

# Weekly Calendar and News

October 31-Nov. 6, 2016

## Departmental Colloquium

### “Hundred Years of General Relativity: A Global Perspective”

**Abhay Ashtekar**

Pennsylvania State University

**3:30-4:30 pm, Thursday, Nov. 3, 2016**

**Digital Media Center Theater**

**Host: Ivan Agullo**

A century has passed since Einstein discovered general relativity. The theory represents an unprecedented combination of mathematical elegance, conceptual depth and observational success. While our current view of the cosmos has been shaped by this theory, it generally not appreciated that we arrived at it slowly, through unexpected twists and turns. Controversies often raged on fundamental issues, and positions held by some of the then most prominent scientists turned out to be on the wrong side of history. A global perspective on 100 years of general relativity provides valuable insights into how diverse forces work in combination even in most the fundamental areas of Science.

## Events

- **Saturday Science:** “We are all stardust” by Catherine Deibel  
October 29, 2016 Saturday, 10:00 AM - 11:15 AM, Nicholson Hall Room 130
- **LaCNS Seminar:** “Mapping and Manipulating Materials Transformation Pathways and Properties” by Prof. Duane Johnson  
October 31, 2016 Monday, 3:00 PM, 1008B Digital Media Center  
Link for live presentation: <http://lsu.webex.com/>. Meeting id: 928 618 326
- **LaCNS Seminar:** “Search of Kitaev Physics and Majorana Fermions in a honeycomb magnet” Dr. [Arnab Banerjee](#)  
Friday, Nov. 4, 3:30 PM, A101 Life Science Bldg.
- **Landolt Observatory Public Night:** Mars, Venus, First Quarter Moon  
November 6, 2016 Sunday 6:00 PM - 7:00 PM, Nicholson Hall roof - Landolt Observatory

# LSU Physics & Astronomy in the News

- **Alumna Leanne Truehart** discusses career path, mental health  
[http://www.lsunow.com/daily/l-su-alumna-discusses-career-path-mental-health/article\\_c0e6d0fc-9972-11e6-a468-b3ef77b9198f.html](http://www.lsunow.com/daily/l-su-alumna-discusses-career-path-mental-health/article_c0e6d0fc-9972-11e6-a468-b3ef77b9198f.html)
- **Richard Kurtz** named among 2016-17 SEC Academic Leadership Development Program Fellows  
[http://www.lsu.edu/science/news\\_events/cos-news-events/KurtzSECFellow\\_2016.php](http://www.lsu.edu/science/news_events/cos-news-events/KurtzSECFellow_2016.php)
- **Simón Lorenzo** conducted research through the Center for Energy Efficient Electronics Science REU  
[http://www.honors.lsu.edu/news/beyond-the-lecture-hall?utm\\_content=buffer3b53b&utm\\_medium=social&utm\\_source=twitter.com&utm\\_campaign=buffer](http://www.honors.lsu.edu/news/beyond-the-lecture-hall?utm_content=buffer3b53b&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer)
- **Tabetha Boyajian** joined BSRC Director Dr. Andrew Siemion & Penn State Professor Jason Wright at Green Bank observatory to share their observations of Tabby's Star.  
<https://www.youtube.com/watch?v=Ijyn0kAMTL8>
- **Lydia Jagetic** traveled abroad to teach radiation in Mexico  
[http://www.lsunow.com/daily/l-su-phd-student-traveled-abroad-to-teach-radiation-in-mexico/article\\_26b98e8c-9be0-11e6-b69a-0b12666ce1fc.html](http://www.lsunow.com/daily/l-su-phd-student-traveled-abroad-to-teach-radiation-in-mexico/article_26b98e8c-9be0-11e6-b69a-0b12666ce1fc.html)

## Landolt Astronomical Observatory Public Night

**Mars, Venus, First Quarter Moon**

Sunday, November 6, 2016, 6:00 PM - 7:00 PM

Nicholson Hall Roof- [Landolt Astronomical Observatory](#)

# SATURDAY SCIENCE

## We are all stardust

A public lecture by  
**Dr. Catherine Deibel**

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### About the Topic

At the birth of our Universe, the Big Bang produced the initial abundances of hydrogen, helium, and lithium that are seen in our Galaxy today. All other elements, however, were synthesized in stellar environments through nuclear processes. Many of these heavy elements were produced in violent stellar explosions, such as classical novae, X-ray bursts, and supernovae, that are driven by nuclear reactions. This nucleosynthesis, which continues in our Galaxy, can be understood through the combination of stellar observations, computational physics, and experimental nuclear physics. I will discuss how we study the physics of microscopic nuclei to understand some of the largest, most violent explosions in the Galaxy, which create elements that make up the Solar System, the Earth and each of us.



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**29 October 2016, 10-11:00 a.m.**

Room 130 Nicholson Hall, LSU

LSUSaturdayScience@gmail.com



## SEMINAR SERIES 2016

Monday, October 31  
3:00 PM  
1008B Digital Media Center  
Louisiana State University

### Mapping and manipulating materials transformation pathways and properties

Electronic-structure-based thermodynamic methods to explore, explain, and control materials phase transformations will be described with applications on novel, complex multicomponent alloys and responsive materials to reveal phenomena such as (i) transformations in shape-memory alloys and new structures, (ii) short- and long-order in high-entropy alloys, (iii) nanoalloy catalysts, (iv) magneto-structural collapse in magnets, and (v) Lifshitz transitions, and quantum critical points in iron-arsenide superconductors. To design multicomponent materials and tailor their functionality, we apply these unique techniques to quantify stability and properties by mapping global solid-solid transformations (e.g., order-disorder and competing long-range order (LRO) states) and local structural instabilities (e.g., short-range order, SRO). In particular, thermodynamic linear-response theory is used to predict SRO involving coupled electronic, chemical, magnetic, and structural fluctuations in complex N-component systems; the solid-state nudged-elastic band method was extended to map pathways (enthalpies and barriers) involving non-conserved order parameters responsible for, e.g., magneto-structural collapse.



*Guest Speaker*

**Dr. Duane  
Johnson**

Chief Scientist and  
Professor of  
Materials Science &  
Engineering

Ames Laboratory,  
Iowa State University

Free and open to the public



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





Friday, November 4  
3:30 PM  
A101 Life Science Building  
Louisiana State University

### **Search of Kitaev physics and Majorana Fermions in a honeycomb magnet**

As dimensions get reduced, the effects of quantum fluctuations increase leading to interesting emergent quantum phenomena and new quantum states. The 2D Kitaev quantum spin liquid (QSL) is such a quantum state of matter which occurs when the three types of bonds of the honeycomb lattice have mutually incompatible Ising interactions.

This Kitaev QSL is particularly intriguing since its magnetic excitations – which appear as a spectrum of Majorana Fermions - are theorized to realize a particular topological quantum computing technology in the solid-state.

Here I describe the comprehensive characterization of the graphene-like Kitaev candidate material  $\alpha$ - $\text{RuCl}_3$  using both real and reciprocal space measurements. This transition metal halide has a relatively high spin-orbit coupling in the presence of an octahedral crystal field ensuring a  $S=1/2$  ground state enhancing quantum fluctuations, which creates a conducive environment for the realization of Kitaev physics.

Using inelastic neutron scattering, we explicitly measure a thermally-resilient broad spinon continuum. This feature is independent of the long-range ordering and inexplicable by classical spin-wave theories, but matched the predictions of the high-energy 2D Majorana Fermions expected from exact Kitaev calculations, placing this material proximate to the true Kitaev QSL. We mapped the detailed energy-momentum resolved dispersion of this mode using single-crystal TOF neutron scattering, which would be the first measurement of its kind on a Kitaev continuum. Our measurements yield critical insights into how and by how much a real material departs from the ideal Kitaev behavior.

Finally, I discuss our very recent field-dependent data which teases a particular route towards achieving the ideal QSL scenario.

SEMINAR  
SERIES  
2016



*Guest Speaker*

**Dr. Arnab  
Banerjee**

Post Doctoral Fellow

Oak Ridge National  
Laboratory

Free and open to the public



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

