Institute for
CONDENSED MATTER THEORY
Physics in Engineering & LAS at Illinois

CALENDAR OF EVENTS http://physics.illinois.edu/bluesheet.asp

Monday, February 18: Institute for Condensed Matter Theory Seminar: "Topological Phases in Disordered and Driven Systems"

Monday, February 18: Medium and High Energy Physics Seminar: Javier Duarte "Unlocking the Potential of LHC Data: Boosted Higgs and Deep Learning"

Tuesday, February 19: Astronomy Colloquium - "Let's Talk About Talking About Science"

Tuesday, February 19: Electronics Workshop

Wednesday, February 20: Physics Careers Seminar: "Scientific Communication Roundtable Discussion"

Wednesday, February 20: Astrophysics, Gravitation and Cosmology Seminar - "What Is Dark Matter? Insights from Dwarf Galaxies and Galaxy Clusters"

Wednesday, February 20: Qi/Amo Seminar: "Engineering Light-Matter Interfaces for Quantum Networks "

Wednesday, February 20: Physics Colloquium: Expert Panel on Communication in Science and Technology

Visitors:

Institute for Condensed Matter Theory Seminar

Title: Topological Phases in Disordered and Driven Systems

Speaker: Hoi Chun (Adrian) Po (Massachusetts Institute of Technology)

Date: Monday, February 18, 2019 **Time/Location:** 12:00 pm/ 190 ESB

Abstract: Periodically driven quantum systems, aka Floquet systems, have been recently identified as a prime platform for the study of topologically nontrivial quantum dynamics. Absent the notion of ground state(s), many-body localization (MBL) plays a crucial role in the definition of such dynamical phases. Strikingly, some of the discovered phases are intrinsically dynamical, in the sense that they do not admit static counterparts. In this talk, I will describe our results on the study of chiral phases in this context. These chiral phases are compatible with the notion of MBL---an impossibility in static systems. I will first discuss the analog of the integer quantum Hall phases, where instead of charge or heat, quantum information is pumped along the edge in a unidirectional manner. Next, I will present an extension of this phase into one featuring intrinsic topological order, where the pumping of emergent Majorana fermions along the edge is accompanied by a necessary dynamical anyon transmutation in the bulk.

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Medium and High Energy Physics Seminar

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Visitors:

Title: Unlocking the Potential of LHC Data: Boosted Higgs and Deep Learning

Speaker: Javier Duarte (Fermi National Laboratory)

Date: Monday, February 18, 2019 **Time/Location:** 1:00 pm / 464 Loomis

Abstract: The discovery of the Higgs boson at the Large Hadron Collider in 2012 opened a new sector for exploration in the standard model of particle physics. Recent developments, including the use of deep learning to identify a complex but common decay of the Higgs boson to bottom quarks, have expanded our ability to study the production of Higgs bosons with very large momenta. By studying these Higgs bosons and measuring their momentum spectrum, we may be able to discover new physics at very high energy scales inaccessible directly at the LHC. I will explain these searches and talk about the direction that deep learning is taking in particle physics, especially how it's changing the way we think about the trigger, event reconstruction, and our computing paradigm.

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Visitors:

Astronomy Colloquium

Title: Let’s Talk About Talking About Science

Speaker: Dr. Paul Sutter (Ohio State University)

Date: Tuesday, February 19, 2019

Time/Location: 3:45 pm / 134 Astronomy

Abstract: Is science communication beneficial, or even necessary? Can talking about science make you a better scientist? Can scientists at all levels connect directly to audiences at all levels, and is that a good thing? Some strange words float around like "branding" - is that useful at all? The answer to all those questions is "yes", and I'll give examples from my own experiences to convince you.

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Visitors:

Electronics Workshop

Date: Tuesday, February 19, 2019

Time/Location: 7:00 pm-8:00 pm / 222 Loomis

Join Society of Women in Physics to learn the basics of circuit construction and connection! Spend an hour learning to use a breadboard, wire a circuit, and successfully solder connections that will keep your circuit together!

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Visitors:

Physics Careers Seminar

Title: Scientific Communication Roundtable Discussion

Speaker: Kenneth Chang (New York Times), David Ehrenstein (American Physical Society), and Phil Schewe (JQI, U. of Maryland)

Date: Wednesday, February 20, 2019 **Time/Location:** 10:00 am / 204 Loomis

Abstract: Informal roundtable discussion about opportunities in science writing.

Bios: Kenneth Chang — Kenneth Chang graduated cum laude with a B.A. in physics from Princeton University in 1987. He also received an M.S. in physics from the University of Illinois at Urbana-Champaign in 1988 and a graduate certificate in science writing from the University of California, Santa Cruz in 1995. Kenneth has been a science reporter at The New York Times since 2000. He covers chemistry, geology, solid state physics, nanotechnology, Pluto, plague and other scientific miscellany. Before joining The Times, Kenneth was a science writer for ABCNews.com from 1997 to 2000. In the summer of 1997, he covered science news for The Star-Ledger in Newark, N.J., and from 1996 to 1997 he reported on education news for Greenwich Time in Greenwich, Conn. From 1995 to 2000, Kenneth was also a freelance writer, writing for the Baltimore Sun, Newsday, San Diego Union-Tribune, Science, United Press International and Santa Cruz County Sentinel. He began his reporting career interning at the Los Angeles Times.

David Ehrenstein — was the founding editor of Physical Review Focus; he got his PhD from the UIUC Dept. of Physics in experimental biological physics. You can read about his career at https://physics.aps.org/about.

Philip Schewe — Phil Schewe is at the University of Maryland. Phil got a BS degree in Physics from UIUC and a PhD from Michigan State in high-energy physics. For many years he was the media liaison for the American Institute of Physics. You can read more about him at http://www.phillipfschewe.org/about-pfs.html

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Visitors:

Workshop Emergent Hydrodynamics in Low Dimensional Quantum Systems

Physical systems look dramatically different at different scales : while the behavior of a few atoms or electrons follows the rules of quantum mechanics, they give rise to new emergent collective behaviors at larger scales. How to go from the microscopic laws of nature to the observed emergent laws at large scale is a question that has fascinated scholars since Democritus.

In the past decade, tremendous progress has been made towards a detailed understanding of these emergent laws in the field of low-dimensional quantum systems, thanks to experimental breakthroughs in ultracold atoms on the one hand, and theoretical advances in quantum integrable systems and low-dimensional field theory on the other hand. Fundamental new paradigms have appeared, such as the Generalized Gibbs Ensembles, and new questions have arisen, that are crucial to understand transport in low-dimensional quantum systems, such as, for instance, about the possible fractal nature of the Drude weight that governs spin conductivity in integrable quantum spin chains.

This timely program aims at bringing together experts in the theory of low-dimensional systems, including the ones responsible for the advances just mentioned, as well as experts in adjacent fields and young promising researchers in those areas.

Registration: More information on the list of speakers, other discussion topics and registration fees are available at www.iip.ufrn.br/events, where interested parties can also register online. IIP’s Events area may also provide assistance through events@iip.ufrn.br or by phone at +55 (84) 3342-2249 (ext. 214 or 215).

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Visitors:

Astrophysics, Gravitation and Cosmology Seminar

Title: What is Dark Matter? Insights from Dwarf Galaxies and Galaxy Clusters

Speaker: Stacy Kim (Ohio State University)

Date: Wednesday, February 20, 2019 **Time/Location:** 12:00 pm / 464 Loomis

Abstract: Despite the key role dark matter has in the composition and evolution of the universe, its identity remains unknown, and dark matter candidates abound. I have devised stronger constraints on key dark matter properties by how they imprint themselves onto astrophysical structures. I show that a classical challenge to the widely accepted cold dark matter paradigm, the missing satellites problem, the conundrum that there are fewer satellites observed around the Milky Way than found in simulations, is solved down to 10^8 Msun. This implies that that warm dark matter models with a thermal relic mass smaller than 4 keV are in tension with satellite counts, putting pressure on the sterile neutrino interpretation of recent X-ray observations. I also show that dark matter self-interactions, which were believed to produce large separations between the galaxy and dark matter distributions in merging galaxy clusters, do not, implying that galaxy-dark matter offsets are unlikely to generate competitive constraints. However, after the dark matter halos coalesce, the galaxies oscillate around the center of the merger remnant on stable orbits with amplitudes that scale strongly with the self-interaction cross section. Observed BCG offsets may constrain the self-interaction cross section to 0.1 cm^2/g---one of the tightest constraints yet.

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Qi/Amo Seminar

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Visitors:

Title: Engineering Light-Matter Interfaces for Quantum Networks

Speaker: Erhan Saglamyurek (University of Alberta, Canada)

Date: Wednesday, February 20, 2019 **Time/Location:** 1:00 pm / 280 MRL

Abstract: The realization of a future quantum Internet relies on processing and storage of quantum information at local nodes and interconnecting distant nodes using photons [1]. Light-matter interfaces constitute building blocks for such networks : they allow for coherent control and reversible transfer of quantum information between “stationary” atoms and “flying” photons. Despite impressive progress over the past two decades, there are still several obstacles needed to be overcome for practical realizations. In my talk, I will address these challenges and present our experimental efforts in view of requirements of quantum networks. Particularly, I will focus on integrated light-matter interfaces based on rare-earth ions and show our demonstrations including the storage of photonic entanglement using these devices [2-4]. Furthermore, I will present a novel approach to develop a broadband spin-photon interface for long-lived storage and manipulation of light in ensemble of laser-cooled atoms [5]. I will conclude my talk with a discussion of future works towards the realization of distributed quantum computing networks.

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Visitors:

Physics Colloquium

Title: Expert Panel on Communication in Science and Technology

Speaker: Kenneth Chang, David Ehrenstein, Phillip Schewe

Date: Wednesday, February 20, 2019

Time/Location: 3:30-5:00 pm/ 141 Loomis

Abstract: Communicating complex ideas in a way that is understandable, unbiased, and meaningful—to other researchers and to the general public—has never been more important for the health of science and of society. The Department of Physics is pleased to announce that three nationally prominent science writers—Kenneth Chang, David Ehrenstein, and Phillip Schewe—will present the Physics Colloquium on February 20, 2019, at 3:30 p.m. in Room 141 Loomis Laboratory of Physics. These distinguished science writers represent decades of experience in communicating science, and they will offer their unique expertise and personal perspectives on how to be an effective spokesperson for your research.