

**LSU**College of  
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# Weekly Calendar and News

February 20-25, 2017

## Departmental Colloquium

### [A New Window into Supernovae and Their Progenitors with Las Cumbres Observatory](#)

[Andrew Howell](#)

Las Cumbres Observatory (LCO) and UCSB

Host: Manos Chatzopoulos

**3:30 PM Thursday, February 23, 2017  
119 Nicholson Hall****• Refreshments served at 3:10 PM in 232 (Library) Nicholson Hall •**

I'll describe the six years' effort to observe 1000 nearby supernovae in unprecedented detail, including sooner after explosion than was previously possible. This is possible because of Las Cumbres Observatory, a global robotic network of eighteen 2 meter, 1m, and 0.4m telescopes. The network allows us to take observations within minutes of triggering observations, to observe continuously without being interrupted by daytime, to rarely miss observations due to weather, and to build large samples of supernovae with a relatively small team. As a result, we are discovering new classes of supernovae, and making new discoveries about their progenitors based on their early data. One new finding is that a large fraction of massive stars (even normal red giants) have mass loss episodes within days to weeks of exploding. This is a surprise from a stellar evolution perspective and remains poorly understood. I'll also show several new types of supernovae, including one perplexing event that remains bright for years, with multiple peaks in the light curve.

# LSU Physics & Astronomy in the News

- Mette Gaarde Named Outstanding Referee for Physical Review Journals  
[http://www.lsu.edu/physics/news/2017/02/gaarde\\_referee.php](http://www.lsu.edu/physics/news/2017/02/gaarde_referee.php)
- Talk 107.3 FM Clarence Buggs talks with E. Ward Plummer about the impact of his recent award from the Chinese Academy of Sciences and that it will open doors to recruit more students from China. <http://talk1073.com/2017/02/16/clarence-buggs-show-2-16-17/>
- Amber Stuver and Gabriela González in The Washington Post: “A year later, scientists keep listening to gravitational waves, the soundtrack of the cosmos”  
<http://wapo.st/2lQu4S2>

## Publications:

- “Electron interaction with the spin angular momentum of the electromagnetic field” by R. F. O'Connell <http://iopscience.iop.org/article/10.1088/1751-8121/aa5575/meta>
- “The Medical Physics Workforce” by Wayne D. Newhauser  
[http://www.researchgate.net/publication/313147978\\_The\\_Medical\\_Physics\\_Workforce](http://www.researchgate.net/publication/313147978_The_Medical_Physics_Workforce)

## Events

- **LaCNS Seminar:** [Electronic phase diagram of High Temperature Superconductors](#)  
**When:** Monday, February 20, 2017, 3:00 PM  
**Where:** 1008B Digital Media Center
- **LaCNS Seminar:** [Understanding and Designing Cyclic Peptides](#)  
**When:** Monday, February 21, 2017, 12:00 PM  
**Where:** 1008B Digital Media Center
- Southwest Quantum Information and Technology-19th Annual SQuInT Workshop  
**When:** Thursday, February 23, 2017 - Saturday, February 25, 2017  
**Where:** [Louisiana Digital Media Center Theater](#)  
**Website:** <http://physics.unm.edu/SQuInT/2017/>
- **Saturday Science:** ["Is Zika such a big deal now because it's changed?"](#)  
**When:** Saturday, February 25, 2017, 10:00 AM - 11:00 AM  
**Where:** Nicholson Hall - Room 130

Please see the attached flyers



Monday, February 20  
3:00 pm  
1008B Digital Media Center  
Louisiana State University

### Electronic phase diagram of High Temperature Superconductors

Even though High Temperature Superconductors (HTSCs) were discovered three decades ago, a microscopic theory is yet to be realized for this unique class of materials. An important step towards this is to characterize the normal state of the HTSCs in great detail. From our temperature ( $T$ ) and carrier concentration ( $\delta$ ) dependent Angle Resolved Photoemission Spectroscopy (ARPES) measurements on  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$  (BISCO 2212) HTSCs, we find that unlike in conventional superconductors where there is a single temperature scale  $T_c$  separating the normal from the superconducting state, HTSCs are associated with two additional temperature scales. One is the so-called pseudogap scale  $T^*$ , below which electronic excitations exhibit an energy gap. The second is the coherence scale  $T_{\text{coh}}$ , below which lifetimes of quasiparticles get enhanced. We observe that  $T^*(\delta)$  and  $T_{\text{coh}}(\delta)$  cross each other near optimal carrier concentration, i.e. the  $\delta$  for which  $T_c(\delta)$  attains its maximum value. There is an unusual phase in the normal state where the electronic excitations are gapped as well as coherent. Quite remarkably, this is the phase from which the superconductivity with maximum  $T_c$  emerges. We also conduct direct comparison between the single-particle spectral functions from charge density wave systems and from the pseudogap phase of BISCO 2212 HTSCs. Our data do not seem to be consistent with the propositions that the energy gap for  $T < T^*$  is due to some charge ordering. Rather, our data are consistent with the presence of incoherent pairs in the pseudogap phase. Moreover, our experimental finding that the two crossover lines  $T^*(\delta)$  and  $T_{\text{coh}}(\delta)$  intersect is not compatible with the theories invoking “single quantum critical” point near optimal doping, rather it is more naturally consistent with theories of superconductivity for doped Mott insulators.

## SEMINAR SERIES 2017



*Guest Speaker*

## Dr. Utpal Chatterjee

Professor,  
Department of  
Physics

University of Virginia

Free and open to the public



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





## Joint LaCNS/Physical Chemistry Seminar

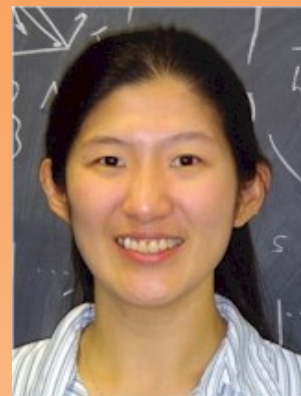
Tuesday, February 21  
12:00 pm  
215 Williams Hall  
Louisiana State University

### Understanding and Designing Cyclic Peptides

Cyclic peptides (CPs) are highly sought after for several unique applications. For example, CPs can target protein surfaces with high affinity and selectivity, thereby inhibiting specific protein-protein interactions that cannot be easily targeted with other molecules. New inhibitors will enable mechanistic studies to dissect the functions of individual protein-protein interactions in the complicated cellular interactome. However, robust application of this fundamentally interesting class of molecules for these and other purposes is limited by our poor capacity to predict CP structures and the resulting inability to rationally design functional CPs.

In this talk, we describe an efficient enhanced sampling method to simulate CPs, using which we aim to fill the knowledge gap of CP sequence-structure relationships, and enable rational design of CPs with desired structures.

SEMINAR  
SERIES  
2017



*Guest Speaker*

**Dr. Yu-Shan Lin**

Professor,  
Department of  
Chemistry

Tufts University

Free and open to the public



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





# SATURDAY SCIENCE

## Is Zika such a big deal now because it's changed?

A public lecture by  
**Dr. Rebecca Christofferson**

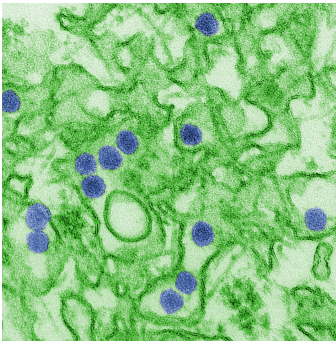
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### About the Speaker

Dr. Rebecca Christofferson is an Assistant Professor in the Department of Pathobiological Sciences' College of Veterinary Medicine at LSU. Her work focuses on ways to better inform model parameters that best explain & predict transmission, expansion, & emergence of biological public health threats.

Zika virus has been around for a long time. It was first identified in 1947 in Uganda and has circulated in Africa for years. So why did it become such a huge thing in South America? Why all of a sudden is it such a threat to pregnant women and their babies? By examining the history of Zika through reading what other scientists have done and by doing experiments on Zika in the lab, we can get closer to answering those questions.



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**25 February 2017, 10-11:00 a.m.**

Room 130 Nicholson Hall, LSU

LSUSaturdayScience@gmail.com