“A New Channel Towards the Explosion of Type Ia Supernovae”

3:30 PM Thursday, November 5, 2015
109 Nicholson Hall

Marina Orio
University of Wisconsin at Madison
INAF, Osservatorio Astronomico di Torino

HOST: Bradley Schaefer

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

"Type Ia supernovae, or thermonuclear supernovae, are very important to set the distance scale for cosmology, yet there are still many uncertainties on how they occur and what type of stellar progenitors lead to them. The common paradigm is that the explosion take place in a white dwarf that ALMOST reaches the so called Chandrasekhar mass (a limit mass of infinite density), and this is necessary because the thermonuclear reactions are ignited in the pycnonuclear regime (in which the reactions are sensitive only to the density). After briefly reviewing recent observational literature indicating the existence of different types of Supernovae Ia, and the possibility that many of them occur on white dwarfs whose mass is considerably smaller than the Chandrasekhar value, I will show that previously neglected nuclear reactions involving impurities of light elements left over in the white dwarf core may considerably heat the star, eventually lifting the pycnonuclear regime and allowing the explosive reactions at much lower density than previously considered necessary. The consequence is that the supernova may even occur in an isolated white dwarf. I will conclude with additional observational evidence on interesting presupernova candidates".

Special Announcement:

Students, Faculty & Staff...we want your help!
The College of Science is currently undertaking a master plan in an effort to align physical resources with the college’s aspirations while preserving and enhancing the character of the campus community. We invite you to join us at the upcoming Open House to share and discuss your ideas for the College of Science and LSU campus of today and tomorrow.

Master Plan Open House
Clarence P. Cazalot, Jr.
Marathon Oil Corp. Atrium,
Howe-Russell Geosciences Complex

This is an important opportunity for the wider campus community – students, faculty and staff – to engage directly with the master plan and help shape the future of LSU College of Science. We are excited to hear your ideas and look forward to hearing from you at the Open House!

Drop By Tuesday, Nov. 3rd
between 3:00 p.m. - 6:00 p.m.
Monday, November 9  3:00-4:00pm  
Live at LSU  1008B Digital Media Center  

Broadcast: Tulane 600 Lindy Boggs  I  UNO 234 Liberal Arts  
LaTech 122 Nethken Hall  

Search for interesting behaviors beyond iron-based materials in tetragonal pnictides  

After the discovery of high-temperature superconductivity (SC) in the iron-based tetragonal compound LaFeAsO$_1$–xF$_x$ in 2008, a worldwide effort began to understand the mechanism of SC and to discover other new superconductors in the related structures. This effort quickly led to the discovery of SC in structurally related 122-type iron-arsenides where the parent compounds with the composition of AFe$_2$As$_2$ (A = Ca, Sr and Ba) crystallize in tetragonal ThCr$_2$Si$_2$-type structure. Soon the interest expanded beyond the iron-based compounds and some exciting observations were made in other arsenide materials. Our stimulating observations of unexpected stripe-type antiferromagnetic correlations in SrCo$_2$As$_2$ and the discovery of a novel magnetic ground state in hole-doped BaMn$_2$As$_2$, where half-metallic itinerant ferromagnetism of doped holes coexists with a local-moment antiferromagnetism of Mn lattice, hint toward the abundance of possibilities contained in the transition metal-pnictide systems. I shall discuss some of our recent works on SrCo$_2$As$_2$ and hole-doped BaMn$_2$As$_2$ and their possible impact on the future research in this field. I will also briefly discuss about a new family of layered transition metal-pnictide materials recently discovered by us.  