College of Science
Department of Physics & Astronomy

WEEKLY CALENDAR

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WEEKLY CALENDAR

October 21-25, 2013

DEPARTMENTAL COLLOQUIUM

"Light Echoes from Luminous Transients - An Exploration of Asymmetries and Time Evolution"

3:30 PM October 24, 2013
109 Nicholson Hall

Douglas Welch
McMaster University

Host: Geoffrey Clayton

• Refreshments served at 3:10 PM in 232 (Library) Nicholson Hall •

Supernovae and other luminous transients produce such prodigious quantities of light that the very tiny fraction scattered towards Earth by interstellar dust hundreds of light years away can still be studied spectroscopically with large telescopes. In this talk I will review our progress towards understanding the degree of asymmetry of supernova photospheres, recreating lightcurves, and studying centuries of activity of supernova precursors.

LA-SiGMA

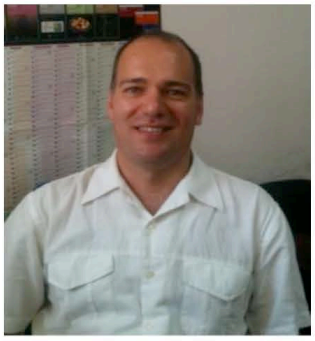
Louisiana Alliance for Simulation-Guided Materials Applications

Fall Seminar
3:30pm - 4:30pm, Wednesday, October 23, 2013
1008B, Digital Media Center, Louisiana State University

Spin-triplet superconductors: interface to itinerant ferromagnets and magnetic edge states

By

Mario Cuoco
Università di Salerno, Italy



This talk will introduce the physical properties of spin-triplet superconductors [1] whick will focus on two remarkable effects: i) the spin-orbital coupling emerging at the interface with an itinerant ferromagnet (FM) [2], ii) the occurrence of magnetic Andreev states at their edge if the system allows for singlet pairing in a subdominant channel [3]. In a TSC-FM heterostructure, the orientation of the FM moment relative to the TSC vector order parameter is a crucial variable that controls the physical behavior. In addition to the pair breaking, spin-flip reflection processes at the interface with the FM scatter the triplet Cooper pairs between the spin up and down condensates, setting up an effective Josephson-like coupling between them. [4] The pair-breaking and spin Josephson coupling both make significant contributions to the free energy of a TSC-FM junction through the proximity effect, interface electronic reconstruction, and the variation of the TSC gap. Although these contributions depend upon the direction of the FM's exchange field, the two effects do not necessarily act constructively. For a single-component p-wave TSC, we find that the variation of the gap controls the orientation of the FM's moment via the change in condensation energy. The stable configuration is either parallel or perpendicular to the TSC vector order parameter, depending on the alignment of the TSC gap with respect to the interface, thus evidencing a unique form of spin-orbital coupling. The competing orbital components of the chiral px+ipy state generate a non-unique behavior and a first-order transition from the perpendicular to the parallel configuration as the FM exchange field is increased. When the interface is imperfect or spin active the scenario is different and other processes can play the decisive role in setting the magnetic profile [5]. Concerning the surface states of TSC, novel magnetic effects can occur if triplet and singlet pairing get mixed and have a non-uniform spatial profile. The talk will also show that a) a subdominant in-phase s-wave superconducting order can exist near the edge of the sample; b) the in-phase s-wave component gives a non-unitary superconducting state at the boundary; c) as a result, the bound states are spin-polarized, leading to a finite surface magnetization; d) spin current flows along the interface in this regime; e) surface charge currents exhibit anomalous dependence on the magnetization [3].

Mario Cuoco has been a CNR researcher since 2002 and currently at the CNR-SPIN Institute ("SuPerconductors, oxides and other INnovative materials and devices") in Salerno (Italy). His research activity deals with the investigation of systems with competing superconductivity and magnetism; modelling and computation of electronic, magnetic and transport properties of correlated systems, mainly oxides in bulk and heterostructures. (Co-)author of about 90 articles on peer review international journals. He has contributed to research activities on transition metal oxides and heterostructures at large scale facilities: muon-spin spectroscopy, X-ray absorption, angle resolved photoemission and neutron analyses. He has been the scientific coordinator of the Regional Project about "Superconducting states in metallic ferromagnets: mechanisms and patterns of mixed phases". Awarded as Marie-Curie Research Fellow within the European program "Improving Human Potential". He is the coordinator of the European FP7 RegPot project "MAMA (Multifunctional Advanced MAterials and Nanoscale Phenomena)" funded by the EC.

UNO *- Liberal Arts Building 234 ~* ***LATech*** *- PML 1015, Center for Instructional Technology, at the Wyly Tower*

Note, this seminar will ONLY be available via abobe connect
http://connect.lsu.edu/la-sigma/