

Electronic Newsletter 2014-2015, Part 2

April 3, 2015

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Member-at-Large:

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Miriam Forman

Questions? Comments?

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Greg Madejski

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Finalize your plans now to attend the April 2015 meeting held this year in Baltimore, Maryland. A number of plenary and invited sessions will feature presentations by DAP members. Here are the key details:

What: April 2015 APS Meeting

When: Saturday, April 11 – Tuesday, April 14, 2015

Where: Hilton Baltimore Inner Harbor

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

The 2015 April Meeting meeting will take place at the Hilton Baltimore Inner Harbor Hotel. 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 8, 2015

If you haven't done so as yet - **we urge you to cast your vote in the annual DAP elections for the DAP officers.** Please check your e-mailbox - the announcement and instructions arrived on March 17th. A reminder went out April 3rd - if you haven't seen it, please check your spam E-mail folder.

Call for Nominations for APS Fellowship

Deadline: June 1, 2015

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 2015. 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, 2015

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 Paul Shapiro

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 37 sessions at the APS April Meeting, including 16 invited sessions and 3 mini-Symposia.

In addition, astrophysics and cosmology are featured in all three Plenary Sessions, including several talks in honor of the two major anniversaries to be celebrated at this April Meeting: the 100th for Einstein's General Relativity and the 50th for the Cosmic Microwave Background.

- **Invited sessions.** The DAP, including through cooperation with several other APS units (DCOMP, DNP, DPF, GFB, 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.

- **Business Meeting.** Please join us on Monday evening for the DAP Business Meeting, where food and drinks will be served.

- **Focus on Young Scientists.** Division of Astrophysics has recently established a new Thesis Prize: our first cohort of three finalists will give invited talks at a special session on Saturday, April 11 (Session B9), and will include presentations by Anne Archibald, Fabienne Bastien, and Jim Fuller. In addition, the DAP is providing partial travel support for many graduate students.

- **Communicating science.** The April meeting will include two special sessions devoted to communicating science. The details are on the following pages.

- **Special plea to students attending the April meeting:** APS Office of Public Affairs would like to ask if you would be willing to sign up to volunteer 2 hours of your time at the APS Contact Congress table run by the Office of Public Affairs. If you can - please navigate to the following shared document and fill in when you're able to volunteer.

<http://go.aps.org/1G5svTH>

Tyler Glembo will meet you at the booth to explain all instructions on volunteering. If you have any advance questions you can reach him at glembo@aps.org.

LEARN THE TRICKS, TECHNIQUES, AND SCIENCE that enable you to powerfully connect with audiences!

WHO Ninja Communications
WHAT A half-day science communications session focusing on crafting influential messages and creating “next level” PowerPoint Presentations.
WHEN April 11 from 1-6pm
WHERE Hilton Baltimore Inner Harbor



Science: Becoming the Messenger™ Workshop

April 11, 2015

American Physical Society

THE AGENDA

1:00 pm – 1:25 pm Welcome and Introduction

Susan Mason, Head of External Affairs, National Science Foundation
Gregory Mack, PhD, AAAS Science & Technology Policy Fellow, Division of Physics

1:25 pm – 3:50 pm Masterful Messaging

A deep dive into creating messages that influence thinking, alter attitudes, sway decisions, and affect behaviors using the discipline that pros use to make communications rock. Learn the tricks, techniques, and science that ignite communications and enable you to take audiences where you want them to go, including how thinking like a GPS makes you a more effective communicator, why the very thing that enables us to communicate in the first place causes so many communication problems, how the best messages are like well-composed photographs, how what you know “curses” communications, and much more. Includes a bonus segment on how to make messages more memorable and more quotable, as well as how to stay on message during Q&A sessions.

3:50 pm – 4:10 pm Break

Light refreshments provided

4:10 pm – 5:30 pm PowerPoint Alchemy

A crash course in how to transform leaden “talk and slides” presentations into communications gold during a session that Ninja workshop alumni frequently proclaim to be the ‘single most valuable workshop session’ they’ve ever attended. Discover how to: hook the audience at the outset; answer four questions every audience has; keep the audience interested and engaged; call the audience to action; incorporate slides that enhance presentations (not derail them!); create effective charts and graphs; and two “secrets” that immediately improve presenter effectiveness.

5:30 pm – 6:00 pm Closing Remarks & Wrap-up

Rebecca Thompson, PhD, Head of Public Outreach, American Physical Society

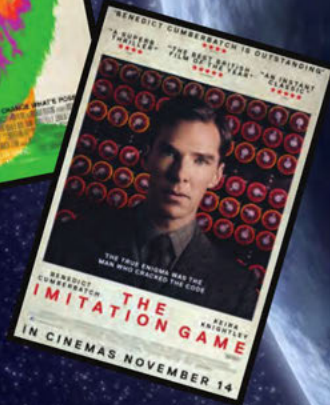




Office of Public Affairs

AN APERTURE INTO SCIENCE ADOVACY

Join us as we explore how popular films with science-based plots can help physicists communicate the value of science to members of Congress, and the public, in a compelling and individual way.



Sunday, April 12 - 7:00 p.m. - 8:30 p.m.
Location: Hilton Baltimore, Johnson



Introductory remarks by
Herman B. White
Senior Scientist, Fermilab
APS Edward A. Bouchet
Award Recipient (2010)



Moderated by
Jeremy Hobson
Co-host, *Here & Now*
WBUR (Boston)
National Public Radio



Panelist
Andre Bormanis
Television producer, screenwriter
and author of the book,
"Star Trek: Science Logs"
and a consultant for
"Cosmos: A Space Time Odyssey"



Panelist
Brandon Fibbs
Producer of science television
shows and most recently,
part of the team that rebooted
"Cosmos: A Space Time Odyssey"

**Annual DAP Business Meeting at April 2015 APS Meeting
Monday, April 13 at 5:30 PM in the Key room 5**

The Division of Astrophysics will hold its annual **Business Meeting** at the April APS meeting in Baltimore on **Monday, April 13 at 5:30 PM** in room *Key 5*. *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. Refreshments will be served. See you there!

**Mini-Symposium on Future MeV Gamma-ray Science and Missions
Monday, April 13, 8:30 AM Session U14, Room Key 10**

The speakers for the mini-symposium are: Reshmi Mukherjee, Eric Charles, Bernard F. Philips, Alexander Moiseev, Mark McConnell, Stanley Hunter, and Tonia Venters.

**Mini-symposium on Physics of the Cosmos
Tuesday, April 14, 10:45 AM, Session X5, Room Holiday 3**

The speakers for the mini-symposium are: Jamie Bock, Edward J. Wollack, Mark McConnell, Angela V. Olinto, Olivier Dore, Marshall Bautz, and John Conklin.

**Mini-symposium on Cosmology and Dark Energy from the
BOSS/SDSS II Galaxy and Quasar Surveys
Tuesday, April 14, 3:30 PM Session Z2, Room Holiday 1**

The speakers for the mini-symposium are: Daniel Eisenstein, Florian Beutler, Julian Bautista, Carl Michael Blomqvist, Jose Vazquez, and David Schlegel.

Plenary Session Highlights for April 2015 Meeting:

Plenary I (Session A1, Holiday 4-6): Cosmic neutrinos; views from NASA and DOE

Saturday, April 11, 8:30 AM

- Francis Halzen (Wisconsin / Madison) *“IceCube and the Discovery of High-Energy Cosmic Neutrinos”*
 - John M. Grunsfeld (NASA HQ) *“Addressing big scientific questions for the benefit of the Nation - The view from the NASA Space Program”*
 - Lynn Orr (US Department of Energy) *“Addressing big scientific questions for the benefit of the Nation - The view from the Department of Energy”*
-

Plenary II (Session Q1, 1, Holiday 4-6): Kavli Foundation Plenary Session

Monday, April 13, 8:30 AM

- John Mather (NASA / Goddard) *“50 Years of the CMB”*
 - Clifford Will (Univ. of Florida) *“Was Einstein Right? A Centennial Assessment”*
 - Stuart Shapiro (Univ. of Illinois, Urbana-Champaign) *“Compact Binary Mergers as Multimessenger Sources of Gravitational Waves”*
-

Plenary III (Session W1, Holiday 4-6)

Tuesday, April 14, 8:30 AM

- Krzysztof Gorski (Jet Propulsion Laboratory) *“Status of cosmological parameters from the cosmic microwave background”*
 - James Hartle (UC Santa Barbara) *“Quantum Gravity and Quantum Cosmology”*
 - Haiyan Gao (Duke Univ and Duke Kunshan University) *“Proton - a fascinating relativistic many-body system - remains puzzling”*
-

Public Lecture (Session F12, Room: Key 8):

Einstein’s Legacy: Studying Gravity in War and Peace

Saturday, April 12, 7:30 PM

David Kaiser, MIT

DAP Invited Sessions and Mini-Symposia at the April 2015 Meeting

The current schedule of the invited sessions and mini-symposia sponsored or co-sponsored by DAP is tabulated in time-order below. On the following pages find the highlight descriptions of selected sections. This year's April meeting promises to be particularly exciting for members of the astrophysics and astroparticle physics and cosmology communities.

Session ID	Title	Day Date	Start Time	Room
B3	New Developments in Understanding the R-Process	Sat. Apr 11	10:45AM	Holiday 2
B9	Thesis Prize Talk	Sat. Apr 11	10:45AM	Key 5
C9	High-Energy Transients in the Universe	Sat. Apr 11	1:30PM	Key 5
C11	Frontiers of Computational Cosmology	Sat. Apr 11	1:30PM	Key 7
E10	Indirect Detection of Dark Matter	Sat. Apr 11	3:30PM	Key 6
E11	Detecting GWs from the Ground and in Space	Sat. Apr 11	3:30PM	Key 7
E12	Exploration for Life in the Universe: Implications for Society	Sat. Apr 11	3:30PM	Key 8
H9	Astrophysical and Cosmological Neutrinos	Sun. Apr 12	8:30AM	Key 5
K9	Astrophysical Black Holes on All Mass Scales	Sun. Apr 12	1:30 PM	Key 5
M9	Windows on the Epoch of Reionization	Sun. Apr 12	3:30PM	Key 5
R9	Understanding Core-Collapse Supernovae from the Inside Out	Mon. Apr 13	10:45AM	Key 5
R10	Exploring the Dark Side of the Universe: Progress and Open Questions	Mon. Apr 13	10:45AM	Key 6
S9	Cosmic Microwave Background B Modes and Inflation	Mon. Apr 13	1:30PM	Key 5
U9	Cosmological Parameters and Tensions	Mon. Apr 13	3:30PM	Key 5
U14	Mini-Symposium on Future MeV γ-ray Science and Missions	Mon. Apr 13	3:30PM	Key 10
X5	Mini-Symposium on the Physics of Cosmos	Tues. Apr 14	10:45AM	Key 1
X9	Hot Topics in Astrophysics	Tues. Apr 14	10:45AM	Key 5
Y9	New Results on Cosmic Rays	Tues. Apr 14	1:30PM	Key 5
Z2	Mini-Symposium on Cosmology and Dark Energy From BOSS + SDSS II	Tues. Apr 14	3:30PM	Holiday 1

April 2015 Meeting DAP Invited Sessions Highlights

Session C4: Division of Astrophysics Thesis Prize

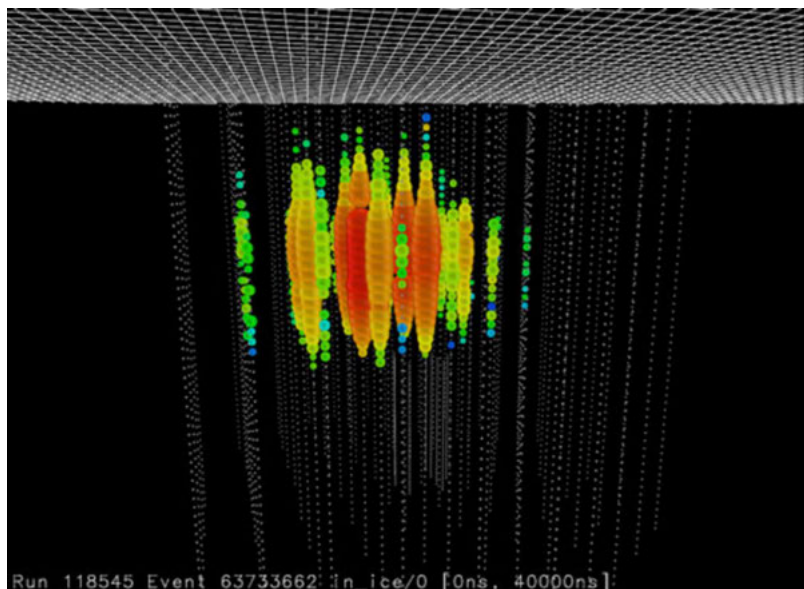
Saturday, April 11, 10:45 AM

Finalists for the DAP Thesis Prize will present the science behind their dissertations. Anne Archibald discovered the first object to transition between millisecond radio pulsar and low-mass X-ray binary states, and her multiwavelength observations challenge models of accretion. Fabienne Bastian determined that the origin of low-level light variations in Sun-like stars arise from granulation, and she used these variations to infer the properties of Kepler planet host stars. Jim Fuller investigated tidal effects on compact white dwarf binaries, finding that tidal heating may make white dwarfs orders of magnitude more luminous and cause a thermonuclear runaway.

Session C11: Frontiers of Computational Cosmology

Saturday, April 11, 1:30 PM

The modern theory of cosmic structure formation is the ultimate initial value problem, in which a homogeneous, isotropic, expanding universe is perturbed by tiny fluctuations which grow by gravitational instability to form galaxies and stars and the cosmic web of large-scale structure. This highly nonlinear, multi-scale process requires a numerical solution of the partial differential equations of gas and gravitational dynamics, including radiative transfer. Three leading experts in the development and application of forefront methods for solving this problem will present the latest developments. Anatoly Klypin (NMSU) will review the gravitational frontier of galaxy and large-scale structure formation involving the solution of the cosmological N-body problem. Philip Hopkins (Caltech) will review the frontier in which hydrodynamics and gravitational dynamics couple to form galaxies, with interstellar gas, stars, and supermassive black holes. Romain Teyssier (U. of Zurich) will add to these two frontiers, the third coupling — radiative transfer — as galaxies and the stars and black holes within them release radiation that feeds back on the formation of galaxies and the intergalactic medium.



Session H9: Astrophysical and Cosmological Neutrinos

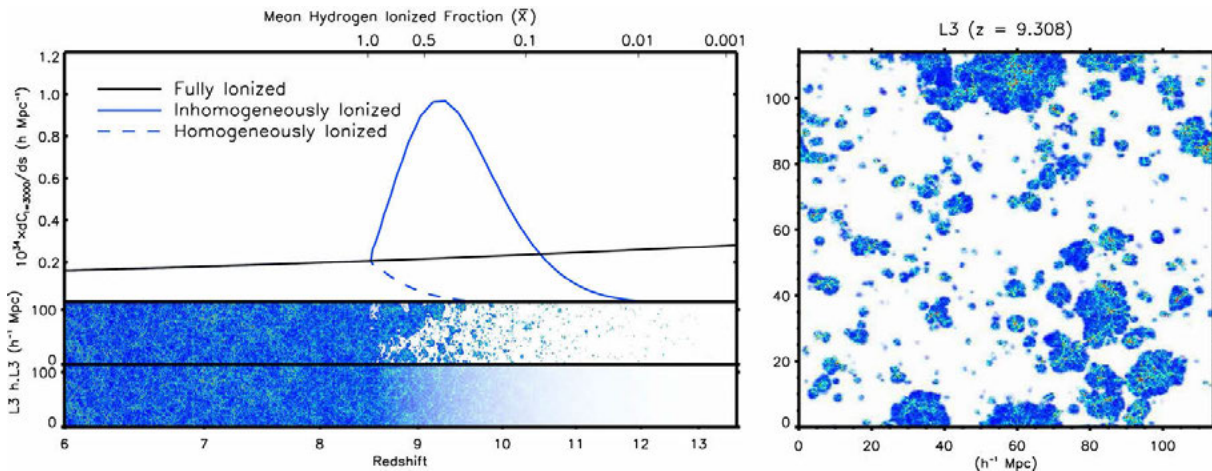
Sunday, April 12, 8:30 AM

The Ice Cube experiment in the South Pole has detected dozens of neutrinos originating from outside the Solar System while experiments probing the Cosmic Microwave Background have indirectly detected neutrinos produced in the first second of the Universe. Upcoming underground experiments will be sensitive to neutrinos emerging from supernovae in our Galaxy. Come hear three experts discuss progress in the emerging field of cosmic neutrinos, what we have learned, and what we will learn about fundamental neutrino properties from these observations.

Session K9: Astrophysical Black Holes on All Mass Scales

Sunday, April 12, 1:30 PM

The session entitled "Astrophysical Black Holes on all mass scales" will feature three presentations. Dr. Felix Fuerst (Caltech) will present recent results from the NuSTAR satellite regarding the so-called "Ultra-luminous X-ray sources" (ULXs), which have luminosities well in excess of that expected via considerations of the Eddington limit from the "standard" accreting neutron stars and stellar-size black holes. He will also present the evidence that in one of such ULXs, the compact source is actually a neutron star. Dr. Andreas Eckart (Univ. of Cologne) will present the latest observations of the Galactic Center - what's new? Finally, Dr. Christine Done (Durham, UK) will present her view on the observational similarities and differences between the accreting stellar-size (Galactic) and supermassive (extra-galactic) black holes: are all observational data consistent with the expected scaling between the two classes?



Session M9: Windows on the Epoch of Reionization

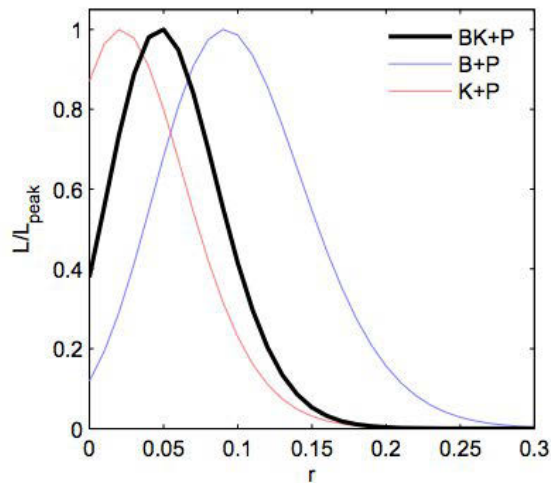
Sunday, April 12, 3:30 PM

In the first billion years after the Big Bang, ionizing UV starlight emitted by the first galaxies and stars flowed outward into the cold, neutral intergalactic gas, photoionizing and heating it to 10,000K, creating a patchwork quilt of ionized and neutral zones, until the ionized patches grew to fill the entire universe. This epoch of reionization (EOR) is the last available frontier of cosmic time subject to direct detection, and a critical missing piece of the LCDM cosmological paradigm. Three leading experts will review the status of the search for observational signatures of the EOR from the ground and space at different wavelengths. Aaron Parsons (UC Berkeley) will review the progress and prospects for detecting fluctuations in the cosmic radio background from the redshifted 21cm line of neutral hydrogen patches in the IGM during the EOR, by current and future radio telescopes and arrays. The imprint of the EOR on the CMB and cosmic IR background will be reviewed by Olivier Dore (Caltech/JPL). Garth Illingworth (UC Santa Cruz) will describe the results of the ongoing, systematic search for the earliest galaxies – the sources of the UV radiation that caused reionization – by the Hubble Space Telescope, and what to expect from the future JWST.

Session R9: Understanding Core-Collapse Supernovae from the Inside Out

Monday, April 13, 10:45 AM

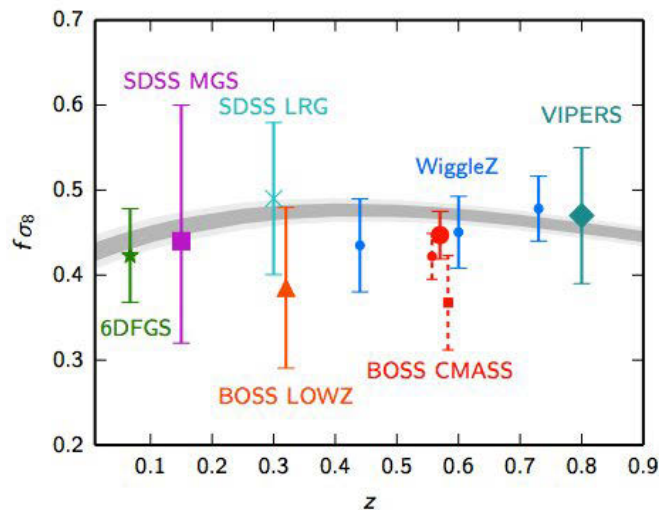
Core-collapse supernovae are crucial to many areas of astrophysics. They produce neutron stars and black holes; their optical signals are detected from great distances; and they inject energy and elements into the interstellar medium. Despite this, much about them is not understood. New efforts are needed to unify modeling of their collapsed cores, the dynamics of the explosions, and the shell remnants of those explosions. James Lattimer, the 2015 Bethe Prize winner, will cover neutron stars from birth to old age, connecting their nuclear properties to their astrophysical phenomenology. Ondrej Pejcha will cover the explosions, from the prompt neutrino phase to the long-lasting optical phase, connecting the physics of the mechanism to astronomical data. Laura Lopez will cover supernova shell remnants, and how their morphology and composition provide a detailed diagnostic image of the explosions of a large number of nearby events.



Session S9: Cosmic Microwave background B-modes and inflation

Sunday, April 13, 1:30 PM

This session, on the afternoon of April 13th, will review recent developments in the hunt for gravitational waves from inflation, as well as look toward the future. John Kovac (Harvard) will speak about the recent joint analysis of BICEP2, Keck and Planck data (which led to the constraints on the tensor-to-scalar ratio shown in the figure above) and review plans to continue the chase. Given the importance of controlling contamination from polarized emission from interstellar dust, Bruce Draine (Princeton) will tell us about models of this emission, as informed by the most recent data. Sarah Shandera (Penn State) will discuss the importance of B-mode measurements for theories of the primordial universe.

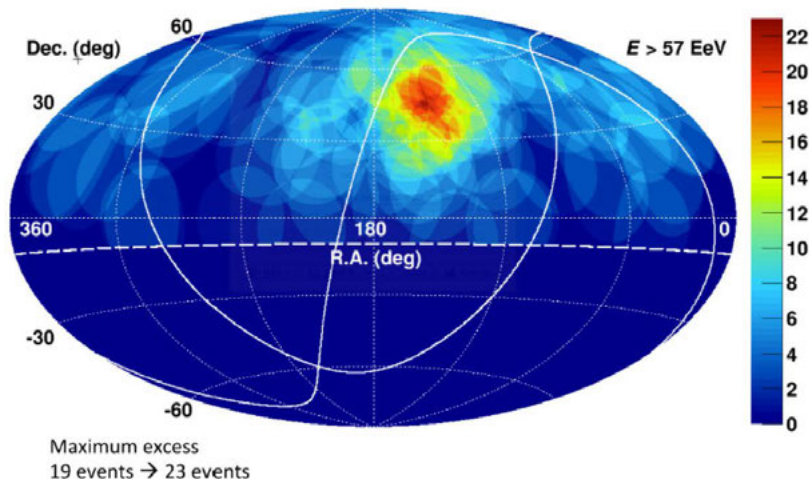


Session U9: Cosmological Parameters and Tensions

Monday, April 13, 3:30 PM

In the context of the Λ CDM model, the Planck data imply, relative to earlier data, a higher matter density, a higher amplitude of fluctuations, σ_8 , and a lower expansion rate today, H_0 . This has led to some degree of tension with more direct measurements of H_0 , and other probes of the amplitude and growth rate of structure. Speakers Charles Lawrence (JPL), Raphael Flauger (CMU) and Cora Dvorkin (Harvard) will review the physical origin of the parameter constraints from Planck data, their robustness, and the degree of tension between datasets.

Oversampling with 20°-radius circle



Session Y9: New Results on Cosmic Rays

Tuesday, April 14, 1:30 PM

In this session we will learn about cosmic rays searches of Dark Matter signals and the detection of anisotropies in cosmic rays with the High Altitude Water Cherenkov (HAWC) and the Telescope Array (TA). HAWC has detected an anisotropy in the arrival directions of the cosmic rays that has power on angular scales smaller than 10 degrees, which is difficult to explain given the propagation of these charged particles through the expected magnetic fields between the nearest sources and Earth. HAWC has also detected multiple Galactic gamma-ray sources, which are indirect probes of the sources of cosmic rays, because the cosmic rays interact in the sources to produce gamma rays, that unlike the charged cosmic rays, point back to their source. At ultrahigh energies, the TA hotspot may indicate the first source ever to be identified at these extreme energies.

Session X9: Hot Topics in Astrophysics

Tuesday, April 14, 10:45 AM

The "Hot Topics" session presents some of the latest and most exciting developments in astrophysics. Roland Diehl (MPE) will present the latest results from the INTEGRAL mission that detected gamma-rays from radioactive decay processes during the explosion of supernova SN2014J. This confirms Type Ia supernova to be a disintegrated white dwarf. Alex Drlica-Wagner (Chicago / Fermilab) will report on the recent discovery of candidates for some of the faintest galaxies. This work is essential for testing galaxy formation on small scales. Pablo Mosteiro (INFN / Rome) will speak on neutrino oscillations that are the result of neutrinos arising from the secondary processes of the pp-chain in the Sun. This is the first spectroscopic detection of the operation of such processes.