Institute for Condensed Matter Theory Seminar

Title: Higher Order SPT’s: Classification, Construction, and Interactions

Speaker: Alex Rasmussen (Ohio State University)

Date: Monday, February 25, 2019  Time/Location: 12:00 pm / 190 ESB

Abstract: Symmetry protected topological (SPT) phases of matter have been an intense area of study due to their unique boundary properties. Recently, it has been shown that in addition to ordinary d-dimensional SPT phases that can host gapless modes on their d-1-dimensional boundaries, so-called "higher-order" SPT phases host d-1-k-dimensional modes. These corner or hinge modes can be protected by global symmetries and be robust against disorder. I will discuss how to construct and classify these phases from lower-dimensional SPT building blocks. For bosons, we will see how the Künneth formula expansion can be connected to decorated domain walls. For fermions, I will demonstrate several intrinsically interacting fermionic HOSPT phases with no free-fermion analogue.
Medium and High Energy Physics Seminar

**Title:** Top-Higgs Interactions at ATLAS

**Speaker:** Peter Onyisi (University of Texas at Austin)

**Date:** Monday, February 25, 2019

**Time/Location:** 1:00 pm / 464 Loomis

**Abstract:** As the most massive known fundamental particle, the Standard Model predicts that the top quark has very strong Yukawa interactions with the Higgs boson. This interaction plays a central role in our understanding of the Hierarchy Problem and in the high-energy behavior of the Higgs potential, and so gives us a unique window into key questions of electroweak symmetry breaking. In addition, top-Higgs interactions not predicted by the Standard Model can be induced at tree level by more complex Higgs sectors and produce observable effects at the LHC. I will summarize the recent ATLAS observation of top quark pair-Higgs boson associated production (ttH) and the associated direct measurement of the top quark Yukawa coupling, and searches for non-SM flavor-changing neutral current top quark decays to a Higgs boson and a charm or up quark.
Astronomy Colloquium

Title: A Magnified Visions of How Galaxies Evolve

Speaker: Dr. Jane Rigby (NASA)

Date: Tuesday, February 26, 2019

Time/Location: 3:45 pm / 134 Astronomy

Abstract: In hundreds of known cases, "gravitational lenses" deflect, distort, and magnify images of galaxies behind them. Lensing can magnify galaxies by factors of 10--100 times, transforming them from objects we can barely detect to bright objects we can study in detail. We have taken advantage of these natural telescopes to build Megasaura: The Magellan Evolution of Galaxies Spectroscopic and Ultraviolet Reference Atlas. Megasaura is an atlas of high signal-to-noise, medium spectral resolution ($R \sim 3000$) spectra of 15 extremely bright gravitationally lensed galaxies at redshifts of $1.7 < z < 3.6$. The Megasaura spectra reveal a wealth of spectral diagnostics: absorption lines from gas being blown out of the galaxy, emission lines from gas heated by newly-formed star, and photospheric absorption lines and P Cygni profiles from the massive stars that power the outflow. These will be key diagnostics for future telescopes (JWST and beyond) that with Megasaura we can study now. Indeed, Megasaura will be the definitive spectral atlas of its kind until the advent of 20–30m ground-based telescopes in the late 2020s, giving insight into the processes by which galaxies evolve over cosmic time.
CALENDAR OF EVENTS http://physics.illinois.edu/bluesheet.asp

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Monday, February 25: Medium and High Energy Physics Seminar: Peter Onyisi "Top-Higgs Interactions at ATLAS"

Tuesday, February 26: Astronomy Colloquium - "A Magnified Vision of How Galaxies Evolve"

Tuesday, February 26: Celia Elliott’s Russia Talk

Wednesday, February 27: Astrophysics, Gravitation and Cosmology Seminar

Wednesday, February 27: Qi/Amo Seminar: "Engineering Tapped-Ion Systems for Large Scale Quantum Simulation"


Wednesday, February 27: Privilege Walk

Visitors:

Celia Elliott’s Russia Talk

Date: Tuesday, February 26, 2019

Time/Location: 7:00 pm – 9:00 pm/ Loomis 222

Sponsor: Society for Women in Physics & Society of Physics Students

Abstract: Celia Elliott is an academic professional with extensive experience in grant and proposal writing and journal publishing in UIUC's physics department... she also has been to Russia 34 times (come to find out why!), and is coming to our meeting to recount both her adventures and her misadventures! This is seriously a meeting you don't want to miss!!
Astrophysics, Gravitation, and Cosmology Seminar

Speaker: Jane Rigby (NASA)

Date: Wednesday, February 27, 2019

Time: 12:00 pm

Location: 464 Loomis Laboratory
Title: Engineering Tapped-Ion Systems for Large Scale Quantum Simulation

Speaker: Guido Pagano (University of Maryland and National Institute of Standards and Technology)

Date: Wednesday, February 27, 2019

Time/Location: 1:00 pm/ 280 MRL

Abstract: Laser cooled trapped ions offer unprecedented control over both internal and external degrees of freedom at the single-particle level. They are considered among the foremost candidates for realizing quantum simulation and computation platforms that can outperform classical computers at specific tasks. In this talk I will show how linear arrays of trapped 171Yb+ ions can be used as a versatile platform for studying quantum dynamics of strongly correlated many-body quantum systems. In particular I will describe how to realize time-crystalline phases in a Floquet setting, where the spin system exhibits persistent time-correlations under many-body-localized dynamics [1]. I will also present our observation of a new type of out-of-equilibrium dynamical phase transition in a spin system with over 50 spins [2]. Moreover I will show our latest efforts towards scaling up the trapped-ion quantum simulator [3] using a cryo-pumped vacuum chamber where we can trap more than 100 ions indefinitely. The reliable production and lifetime of large linear ion chains enabled us to investigate quasi-particle excitations showing confinement in the post-quench dynamics [4] and the implementation of Quantum Approximate Optimization Algorithms (QAOA) [5].
Title: Atomic Layer Deposition Origami: A Technology Platform for Nanoscale Machines, Sensors, and Robots

Speaker: Itai Cohen (Cornell University)

Date: Wednesday, February 27, 2019  Time: 4:00 pm

Abstract: What would we be able to do if we could build cell-scale machines that sense, interact, and control their micro environment? Here I will describe a new platform we are developing for the construction of micron sized origami machines can sense their environments, respond, and perform useful functions on time and length scales comparable to microscale biological organisms. With the incorporation of electronic, photonic, and chemical payloads, these basic elements will become a powerful platform for robotics at the micron scale. As such, I will close by offering a few forward looking proposals to use these machines as basic programmable elements for the assembly of multifunctional materials and surfaces with tunable mechanical, optical, hydrophilic properties. Professor Itai Cohen is obsessed with matter in motion. At Cornell, his research has focused on investigating the behavior of microscopic and nanoscopic particles suspended in a fluid, exploring the mechanics of materials ranging from biological tissues to origami inspired metamaterials, discovering the mechanisms used by insects during flapping flight, and determining how Tango dancers and audiences at heavy metal concerts coordinate their movement. Understanding the out-of-equilibrium behaviors of these systems remains one of the biggest challenges in Physics.
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Wednesday, February 27: Privilege Walk

Visitors:

Privilege Walk

Date: Wednesday, February 27, 2019

Time: 8:00 pm

Location: Loomis 222
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Visitors:

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Missouri University of Science and Technology Available Postdoctoral Position

The quantum many-particle research group at the Missouri University of Science and Technology expects to fill a postdoctoral position in condensed matter theory. The group is led by Thomas Vojta, with research interests in quantum, classical, and nonequilibrium phase transitions, disordered system, magnetism and superconductivity.

More information can be found at [http://web.mst.edu/~vojtat](http://web.mst.edu/~vojtat).

They are looking for a candidate with experience in one or more of these subjects. The position is anticipated to start on September 1, 2019, but earlier or later start dates may be possible. The initial appointment will be made for one year, with a possible extension for another year. Potential applicants should email CV, list of publications, a description of research interests, and names of three references (with e-mail addresses and phone numbers) to vojtat@mst.edu. Review of the applications will begin on March 10, 2019, but applications will be considered until the position is filled.
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2nd Minnesota Condensed Matter Summer School

Title: Advances in strongly correlated electronic systems (ASCES 2019)

This school is sponsored by the William I. Fine Theoretical Physics Institute (FTPI) at the University of Minnesota. The school is aimed at research-active graduate students and postdocs and will be held in Minneapolis from Monday, June 10th - Saturday, June 15th, 2019.

The emphasis of the school will be on fundamental physics and on recent developments in the fields of unconventional superconductivity, topological properties, strong correlations, cold-atom systems, and novel numerical methods. The full list of confirmed lecturers, details about the school and a link to the application are on the attached poster and available at our website: http://www.ftpi.umn.edu/workshops/2018-2019/ASCES/index.html

The application deadline is March 22, 2019, so please encourage your students and postdoc to apply. Please contact us with any questions by email at FTPI (at) umn.edu.