

Electronic Newsletter 2015-2016, Part 2

April 7, 2016

In this issue

- [April 2016 Meeting, Salt Lake City, Utah](#)
- [Nominations for APS Fellowships and the Bethe Prize](#)
- [DAP Elections](#)
- [DAP Business Meeting](#)
- [Public Lecture and Plenary Session Highlights](#)
- [DAP Session Schedule](#)
- [Focus Sessions sponsored by the DAP](#)
- [Invited Session Highlights](#)



APS DAP Officers 2015-2016:

Chair: Paul Shapiro
Chair-Elect: Julie McEnery
Vice Chair: Fiona Harrison
Past Chair: John Beacom
Secretary/Treasurer:
Scott Dodelson
Deputy Sec./Treasurer:
Keivan Stassun
Member-at-Large:
Patricia Burchat
Member-at-Large:
Brenna Flaughner
Division Councilor:
Miriam Forman
Member-at-Large:
Anna Frebel
Member-at-Large:
Marc Kamionkowski

Questions? Comments?

Newsletter Editor:
Scott Dodelson
dodelson@fnal.gov

Finalize your plans now to attend the April 2016 meeting held this year in Salt Lake City, Utah. A number of plenary and invited sessions will feature presentations by DAP members. Here are the key details:

What: April 2016 APS Meeting

When: Saturday, April 16 – Tuesday, April 19, 2016

Where: Salt Lake City, Utah (Salt Palace Convention Center)

Registration Deadline: Passed; still possible to register on-site

The 2016 April Meeting will take place at the Salt Palace Convention Center. Detailed information for the meeting, including details on registration and the scientific program can be found online at <http://www.aps.org/meetings/april>

**Note that you can still register on-site, if you didn't do so yet.
For a regular member, the on-site registration fee is \$540.**

Elections for the APS DAP Officers

Deadline: April 15, 2016

We urge you to cast your vote in the annual DAP elections for the DAP officers. Please check your e-mailbox on Friday, April 8 for the announcement and voting instructions. No lines to stand in; no polling places closing on you; simply spend 5 minutes perusing the superb qualifications of the candidates and a few more seconds recording your vote. You have a full 7 days to fill out the ballot. .

Call for Nominations for APS Fellowship

Deadline: June 1, 2016

Members of the Division of Astrophysics are encouraged to submit nominations of DAP members for Fellowship in the APS, according to which, "Any active APS member is eligible for nomination and election to Fellowship. The criterion for election is exceptional contributions to the physics enterprise; e.g., outstanding physics research, important applications of physics, leadership in or service to physics, or significant contributions to physics education. Fellowship is a distinct honor signifying recognition by one's professional peers."

The number of new Fellows elected per year is limited to one-half percent of the current membership, and is apportioned according to Division membership. Last year, 12 nominations put forward by the DAP were successful.

As noted by the APS, "The membership of APS is diverse and global, and the Fellows of the APS should reflect that diversity. Fellowship nominations of women, members of underrepresented minority groups, and scientists from outside the United States are especially encouraged." The DAP strongly supports these statements.

Please consider nominating deserving DAP members for APS Fellowship! (Or persuading their department chairs and mentors to do so!) You can check a person's membership and fellowship status in the APS Member Directory <https://www.aps.org/membership/directory.cfm>. All instructions for nominations can be found at <http://www.aps.org/programs/honors/fellowships>.

The DAP deadline for nominations is 1 June 2016. It takes some time to gather the materials and supporting letters, so we encourage you to start now.

Call for Nominations for the Bethe Prize

Deadline: July 1, 2016

The Executive Committees of the APS Divisions of Astrophysics and Nuclear Physics encourage nominations for the Hans A. Bethe Prize. For details, see <http://www.aps.org/programs/honors/prizes/bethe.cfm>. This prize is intended to recognize outstanding work in theory, experiment or observation in the areas of astrophysics, nuclear physics, nuclear astrophysics, or closely related fields. The prize consists of \$10,000 and a certificate citing the contributions made by the recipient. This prize is endowed by contributions from the Division of Astrophysics, the Division of Nuclear Physics, and friends of Hans A. Bethe to honor him for his outstanding and numerous accomplishments in both astrophysics and nuclear physics.

The Executive Committees of the APS Divisions of Astrophysics and Nuclear Physics especially encourage nominations reflecting the stated intent of the Hans Bethe Prize: To recognize outstanding work in theory, experiment, or observation in the areas of astrophysics, nuclear physics, nuclear astrophysics, or closely related fields. This is in keeping with Hans's wishes — a Prize encompassing both fields with which he is most closely identified. The prize is open to any scientist working in these areas, worldwide.

Relatively few nominations have been received in observation or in experiment in recent years. Likewise, relatively few nominations have been received for work that is centered on astrophysics, or centered on nuclear physics, as distinct from the intersection of these two fields. Thus we encourage nominations that reflect the broad scientific diversity of Hans Bethe's interests. We also encourage nominations of women, members of other under-represented groups, young scientists, and international scientists.

Encourage your students to join the APS and DAP

The next generation of physicists are current students. The APS has many programs to help students grow their careers. Students can join the APS with the first year free and the low rate of \$35/year thereafter; they can join up to two Divisions and Topical Groups for free. Please see <http://www.aps.org/membership/student.cfm> for details. Once they are members, students are eligible to give talks at APS meetings, apply for travel support and merit-based awards, and more. Student DAP members can apply for up to \$600 in travel support to attend the April Meeting; they can also be nominated to be considered for the Thesis Prize, which includes giving an invited talk with additional travel support.

One of the main goals of the APS is to "advance and diffuse the knowledge of physics." This includes advocacy with the government and the press, connecting different parts of the community, publishing leading journals, running meetings with great opportunities for students, providing professional recognition, and more.

In a similar way, the DAP works to advance and diffuse the knowledge of astrophysics, which includes helping the APS carry out the above missions. Astrophysics is on a great run of important discoveries that impact many fields. We are working to grow the scope of the DAP to better include new developments in cosmology, gravitation, particle and nuclear astrophysics, and more.

Advisors can play a crucial role in encouraging their students to join the APS and DAP. Please forward this to yours!

Overview of the April Meeting

Message from the DAP Chair-elect Julie McEnery

We are excited about this April Meeting and hope that you plan to attend. This newsletter includes some highlights and special features of the DAP-related parts of the meeting. Details are given in the following pages. This year DAP is sponsoring 38 sessions at the APS April Meeting, including 13 invited sessions and 7 mini-Symposia.

- **Plenary sessions.** Several of the plenary events will be of great interest to DAP members. This year, there is an extra plenary talk on the first direct detection of gravitational waves given by Vicky Kalogera, this year's winner of the Hans Bethe prize. In addition, there will be a public talk by Lisa Randall on Dark Matter and the Dinosaurs: The Astounding Interconnectedness of the Universe.

- **Invited sessions.** The DAP, including through cooperation with several other APS units (DNP, DPF, and GGR), is offering a large number of sessions covering a wide range of forefront topics and a diverse set of excellent speakers. Our "Hot Topics" session highlights late-breaking results on i) electromagnetic follow up to the first gravitational wave detection, ii) measuring the kinematic SZ effect with the South Pole Telescope and iii) r-process events in dwarf galaxies.

- **Business Meeting.** Please join us on Monday evening at 5:30 for the DAP Business Meeting in Room 250DE, where food and drinks will be served.

- **Focus on Young Scientists.** Division of Astrophysics has recently established a new Outstanding Doctoral Thesis Award: our second cohort of three finalists will give invited talks at a special session on Sunday, April 17 at 1:30 (Session K4), which will include presentations by Blakesley Burkhart, Liang Dai, and Wen-fai Fong. The winner will be announced at the DAP Business Meeting, Monday evening. In addition, the DAP is providing partial travel support for many graduate students to attend the meeting.

- **Minisymposia/focus sessions.** This year, we are especially happy to have an increased number of focus sessions. These sessions which are organized by DAP general members provide an opportunity for the DAP community to directly participate in the scientific organization of the April meeting. This year's sessions include a meeting for several NASA science interest groups, two sessions on cosmic-rays (one on high energies with telescope array and another focusing on medium energy observations from space), and a session on high energy gamma-rays.

**Annual DAP Business Meeting at April 2016 APS Meeting
Monday, April 18 at 5:30 PM in Room 250DE**

The Division of Astrophysics will hold its annual **Business Meeting** at the April APS meeting in Salt Lake City on **Monday, April 18 at 5:30 PM** in Room 250DE. *All members of DAP are warmly encouraged to attend the annual business meeting.* Please join us for discussion of issues relevant to the membership of the DAP. Newly elected APS Fellows from the DAP will be honored and the winner of the DAP Thesis Prize will also be announced. Refreshments will be served. See you there!



**Public Lecture (Session G1, Room: Ballroom A):
Dark Matter and the Dinosaurs: The Astounding Interconnectedness of
the Universe
Saturday, April 16, 7:30 PM
Lisa Randall, Harvard**



Plenary Sessions for the April 2016 Meeting

Plenary I (Session A1, Ballroom E-J): Physics and Society

Saturday, April 16, 8:30 AM

- Helen Quinn (SLAC) *“Physics and Education”*
 - Marcel Demarteau (Argonne National Laboratory) *“The Tools and Techniques of Particle Physics and Their Impact on Society”*
 - Mei Bai (Brookhaven National Laboratory) *“Accelerators for America’s Future”*
-

Plenary II (Session Q1, Ballroom E-J): Fred Kavli Keynote Session Commemorating the 60th Anniversary of Cowan and Reines Detection of the Neutrino in 1956

Monday, April 18, 8:30 AM

- Art McDonald (Sudbury Neutrino Observatory Institute and Queens) *“The Sudbury Neutrino Observatory: Observation of Flavor Change for Solar Neutrinos”*
 - Takaaki Kajita (Tokyo) *“Atmospheric Neutrinos”*
 - Neta Bahcall (Princeton) *“John Bahcall and the Solar Neutrino Problem”*
-

Plenary III (Session W1, Ballroom E-J): Commemorating the 60th Anniversary of Lee and Yang’s Parity Violation Proposal and the Wu Experiment

Tuesday, April 19, 8:30 AM

- Gerald Gabrielse (Harvard) *“Stringent Low Energy Tests of the Standard Model, Its Symmetries and Modifications”*
 - Xiaochao Zheng (Virginia) *“Experiments probing parity violation using electrons at GeV energy”*
 - Edward Witten (Institute for Advanced Study) *“Symmetries and Geometry”*
-

DAP Focus and Invited Sessions at the April 2016 Meeting

The current schedule of the focus and invited sessions sponsored or co-sponsored by DAP is tabulated in time-order below. The following pages contain brief highlights of some of these sessions. Of course the LIGO discovery will pervade the atmosphere, but note the excitement in many other areas of astrophysics!

Session ID	Title	Day Date	Start Time	Room
B4	Cosmic Microwave Background	Sat. Apr 16	10:45 AM	Ballroom C
C4	WIMP Dark Matter	Sat. Apr 16	1:30 PM	Ballroom C
E4	Local Universe Cosmology	Sat. Apr 16	3:30 PM	Ballroom C
H4	The Physics of Exoplanets	Sun. Apr 17	8:30 AM	Ballroom C
H11	Physics of the Cosmos mini-symposium	Sun. Apr 17	8:30 AM	250C
J4	Cosmology with the Dark Energy Survey	Sun. Apr 17	10:45 AM	Ballroom C
J11	Inflation Probe Science Interest Group	Sun. Apr 17	10:45 AM	250C
J12	Gravitational Wave Science Interest Group	Sun. Apr 17	10:45 AM	250DE
J13	Cosmic-Ray Science Interest Group	Sun. Apr 17	10:45 AM	250F
K4	Invited DAP Thesis Prize	Sun. Apr 17	1:30 PM	Ballroom C
K5	Listening to the Universe with Pulsar Timing Arrays	Sun. Apr 17	1:30 PM	Ballroom D
M3	Neutron Stars in the Multi-Messenger Era	Sun. Apr 17	3:30 PM	Ballroom B
R2	Dark Matter Beyond WIMPs	Mon. Apr 18	10:45AM	Ballroom A
S4	Supernovae - New Clues and Challenges	Mon. Apr 18	1:30 PM	Ballroom C
S13	Intermediate Energy Cosmic Rays	Mon. Apr 18	1:30 PM	250F
U4	New High Energy Views of the Galaxy	Mon. Apr 18	3:30 PM	Ballroom C
X2	Cosmic Neutrinos and New Physics	Tues. Apr 19	10:45 AM	Ballroom A
X4	Hot Topics in Astrophysics	Tues. Apr 19	10:45 AM	Ballroom C

Focus Sessions for the April 2016 Meeting

Physics of the Cosmos mini-symposium Sunday, April 17, 8:30 AM Session H11, Room 250C

Speakers: Ann Hornschemeier, John Conklin, Marshall Bautz, Mark McConnell, Eun-Suk Seo, Edward Wollack, and Olivier Dore.

Inflation Probe Science Interest Group Sunday, April 17, 10:45 AM, Session J11, Room 250C

Speakers: Jamie Bock, Charles Lawrence, Adrian Lee, Shaul Hanany, John Carlstrom, and Michael Niemack.

Gravitational Wave Science Interest Group Sunday, April 17, 10:45 AM Session J12, Room 250DE

Speakers: Neil Cornish, Guido Mueller, Robin Stebbins, William Klipstein, Jeffrey Livas, Shane Larson, and Martin Hewitson.

Cosmic-Ray Science Interest Group Sunday, April 17, 10:45 AM Session J13, Room 250F

Speakers: Igor Moskalenko, T. Gregory Guzik, Nicolas Picot-Clemente, T. Brandt, John Krizmanic, and James Adams.

Telescope Array Monday, April 18, 8:30 AM Session R11, Room 250C

Speakers: John Matthews, John Belz, Jihee Kim, Jon Paul Lundquist, Robert Cady, Ivanov, and Rasha Abbasi.

Fermi-HAWC-VERITAS Monday, April 18, 8:30 AM Session R13, Room 250F

Speakers: Hao Zhou, Ralph Bird, Nieto Castano, Robert Lauer, Maco Ajello, Elisa Pueschel, and Roger Blandford.

April 2016 Meeting DAP Invited Sessions Highlights

Session K4: Division of Astrophysics Thesis Prize

Sunday, April 17, 1:30 PM

Finalists for the DAP Thesis Prize will present the science behind their dissertations. Blakesley Burkhart, PhD University of Wisconsin, has studied turbulence in the interstellar medium and will describe new techniques for learning about the injection scale, spectral index and Mach number. Liang Dai, PhD Johns Hopkins University, introduced novel techniques for characterizing perturbations in the early universe with an eye on implications for inflation. Wen-fai Fong, PhD Harvard University, has unveiled the progenitors of short gamma-ray bursts.

Session X4: Hot Topics in Astrophysics

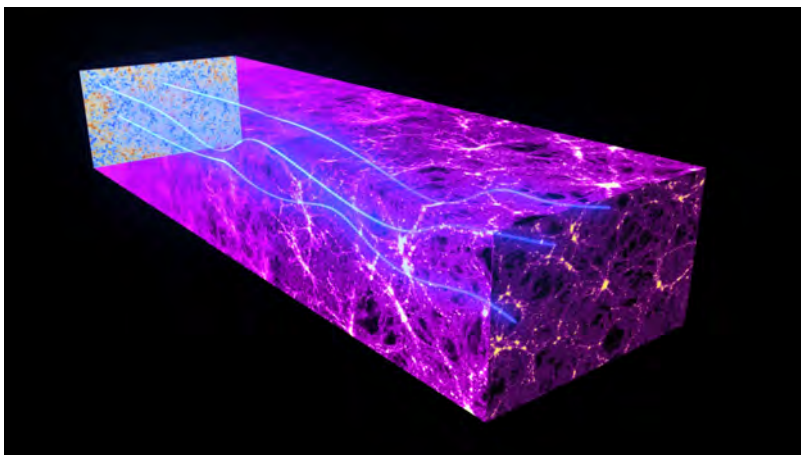
Tuesday, April 19, 10:45 AM

The “Hot Topics” session presents some of the latest and most exciting developments in astrophysics. Lindy Blackburn (Harvard-CfA) will present the latest results on the initial detection of gravitational waves and follow-up of a weak event of moderate significance by the Fermi Gamma-ray Burst Monitor. The plausibility of it being an EM counterpart when none is expected for the binary black-hole system will be discussed. Kyle Story (Stanford) will report on the recent first, significant (4σ) detection of the pairwise kinematic Sunyaev-Zel’dovich signal using a galaxy cluster catalog from the first year of data from the Dark Energy Survey with CMB temperature maps from the South Pole Telescope, to constrain cosmological models and probe gravity on large length scales. Alexander Ji (MIT) will speak on the discovery of old metal-poor stars that contain large amounts of heavy r-process elements in the ultra-faint dwarf galaxy Reticulum II. This suggests the r-process to occur in neutron star mergers (or possibly magnetars) in the early universe rather than core-collapse supernova, as long presumed and promoted based on observations of halo r-process stars.

Session B4: Cosmic Microwave Background

Saturday, April 16, 10:45 AM

The cosmic microwave background (CMB) has proven to be essential to the development of a quantitatively precise model for the origin, evolution, and largest-scale structure of the Universe. The information extracted from the CMB has come primarily from measurements of temperature fluctuations, but the CMB polarization is now playing an increasingly important role. This session will highlight several of the ways the CMB has impacted our understanding of the Universe and discuss some new ways that future CMB measurements may be used. Brendan Crill will review how current measurements of CMB fluctuations constrain how the first stars in the Universe formed and how they reionized the intergalactic medium. Celine Boehm will discuss how CMB measurements may be used to constrain the properties of dark matter. Finally, John Carlstrom will review a variety of science targets, including the physics of inflation and neutrino masses, for next-generation experiments.



Session C4: WIMP Dark Matter

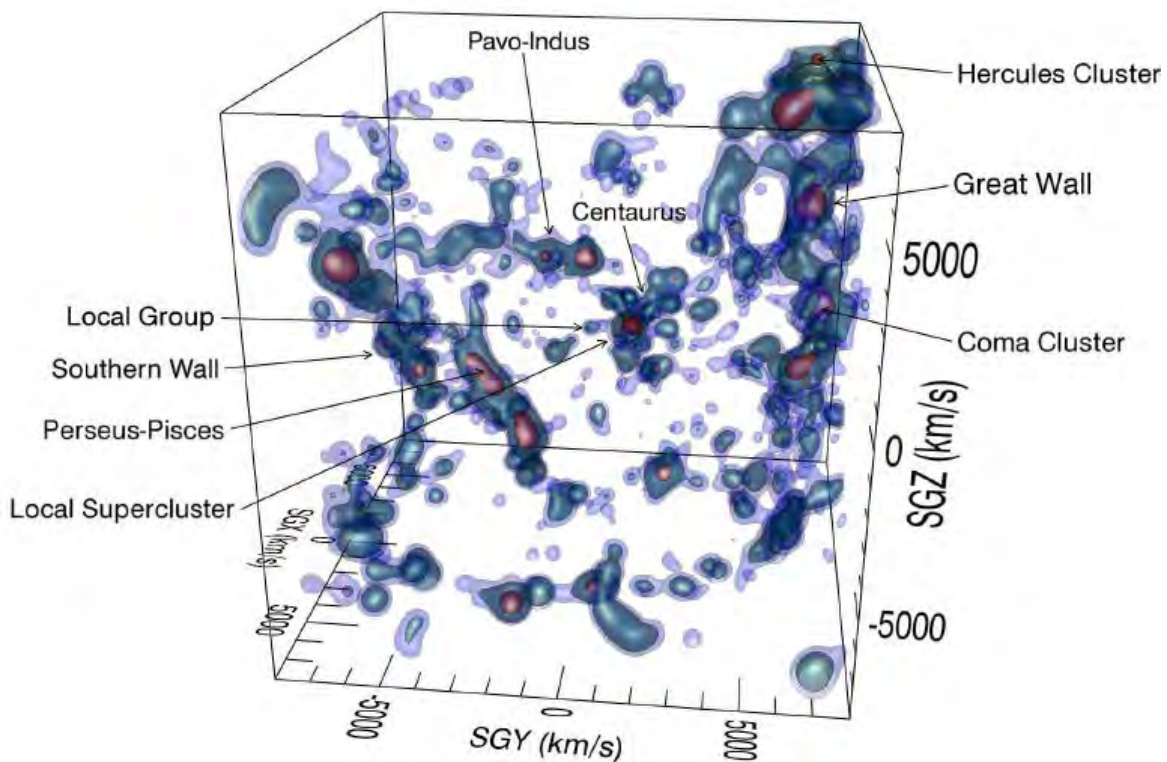
Saturday, April 16, 1:30 PM

The most viable candidate for dark matter remains the WIMP, a weakly interacting massive particle. Paolo Gondolo will provide an overview of the new ways this idea is being explored within the community. Then, Elena Aprile will describe the international effort to detect WIMPs directly via their interaction with nuclei in large underground detectors. Finally, Miguel Sanchez-Conde will present the current state of affairs in the field of indirect detection, where daughter photons, neutrinos or charged particles can be used to detect or constrain the properties of WIMP dark matter.

Session E4: Local Universe Cosmology

Saturday, April 16, 3:30 PM

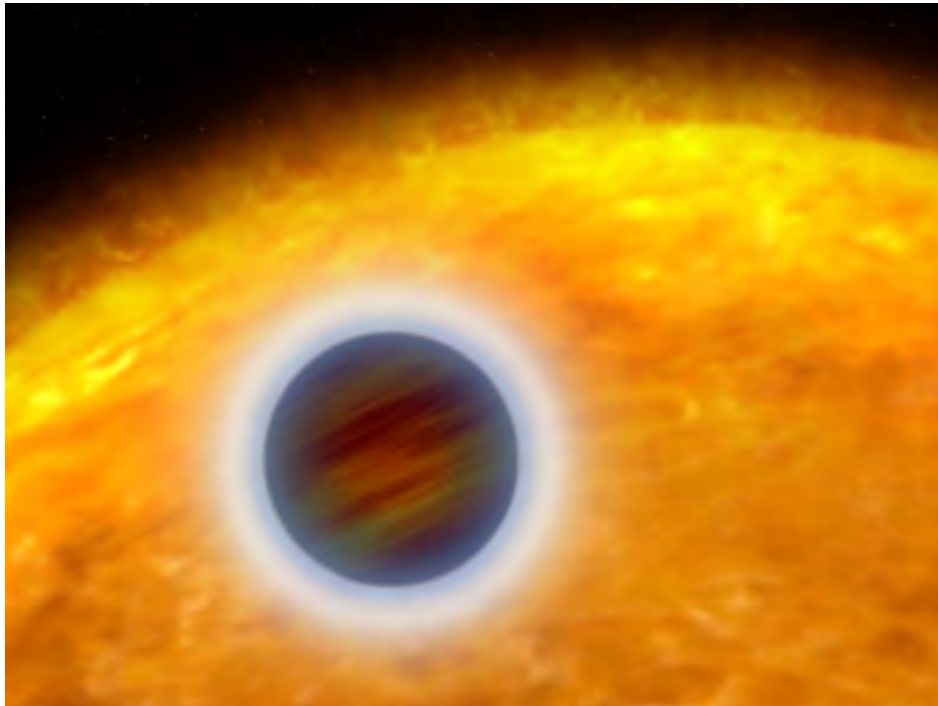
Astronomers observe galaxies and large-scale structure in our near-by universe today in much greater detail than is possible for those in more distant parts of the universe at earlier times. The Local Universe is centered on the Local Group consisting of the Milky Way and Andromeda galaxies and their dwarf-galaxy satellites, and includes the surrounding galaxies, clusters and superclusters of galaxies. The Local Universe therefore provides an accessible laboratory for testing current theories of cosmology and dark matter. The three invited talks of this session will describe the current status of this rapidly developing field. Matthias Steinmetz will describe how galaxy surveys and the theory of gravitational instability in the expanding Friedmann universe are combined to make 3D maps of the galaxies and large-scale structure of the Local Universe, and learn what initial conditions were required to lead to the present-day structures. Joshua Simon will describe observations of dwarf galaxies and their stars and attempts to detect their dark matter indirectly by searching for gamma rays from its annihilation. Michael Boylan-Kolchin will describe the confrontation between such observations and the theory of galaxy and large-scale structure formation in the standard models involving cold dark matter, as well as alternative forms of dark matter.



Session H4: The Physics of Exoplanets

Sunday, April 17, 8:30 AM

Since the discovery of the first exoplanets – planets orbiting stars other than our Sun – 20 years ago, the study of exoplanets has developed beyond discovery into a full science. This session will highlight the progress and emerging challenges in the field of exoplanet science from a physics perspective. These invited presentations will highlight three exciting topics that are sure to educate and entertain: (1) Dynamics and Evolution of Planetary Systems: Packing, Swapping, Cannibalization, and Ejection; (2) Exoplanet Habitability: Our Knowledge, Ignorance & Constraints; and (3) Relativity and Exoplanets: Gravitational Microlensing, Doppler Beaming, and More. Join us for a fun session at this timely interface of physics, astronomy, and planetary science.



Session J4: Cosmology with the Dark Energy Survey

Sunday, April 17, 10:45 AM

Since its discovery in the late 1990's, the nature of dark energy and the explanation of the accelerating expansion of the universe has remained a mystery. The Dark Energy Survey (DES) was designed to address these questions using multiple complementary techniques. Comparing and combining probes sensitive to the expansion rate of the universe, such as type Ia supernova, and the growth of structures, such as galaxy clusters, will provide new constraints on the nature of dark energy. DES recently completed its 3rd year of observations. Ravi Gupta will present results from supernova searches including type Ia as well as discoveries of super luminous supernova. Michael Troxel will present results using weak lensing including the status of current analyses and the outlook for future cosmological constraints. Boris Leistedt will describe cosmological results obtained with galaxy clustering and Baryon Acoustic Oscillations as well as expectations for the full DES data sample and future surveys such as LSST.

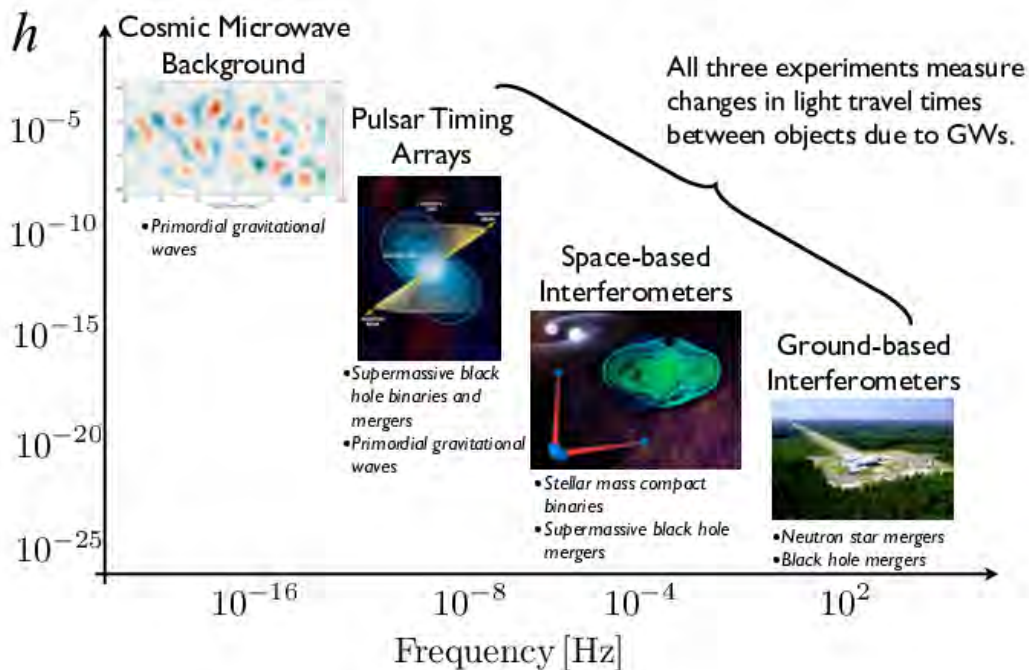
Session K5: Listening to the Universe with Pulsar Timing Arrays

Sunday, April 17, 1:30 PM

LIGO is just the beginning. In the dawn of the era of gravitational wave astronomy, astrophysicists are pursuing a number of ways of detecting these ripples in the fabric of space-time. One idea is explored in this session: pulsar timing arrays. The session begins with Maura McLaughlin talking about NANOGrav, a collaboration that monitors over 50 millisecond pulsars with the Green Bank Telescope and the Arecibo Observatory. Xavier Siemens will continue the discussion by highlighting the consortium of NANOGrav and the International Pulsar Timing Array, arguing that detection of the background produced by supermassive black hole binaries is possible by the end of the decade. Finally, Sarah Burke-Spolaor will describe how the observations constrain exotic physics such as cosmic strings and other source populations.



The spectrum of gravitational wave astronomy



Session M3: Neutron Stars in the Multi-Messenger Era

Sunday, April 17, 1:30 PM

Need more LIGO? The 2015 Hans Bethe Prize was awarded to Vassiliki Kalogera; she will deliver the Prize lecture during this session about the mergers of binary systems, focusing (for very good reasons!) on their gravitational wave signature. Chares Horowitz will then follow up with how astrophysics contributes to one of the themes of the meeting: symmetry violation, with his talk “Probing neutron rich matter with parity violation.” Gravitational waves reappear in the final talk of the session when Duncan Brown describes the nuclear and gravitational physics that can be extracted from upcoming LIGO observations.

Session R2: Dark Matter Beyond WIMPs

Monday, April 18, 10:45 AM

Well motivated candidates for dark matter – beyond WIMPs – include the light QCD axion, sterile neutrinos, and “asymmetric” dark matter. Asymmetric dark matter is motivated to explain the similar observed densities of dark matter and baryons in the Universe. The connection between the two densities arises naturally when the dark matter has an asymmetry in its number density of matter over anti-matter that is similar to that for baryons, so that the dark matter density is set by its asymmetry – which can be directly connected to the baryon asymmetry – rather than by its annihilation cross-section. Kathryn Zurek will review asymmetric dark matter, including the possibility of hidden sectors with dark forces and self-interacting dark matter. The QCD axion is a hypothetical elementary particle arising from an elegant solution to the strong CP problem. Only recently have detection technologies advanced to a stage where light QCD axions, with their extremely feeble interactions with normal matter and radiation, might be detected. Leslie Rosenberg will describe the dark-matter axion experimental landscape and the prospects for discovery. A sterile neutrino is a hypothetical particle that has no weak interaction, but can couple to standard neutrinos through oscillations. Kevork Abazajian will discuss x-ray signals from astrophysical objects as a possible signature for sterile neutrinos.

Session S4: Supernovae - New Clues and Challenges

Monday, April 18, 1:30 PM

Adam Burrows will describe some of the insights about core collapse supernovae that have been gleaned by state-of-the-art 3D simulations. Steve Boggs will discuss the gamma ray signature from SN 1987A, and Edward Brown will describe the physics, especially the nuclear physics, that is responsible for Type Ia Supernovae explosions.

Session U4: New High Energy Views of the Galaxy

Tuesday, April 18, 3:30 PM

New observational capabilities are revealing new details of high energy emitters in our Galaxy. The origin of the GeV gamma-ray excess in the inner Galaxy remains under debate. NuSTAR observations of the Galactic Center region provide new insights with good angular and energy resolution at hard x-ray energies, and finally observations by HAWC, will unveil the most sensitive wide-field TeV survey.

Session X2: Cosmic Neutrinos and New Physics

Tuesday, April 19, 10:45 AM

Neutrinos play an increasingly important role in high energy physics and astrophysics, as exciting experiments produce more and more information about these ghostly particles. This session will highlight current and upcoming constraints from cosmological probes, with an overview provided by Lloyd Knox. One of the most interesting experiments is IceCube, and Carlos Delgado will present results that constrain the properties and existence of sterile neutrinos. Finally, Mauricio Bustamante will present further constraints from IceCube and other experiments that probe new neutrino physics.