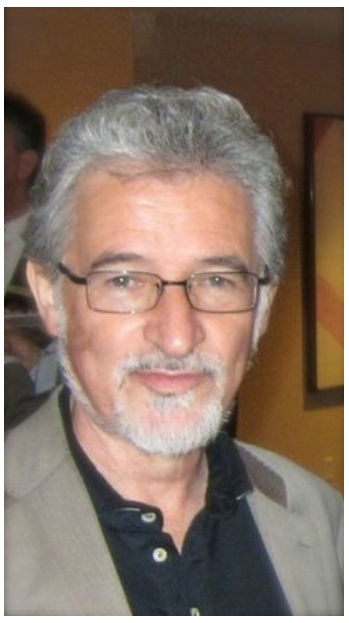

Professor Kevin S. Bedell
John H. Rourke Professor of Physics
Department of Physics, Boston College

Non-Equilibrium Fermi Liquids Out of Their Fields: A "ferromagnetic proximity effect"

Tuesday, August 8, 2017
2:00 - 3:00
MSL Auditorium (TA-03 - Bldg 1698 - Room A103)

Abstract: In the low temperature quantum regime, $T << T_F$, (where T_F is the Fermi temperature), producing a large equilibrium magnetization, $\mathbf{M}_0$, in quantum spin systems like, metallic and neutral Fermi liquids, often requires unattainable large external magnetic fields, **B**. To probe theses system a number of techniques have been introduced to increase the magnetization, e.g., rapid melting in ^{3}He or spin injection in a Ferromagnetic/Normal metal (F/N) junction. If the spin relaxation times, T_1, of these systems are very long it is possible to measure a number of physical properties of these Fermi liquids with large non-equilibrium magnetizations, **M**. This raises an important question: *Is the non-equilibrium Fermi liquid in the low temperature quantum regime with a large magnetization qualitatively the same as a Fermi liquid in equilibrium with the same magnetization produced by a large external magnetic field?* To answer this question we have explored the spin dynamics as well as the thermodynamic and transport properties of non-equilibrium Fermi Liquids. *What we have found is that the spin dynamics and other properties are qualitatively changed from an equilibrium Fermi liquid.* A particular example of this qualitative change is that the spin dynamics of a non-equilibrium paramagnetic metal is that of a ferromagnetic metal. In this talk we will explore some consequences of the non-equilibrium magnetization in Fermi liquids and in a basic spintronic device, the F/N junction. We will argue that the physical consequences of the non-equilibrium magnetization can be viewed as a kind of, "ferromagnetic proximity effect!"

Bio: Kevin S. Bedell is the John H. Rourke Professor of Physics at Boston College (BC). Long before coming to BC he received his Ph.D. in Physics, from SUNY Stony Brook, NY, August 1979, his thesis advisor was Gerry Brown. He did his first postdoc with David Pines, at the University of Illinois, September 1979 – January 1982. He returned to Stony Brook as a Research Associate, in the Institute for Theoretical Physics, ITP (now called the Yang ITP) from September 1982 – August 1985. After this he spent a year as a visiting Assistant Professor at the Kamerlingh Onnes Laboratory, in Leiden. After his "seven-year stint on the road" he became a Staff Member at LANL, in the group, T-11 (now T-4), September 1986 – January 1996. During this period he became the Deputy Director of the Advanced Studies Program in High Temperature Superconductivity and then Director of the Program in Correlated Electron Theory. While at LANL Kevin became a Fellow of the American Physical Society in 1993 and started as an Editor for Advances in Physics, November 1995 – November 2015. After this long period at LANL Kevin started a new job as Chair, of the Department of Physics, at Boston College, September 1995 – September 2006. He was appointed the Vice Provost for Research, October 2006 – August 2010, and returned to the Faculty in 2010. His research interests involved the application of many body theory and Fermi liquid theory to a variety of quantum fluids, the electron gas, liquid 3He, liquid 3He-4He mixtures, cold atom Fermi gases, heavy fermions, Hi-TC superconductors, nuclear matter, exotic ferromagnetic metals and superconductors. More recently Kevin has focused on transport and dynamics of, Dirac materials and unconventional F/N junctions for spintronic applications.

To be on Dr. Bedell's Agenda, to participate in the Early Career Lunch, or for general information contact
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Hosted by Alexander Balatsky * Director of the Institute for Materials Science

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