## CENTER FOR PHYSICS

## **2013 WINTER CONFERENCE**

ON

## **BIOPHYSICS**

January 6 – 11, 2013 Sunday through Friday evening, inclusive

## SINGLE MOLECULE BIOPHYSICS

This will be the 7<sup>th</sup> biennial workshop on Single Molecule Biophysics (SMB) held at the Aspen Center for Physics (ACP), building on a successful conference series begun in 2001. The SMB meeting highlights recent progress in the field of single molecule biophysics on both its experimental and theoretical frontiers. Topics vary somewhat every year. Biological systems covered in past meetings have included mechanoenzymes (myosin, kinesin, dynein, ATP synthase, flagellar motors), nucleic acid-based enzymes (polymerases, topoisomerases, helicases, etc.), nucleic acids (DNA & RNA), and aspects of molecular physiology (folding/unfolding, binding, signaling, and other biostructural changes). Featured experimental techniques have included fluorescence, optical trapping, magnetic tweezers, scanned-probe microscopy, and super resolution microscopy. The workshop traditionally admits a mixture of experimentalists and theorists. Biologists and physicists with either newfound or longstanding interests in biophysics are encouraged to apply: all levels of accomplishment are welcome. The meeting features a lively mix of students and professors. The SMB workshop has been oversubscribed in the past, so higher priority will be assigned to applicants presenting important new findings who commit to remain for the duration of the meeting. In the event of oversubscription, a limit of two representatives from each participating scientific group or collaboration will be adopted. We will attempt to award each group or collaboration one short talk based on the applications submitted. All attendees are also invited to present posters. Prospective participants should submit the following:

A short abstract (<200 words) of the proposed contribution along with a title, names, and affiliations of any co-authors. Abstracts will be ranked and used as a basis for admission.

- Indicate if you wish the abstract to be considered for a talk: otherwise, a poster presentation will be assumed
- Indicate that you intend to attend the full meeting, if accepted. If a partial attendance is necessary, please be sure to state the reason.

In years past, funds have been raised to help defray a portion of the expenses for junior participants, or for those traveling a very long way. Fund-raising continues and we intend to maintain this tradition. In addition, one junior applicant will receive a merit-based scholarship award from a special endowment fund for the ACP Winter Meetings.

Application deadline is October 15, 2012 Please complete your application at: jila.colorado.edu/smb

> **ORGANIZERS:** Steven Block, Stanford University Thomas Perkins, JILA

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Aspen Center for Physics 700 West Gillespie Street Aspen, CO 81611

## CENTER FOR PHYSICS 2013 WINTER CONFERENCE ON

CONDENSED MATTER PHYSICS January 13 – January 18, 2013

Sunday evening reception Meetings Monday morning through Friday noon

## **TOPOLOGICAL STATES OF MATTER**

Topologically ordered phases represent a departure from the well-established Landau paradigm of broken symmetries. They cannot be described by local order parameters, yet they have many peculiar properties clearly distinguishing them from the conventional quantum-disordered phases. One of their most interesting aspects is the appearance of exotic quasiparticles obeying non-Abelian braiding statistics.

This winter conference will focus on topologically ordered phases of matter, their experimental signatures, and possible ways of utilizing them as platforms for topologically-protected quantum computation. It will encompass three major directions of the interdisciplinary research in this field: fractional quantum Hall systems, topological insulators and superconductors, and topological quantum information processing. The aim of this conference is to bring together researchers working on different subjects related to topological states of matter and encourage research driven interaction between them, further stimulating new ideas and approaches in this rapidly developing field.

## Application deadline is October 30, 2012

Conference Website: physics.ucr.edu/~shtengel/ACP2013 Please complete your application at <u>www.aspenphys.org</u>

#### **ORGANIZERS:**

Leo Kouwenhoven, Delft Institute of Technology Roman Lutchyn, Microsoft Station Q Nadya Mason, University of Illinois, Urbana-Champaign Kirill Shtengel, University of California, Riverside

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## A S P E N CENTER FOR PHYSICS 2013 WINTER CONFERENCE

# **ASTROPHYSICS**

January 19 - 24, 2013 Reception Saturday evening Meetings Sunday morning through Thursday noon

## PHYSICAL APPLICATIONS OF MILLISECOND PULSARS

Millisecond pulsars are exotic, energetic neutron stars which allow us to probe multiple facets of fundamental physics via a variety of measurements at different wavelengths. Since the discovery of the first millisecond pulsar 30 years ago, over 200 of these objects have been discovered, with the population more than doubling in the last decade. These discoveries include many strange and unique systems that challenge our theoretical understanding and serve as powerful physics tools. This conference will be the third in a roughly decadal series of Aspen Winter Conferences on studying physics with pulsars. Among the topics to be discussed are: the acceleration of particles to highly relativistic energies in millisecond pulsar magnetospheres and the production of GeV gamma-rays by those particles, the unknown plasma physics responsible for radio eclipses from certain binary pulsars, the physics of matter at supra-nuclear densities and the equation of state of neutron-rich material, the evolution of binary and isolated millisecond pulsars, pulsars in globular clusters, classical and relativistic orbital dynamics including stringent tests of general relativity, and the likely imminent detection of nanohertz gravitational radiation using a pulsar timing array.

## Application deadline is November 15, 2012

Please complete your application at <u>www.aspenphys.org</u> Conference Website: <u>aspen13.phys.wvu.edu</u>

#### **ORGANIZERS**:

Maura McLaughlin, West Virginia University Scott Ransom, National Radio Astronomy Observatory Paul Ray, Naval Research Laboratory Ingrid Stairs, University of British Columbia Stephen Thorsett, Willamette University

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# ASPEN CENTER FOR PHYSICS

# 2013 WINTER CONFERENCE

January 28 – February 3, 2013 Monday evening reception Meetings Tuesday morning through Sunday noon

## **CLOSING IN ON DARK MATTER**

Dark matter is a cornerstone of the cosmological Standard Model, but we only have evidence for it through its gravitational effects. Experimental results to date have provided inconclusive but tantalizing evidence for the particle nature of dark matter. In the coming months, experimental developments are expected to shed light on some of its fundamental properties. A significant advance in our understanding may follow. The complementary approaches to detecting dark matter are reaching sensitivities which will probe many dark matter theories. At the same time, there has been exciting new research elucidating the possible theoretical frameworks for dark matter. This Aspen Winter Workshop will focus on synthesizing these latest experimental results and theoretical developments, determining the implications for dark matter properties, and pinpointing future directions in this rapidly evolving field.

### Application deadline is November 15, 2012

Conference Website: <u>https://indico.cern.ch/conferenceDisplay.py</u>?confld=197862 Please complete your application at <u>www.aspenphys.org</u>

#### **ORGANIZERS:**

Jodi Cooley, Southern Methodist University Stefan Funk, Stanford University Manoj Kaplinghat, University of California, Irvine Jason Kumar, University of Hawaii Jennifer Siegal-Gaskins, Caltech Anyes Taffard, University of California, Irvine

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Reception Sunday evening Meetings Monday morning through Saturday noon

## NEW DIRECTIONS IN NEUTRINO PHYSICS

Nearly a decade ago, a clear path forward was developed by the neutrino physics community. Exciting new results have recently come out as early steps along that path. The time is now ripe to look at new experimental ideas that have arisen and the performance of current experiments. This conference will take the current status of experiments as its launching point. We will examine new accelerator and reactor oscillation results, prospects for learning about the mass hierarchy and leptonic CP violation, and potential for observing new physics in oscillation experiments. We will also cover the latest developments in neutrino physics, astrophysics and cosmology more broadly, including neutrinoless double beta decay, neutrino interactions, and supernovae. The emphasis of the conference will be on how new experimental techniques and theoretical ideas will impact the future directions of the field.

#### Application deadline is November 30, 2012 Please complete your application at <u>www.aspenphys.org</u>

#### **ORGANIZERS:**

André de Gouvêa, Northwestern University Carter Hall, University of Maryland Gail McLaughlin, North Carolina State University Ryan Patterson, California Institute of Technology David Saltzberg, University of California, Los Angeles Kate Scholberg, Duke University Cristina Volpe, APC-Astroparticule et Cosmologie, Paris

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## **2013 WINTER CONFERENCE**

ON

## ASTROPHYSICS

February 9 - 15, 2013 Saturday evening reception Meetings Sunday morning through Friday noon

## EXOPLANETS IN MULTI-BODY SYSTEMS IN THE KEPLER ERA

For centuries, theories of planet formation were guided exclusively by our solar system. However, the discovery of planets orbiting other stars (exoplanets) in the past two decades has demonstrated that nature often produces planetary systems quite different from our own, neither anticipated by nor well-explained by the current theories of solar system formation and dynamics. The diversity of planetary system architectures (the masses and orbital arrangements of planets) has confronted astronomers with many new challenges and reinvigorated the fields of planet formation and orbital dynamics. Among these challenges are planetary systems with multiple planets in close-in orbits, highly eccentric orbits, and planets in binary star systems.

In this one week program, scientists from the fields of planetary science, celestial mechanics, astronomy, astrophysics and astrobiology will meet to discuss new developments in the field of extrasolar multi-planet systems. The goal of our workshop is to provide an environment where these scientists can present new ideas, discuss their implications for identifying the most important problems in the field and chart the field's future direction.

#### Application deadline is November 30, 2012

Conference Website: <u>http://www.astro.ufl.edu/~eford/meetings/aspen2013/</u>

Please complete your application at <u>www.aspenphys.org</u>

#### **ORGANIZERS:**

Eric B. Ford (University of Florida; co-chair) Nader Haghighipour (Institute for Astronomy, Univ. Hawaii; co-chair) Eric Agol (University of Washington) Matthew J. Holman (Harvard-Smithsonian Center for Astrophysics) Rosemary Mardling (Monash University/University of Geneva) Renu Malhotra (The University of Arizona) Ruth Murray-Clay (Harvard-Smithsonian Center for Astrophysics)

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## **2013 WINTER CONFERENCE**

ON

## PARTICLE PHYSICS March 10 – March 16, 2013 Sunday evening reception Meetings Monday through Friday noon

## HIGGS QUO VADIS

By winter 2013, the ATLAS and CMS experiments at the LHC will per experiment have results based on 5 inverse fb at 7 TeV and about another 20 inverse fb at 8 TeV. Following the discovery of a Higgs-like particle in mid 2012, the new data will shed light on its properties, such as couplings to other particles, spin and CP properties.

The 2013 Aspen Winter Conference on particle physics will bring together experimentalists and theorists, creating a stimulating environment to present and discuss the implications of the newest Higgs results. A thorough understanding of the implications of this observation is also essential for higher energy runs at the LHC, including mapping out analysis strategies and proposing new relevant measurements. It will also point the new directions in the search for new physics beyond the Standard Model.

The Higgs-Quo-Vadis conference will be formulated to encourage close collaborations and active exchange of information, which will be crucial to unveil the nature of this new particle that constitutes these days the central topic of particle physics.

#### Application deadline is December 31, 2012 Please complete your application at <u>www.aspenphys.org</u>

#### **ORGANIZERS:**

Sally Dawson, Brookhaven National Laboratory Eilam Gross, Weizmann Institute of Science (chair) Christoph Paus, Massachusetts Institute of Technology Maurizio Pierini, CERN Anna Goussiou, University of Washington Sven Heinemeyer, Insituto de Fisica de Cantabria (IFCA/CSIC) Lian-Tao Wang, University of Chicago

#### INTERNATIONAL ADVISORY COMMITTEE:

Nima Arkani-Hamed, Institute for Advanced Study Dave Charlton, University of Birmingham David Gross, UC Santa Barbara Joe Incandela, UC Santa Barbara Bill Murray, Rutherford Appleton Lab Sharam Rahatlou, Istituto Nazionale di Fisica Nucleare Rob Rosner, Fermilab

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## **2013** SUMMER PROGRAM May 26 to September 15, 2013

The program of the Aspen Center for Physics is based on individual and collaborative research and the informal exchange of ideas. In an environment free from normal distractions, more than five hundred scientists from over a hundred U.S. and international institutions participate in the Center's summer program with eighty to ninety in residence at any one time. Research interests include astrophysics, biophysics, condensed matter physics, dynamical systems, elementary particle physics, mathematical physics and statistical physics. The stimulating interaction among participants with diverse interests and backgrounds is one of the most fruitful aspects of the program. Opportunities for collaboration and for initiating new research are always available as colleagues from a variety of subfields are present throughout the summer. In addition to the unstructured program of Individual Research and Working Groups, Informal Workshops are also scheduled.

Individual Research, any physicist can apply in this category	May 2	26 to	Sept 15
Working Groups, for 3 to 5 collaborators	May 2	26 to	Sept 15

#### Informal Workshops

The Origins of Stellar Clustering from Fragmenting Clouds

to the Build-Up of Galaxies
The Obscured Universe: Dust and Gas in Distant Starburst Galaxies
Lattice Gauge Theory in the LHC Era
<i>Physics of Functional Biological Assemblies: Pushing, Pulling and Sensing</i> May 26 to June 30
The Next Decade of Weak Lensing ScienceJune 16 to July 7
Disorder, Dynamics, Frustration and Topology in Quantum Condensed Matter June 16 to July 21
Mathematics of Superconformal Field Theory July 7 to Aug 4
The Milky Way as a Laboratory for Galaxy FormationJuly 21 to Aug 11
Optical Lattice Emulators and BeyondAug 4 to Aug 25
Implications of LHC Higgs-Like Signals Aug 11 to Sept 1
Dark Matter in Galaxies, the LHC and Direct and Indirect Searches:
Are We Near the End of the Road? Aug 18 to Sept 15
Multi-Component Many-Body Systems Aug 25 to Sept 15
Astrophysical Mechanisms of Particle Acceleration and Escape from the Accelerators Sept 1 to Sept 15

#### Proposals for 2014 Summer Workshops are invited.

## Proposal information and submission are available on our website at <u>www.aspenphys.org</u>. Proposals should be completed by June 30, 2013. Those received after this date will be considered only in exceptional circumstances.

#### Proposals for the 2014 Winter Conferences are also invited.

They should be completed by January 15, 2013.

Physicists who wish to pursue a serious program of research at the Center are invited to apply. Applications by small working groups and independent researchers are strongly encouraged. An effort is made to select a diversity of participants from a wide field of physics, ranging in experience from post-doctoral fellows to senior scientists, and representing a variety of institutions. Special consideration is given to physicists who have never participated or who have not participated recently. The Aspen Center for Physics is committed to the significant participation of women and under-represented groups in all of its programs. While there are no experimental facilities available, experimentalists are encouraged to participate in the Center's programs.

Many summer participants bring their families with them to Aspen. Numerous childcare and day camp options are available within the Aspen/Snowmass area and current information and advice is available through the Center and local websites. Weekly picnics at the Physics Center give families an opportunity to meet and share activities.

Individual participants must provide their own salaries from their contracts, grants, fellowships or regular appointments. Through a grant from the NSF, the Center provides partial financial support for the housing we arrange for you.

## Application Deadline is January 31, 2013

More detailed information and online applications at www.aspenphys.org

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The Aspen Center for Physics continues to be guided by a policy of equal opportunity and non-discrimination.

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