

**Weekly Calendar & News***March 9-17, 2018***Special Colloquium****On Superposition, Interference and Feynman paths**[Urbasi Sinha](#)

Raman Research Institute, Bengaluru, India

**Host: Ravi Rau**3:30 PM **Tuesday, March 13**, in 119 Nicholson Hall

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

The superposition principle forms the heart of all modern applications and properties of quantum mechanics such as quantum entanglement and quantum computing. However, its usual application to slit based interference experiments has caveat in both optics and quantum mechanics where it is often incorrectly assumed that the boundary condition represented by slits opened individually is same as them being opened together. In theory work carried out over the last few years, we have quantified the correction term in terms of the Sorkin parameter [1, 2]. In this talk, we will report the first reported measurement of a deviation from the superposition principle in the microwave domain using antennas as sources and detectors of the electromagnetic waves. This deviation is quantified through the Sorkin parameter which can be as big as 6% in our experiment [3]. Measuring a non-zero Sorkin parameter not only gives experimental verification to the theoretical predictions about the deviation from the superposition principle in interference experiments, it also exemplifies an experimental scenario in which non zero Sorkin parameter need not necessarily imply falsification of Born rule for probabilities in quantum mechanics which has been the basis for several experiments in recent years [4].

[1] R.Sawant, J.Samuel, A.Sinha, S.Sinha, U.Sinha, Non classical paths in quantum interference experiments. Phys.Rev.Lett.113, 120406 (2014).

[2] A.Sinha, Aravind H.V., U.Sinha, On the Superposition principle in interference experiments. Scientific Reports 5, 10304 (2015).

[3] G. Rengaraj, Prathwiraj U, Surya Narayana Sahoo, R. Somashekhar and Urbasi Sinha, Measuring the deviation from the superposition principle in interference experiments, arXiv:1610.09143.

[4] U.Sinha, C.Couteau, T.Jennewein, R.Laflamme, G.Weih, Ruling out multi-order interference in quantum mechanics. Science 329, 418-421 (2010).

# Hearne Eminent Lecture

## What the #\*\$! Do We (K)now!? about Quantum Mechanics

A Public Lecture by [Dr. Carlton M. Caves](#)

Distinguished Professor in the Department of Physics and Astronomy  
Director of Center for Quantum Information and Control  
University of New Mexico

**Host: Mark Wilde**

**When:** Friday, March 16, 2018 2:30 PM

**Where:** Student Union - Cotillion Ballroom - Room 250

There is a world of consummate strangeness at our fingertips, provided our fingers are so exquisitely fine as to be able to feel and manipulate individual atoms and molecules. Ever since the realization that the behavior of atoms and molecules is governed by the laws of quantum mechanics, it has been understood that the world of the very small is nothing like the familiar world of everyday experience. Yet only recently has it been fully appreciated just how different the world of quantum systems is---and how that difference might be exploited to do things that can't be done in our mundane everyday world.

Dr. Caves will illustrate how weird the atomic-scale world really is and indicate how we might take advantage of that weirdness using new technologies for manipulating atomicscale systems.

You will have to pay close attention, but the reward will be a glimpse of the truly astonishing nature of the world we all inhabit.

## LSU Physics & Astronomy in the News

- [LIGO Researcher Gabriela González to be Honored as Distinguished Scientist](#)
- [The 'Astrophysics Disruptor' Who Made Us Think Seriously About Aliens](#)
- [LSU Physicist Applies New Technology to Analyze Ancient Artifacts](#)
- [Corey Matyas Nominated as Goldwater Scholar for his Research with the QST Group](#)
- [Geoff Clayton Featured on Page 10 of City Social Magazine](#)

# Events

- **The International Conference** on Quantum Communication, Measurement and Computing (QCMC 2018)
  - When: Monday, March 12, 2018 8:30 AM - Sat , March 17, 2018 8:30 AM
  - Where: Student Union - Royal Cotillion Ballroom - Room 250
  
- **LaCNS Seminar:**"Breathe, shear, repeat lattice vibration signatures of 2D materials" by Prof. Vincent Meunier from Rensselaer Polytechnic Inst. (Flyer is attached)
  - When: Monday, March 12, 2018 3:00 PM
  - Where: 1008B Digital Media Center
  
- **Public Talks:** "Alienzombie Comets" by Dr. Tabettha Boyajian and "Is the Earth Flat?" by Dr. Geoff Clayton
  - When: Tuesday, March 13, 2018 7:00 PM
  - Where: Varsity Theatre 3353 Highland Road Baton Rouge, LA 70802
  
- **Saturday Science:** "Using technology to understand mental illness" by Alex Cohen from Psychology Department of LSU
  - When: Saturday, March 17, 2018 10:00 AM - 11:15 AM
  - Where: Nicholson (James W.) Hall - Room 130



Monday, March 12  
3:00 pm  
1008B Digital Media Center  
Louisiana State University

**Breathe, shear, repeat lattice vibration signatures of 2D materials**

2D materials (2DMs) such as graphene, transition metal dichalcogenides (TMDs) and black phosphorus have attracted significant attention as emerging low-dimensional materials. These materials feature an array of properties that offer many promises in terms of potential electronic and optoelectronic applications. Many characterization techniques have been employed to improve the understanding of these materials, to establish their crystal structure, purity, number of layers, and internal arrangements. In particular, Raman spectroscopy, has demonstrated that the vibrations can be used as solid indicators of the structural properties of 2DMs. However, due to the emergence of new properties, the interpretation of experimental features requires a dedicated modeling effort based on quantum-mechanics. In this talk, I will overview how quantum mechanical properties and non-resonant Raman scattering are combined to determine the fundamental structural properties in a broad array of 2D materials. I will discuss the importance of low-frequency modes in the study of layer-layer interactions in 2DMs, and how relative twisting angles between layers can be determined by monitoring relative shifts in Raman active mode. I will also show how vibrational signatures can be exploited to understand in-plane anisotropy in phosphorene.

SEMINAR  
SERIES  
2018



*Guest Speaker*

**Dr.  
Vincent  
Meunier**

Gail and Jeffrey L.  
Kodosky '70 Chair,  
Department of  
Physics

Rensselaer  
Polytechnic Institute

Free and open to the public

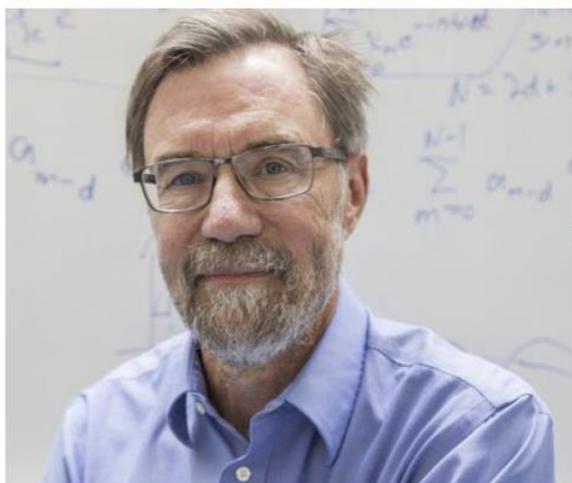


[www.lsu.edu/physics/lacns](http://www.lsu.edu/physics/lacns)





# HEARNE EMINENT LECTURE SERIES



## WHAT THE #\*\$! DO WE (K)NOW!? ABOUT QUANTUM MECHANICS

A PUBLIC LECTURE BY  
DR. CARLTON M. CAVES,  
CENTER FOR QUANTUM INFORMATION  
AND CONTROL

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**Dr. Carlton M. Caves**  
Ph.D., California Institute of Technology, 1979  
Distinguished Professor  
Department of Physics & Astronomy  
Director  
Center for Quantum Information and Control  
University of New Mexico  
Fellow, American Physical Society  
Fellow, American Association for the  
Advancement of Science

**Friday, March 16**  
**2:30 p.m.**  
**Royal Cotillion Ballroom**  
**LSU Union**

**LSU** | College of  
Science  
Department of Physics  
& Astronomy

Socialize with your community's experts in astronomy!

March 13th, at the Varsity Theatre



Doors at 6:30 p.m,  
Talks begin at 7:00 p.m.

@astrotapBR  
astrotapbr@gmail.com

Talks by:

**Dr. Tabetha Boyajian**  
Alien zombie comets

**Dr. Geoff Clayton**  
Is the Earth flat?