



College of  
Science  
Department of Physics  
& Astronomy

202 Nicholson Hall  
Louisiana State University  
Baton Rouge, LA 70803  
TEL: 225-578-2261  
FAX: 225-578-5855  
<http://www.phys.lsu.edu>

## Weekly Calendar

November 2 – 6, 2015

### Departmental Colloquium

#### **“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 pre-supernova candidates".

### Special Announcement:

**FUTURE  
OF THE  
COLLEGE  
OF  
SCIENCE**  
Open House  
November 3<sup>rd</sup>

#### **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. 3<sup>rd</sup>  
between 3:00 p.m. - 6:00 p.m.**



## SEMINAR SERIES 2015

Monday, November 9 3:00-4:00pm

Live at LSU 1008B Digital Media Center

Broadcast: Tulane 600 Lindy Boggs | 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  $\text{LaFeAsO}_{1-x}\text{F}_x$  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  $\text{AFe}_2\text{As}_2$  ( $\text{A} = \text{Ca}, \text{Sr}$  and  $\text{Ba}$ ) crystallize in tetragonal  $\text{ThCr}_2\text{Si}_2$ -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  $\text{SrCo}_2\text{As}_2$  and the discovery of a novel magnetic ground state in hole-doped  $\text{BaMn}_2\text{As}_2$ , 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  $\text{SrCo}_2\text{As}_2$  and hole-doped  $\text{BaMn}_2\text{As}_2$  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.

- [1] A. Pandey *et al.* *Phys. Rev. B* **88**, 014526 (2013)
- [2] W. Jayasekara *et al.* *Phys. Rev. Lett.* **111**, 157001 (2013)
- [3] A. Pandey *et al.* *Phys. Rev. Lett.* **111**, 047001 (2013)
- [4] A. Pandey *et al.* *Phys. Rev. Lett.* **108**, 087005 (2012)
- [5] B. G. Ueland *et al.* *Phys. Rev. Lett.* **114**, 217001 (2015)



*Guest Speaker*

**ABHISHEK  
PANDEY**

**Postdoctoral  
Researcher**

**LSU Department of  
Physics &  
Astronomy**

Dr. Pandey's main research interest is the investigation of magnetic, superconducting, electrical- and magneto-transport, thermal, and structural properties of novel materials in polycrystalline, single-crystal and thin film forms.

Free and open to the public



[www.physics.lsu.edu/lacns](http://www.physics.lsu.edu/lacns)

