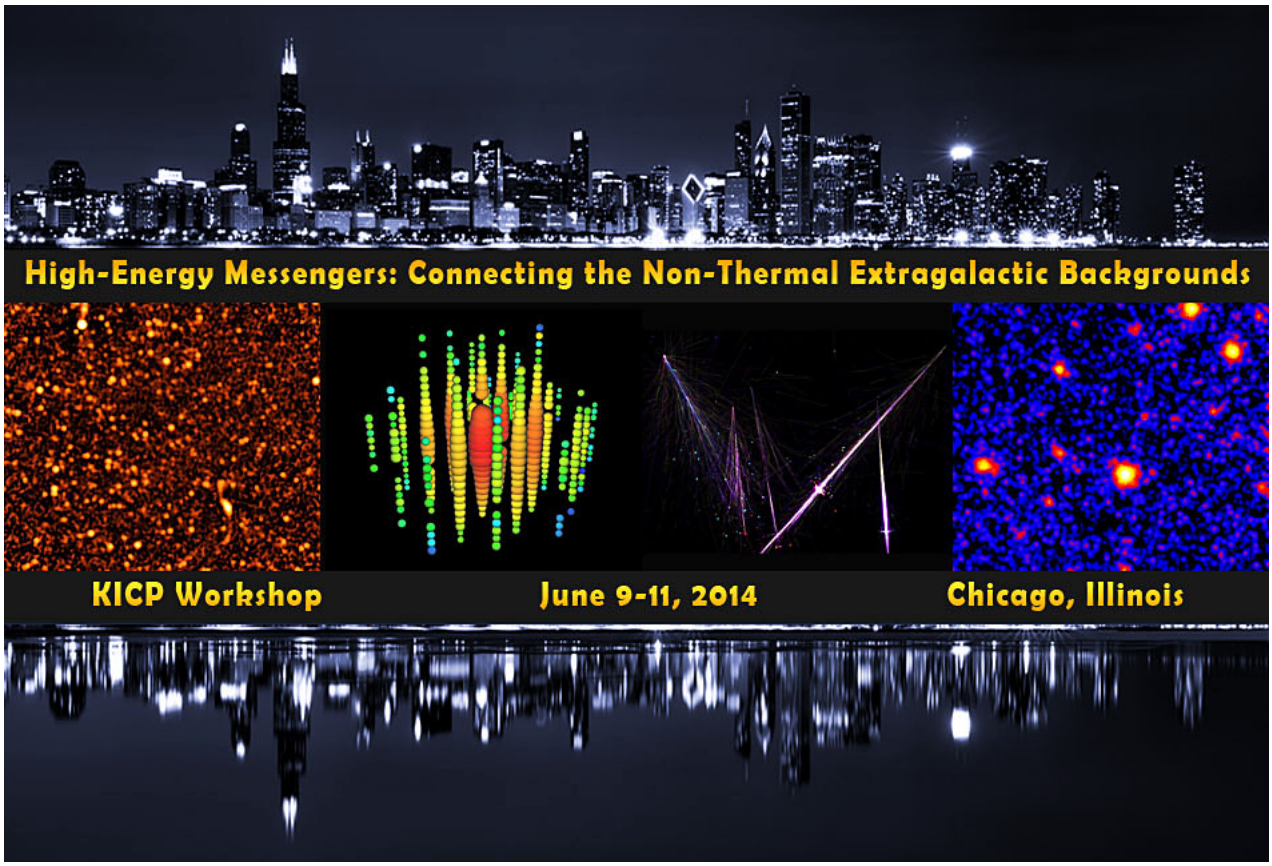

http://kicp-workshops.uchicago.edu/hem2014/

WORKSHOP PRESENTATIONS

The Kavli Institute for Cosmological Physics (KICP) at the University of Chicago is hosting a workshop this summer on the origin of the non-thermal extragalactic backgrounds. The goal is to bring together observers and theorists representing all the high-energy wavebands and particles: radio, GeV and TeV gamma rays, and extragalactic cosmic rays and neutrinos. Topics will include isotropic diffuse intensity measurements, resolved extragalactic source populations and their collective contributions below the individual source detection threshold, anisotropies, and propagation effects and secondary cascades.

Example focus questions:
* Is there a coherent scenario which explains all the current observations in terms of established extragalactic source populations?
* What are the next steps (experimental + theoretical) to move past current uncertainties/degeneracies?

We are planning a three-day workshop for about fifty participants convening on the campus of the University of Chicago. Each day will consist of plenary presentations with plenty of time for discussion in large and/or small groups.

Workshop Topics:
* Radio, gamma rays, neutrinos, UHECRs
* Isotropic diffuse intensity measurements
* Resolved extragalactic source populations and their collective contributions below the individual source detection threshold
* Anisotropies
* Propagation effects and secondary cascades

Organizing Committee

Keith Bechtol
Kavli Institute for Cosmological Physics

Ke Fang
Kavli Institute for Cosmological Physics

Toshihiro Fujii
Kavli Institute for Cosmological Physics

Dan Hooper
U Chicago/FNAL

Tim Linden
Kavli Institute for Cosmological Physics

Angela Olinto
University of Chicago

Abigail Vieregg
University of Chicago

1. **Kevork N Abazajian**, University of California, Irvine
   Talk: Constraints and Signals from the Diffuse Gamma Ray and X-ray Backgrounds

   June 10, 2014 (9:10 AM - 9:30 AM)

   Co-authors: J. Patrick Harding
   I will review physical models of the origin of the diffuse gamma ray background and its potential future resolution to point source blazars. I will highlight the pitfalls of extrapolating source count functions below the detection threshold and the benefits of tying the extragalactic gamma-ray source evolution to the well known evolution of the active galaxy X-ray luminosity function. There exists a strong tension between blazar interpretations of the amplitude of intensity of the gamma ray background and its anisotropy, and I will explore the potential alleviation of this tension.

2. **Markus Ahlers**, WIPAC
   Talk: High-Energy Cosmogenic Neutrinos

   June 11, 2014 (10:10 AM - 10:30 AM)

   Cosmic ray (CR) interactions with the cosmic radiation background are a guaranteed source of high-energy neutrinos. The most optimistic scenario assumes the dominance of CR protons at ultra-high energies (UHE) that rapidly interact with the cosmic microwave background above the Greisen-Zatsepin-Kuzmin (GZK) cutoff. The GZK neutrino prediction of this scenario is testable with present and near-future neutrino observatories. On the other hand, if heavy nuclei dominate the UHE CR spectrum the predictions of GZK neutrinos become smaller by orders of magnitude. I will review the predictions of different UHE CR models and summarize the present status of GZK neutrino searches.

3. **Marco Ajello**, Clemson University
   Talk: Contribution of Blazars and other source classes to the gamma-ray backgroud

   June 9, 2014 (3:00 PM - 3:20 PM)

   Co-authors: Fermi-LAT collaboration
   The abstract and the topic will be refined closer to abstract deadline and/or the meeting

4. **Keith Bechtol**, Kavli Institute for Cosmological Physics
   Talk: Spectrum of the Isotropic Diffuse Gamma-ray Background from 100 MeV to 820 GeV

   June 9, 2014 (9:50 AM - 10:10 AM)

   Co-authors: LAT Collaboration
   The gamma-ray sky can be decomposed into individually detected sources, diffuse emission attributed to the interactions of cosmic rays with gas and radiation fields in our Galaxy, and a residual all-sky emission component commonly called the isotropic diffuse gamma-ray background (IGRB). The IGRB comprises all extragalactic emissions too faint or too diffuse to be resolved in a given survey, as well as any residual Galactic foregrounds that are indistinguishable from isotropic. The sum of the IGRB and individually resolved extragalactic sources represents our best estimate of the total extragalactic gamma-ray background. The first IGRB measurement with the Large Area Telescope (LAT) on board the Fermi Gamma-ray Space Telescope used 10 months of sky-survey data and considered an energy range between 200 MeV and 100 GeV. Improvements in event selection and characterization of particle backgrounds, better understanding of the diffuse Galactic emission, updated emission models for the Earth atmosphere, Sun, and Moon, as well as a longer data accumulation of 50 months, allow for a refinement and extension of the IGRB measurement with the LAT, now covering the energy range from 100 MeV to 820 GeV. We discuss the possible presence of a high-energy cutoff (>100 GeV) in the IGRB, as well as systematic uncertainties that impact the shape and normalization of the measured spectrum.

5. **Sheldon S Campbell**, Ohio State University
   Talk: Combined Energy Spectra of Flux and Anisotropy: Identifying Anisotropic Source Populations of Gamma-rays or Neutrinos

   June 10, 2014 (10:10 AM - 10:30 AM)

   For years, distinct features in the flux spectrum of messengers have been used to identify distinct sources and their properties. If these sources additionally have distinct spatial distributions, there will also be corresponding features in the energy spectrum of the angular distribution of messengers. Using a simple example spectral feature (the spectral line) and a typical measure of angular distribution (angular power spectrum), I demonstrate how a line search using both the flux and angular power spectrum constrains both the flux of the line and the angular distribution of its sources. For some experiments, certain angular distributions of sources probe line fluxes that are dimmer than can be probed by the flux search alone. Thus, line searches with the angular power spectrum can increase the experimental reach of experiments with wide fields of view.

6. **Amy Connolly**, Ohio State University
   Talk: The Complementarity Neutrinos and Cosmic Rays for UHE Astrophysics

   June 11, 2014 (10:50 AM - 11:10 AM)

   Co-authors: Shunsaku Horiuchi, Nathan Griffith
   In the ultra-high energy (UHE) regime, cosmic rays and neutrinos are complementary probes of the most extreme accelerators in the universe. Cosmic rays above 10^19.5 eV cannot have originated from more than approximately 100 Mpc from Earth due to the onset of the GZK process. Neutrinos, however, would travel cosmological distances unabated and would be our only view of the distant universe above the GZK cutoff. We will quantify the implications of current cosmic ray measurements and neutrino constraints on parameters characterizing the UHE sources, such as the spectrum of cosmic rays produced at the sources, the ultimate energy of cosmic accelerators, and the redshift evolution of the sources. We will also assess the expected constraints on these parameters with future experiments.

7. **Charles D. Dermer**, Naval Research Laboratory
   Talk: Origin and Impact of Radiation Backgrounds on Detection of High-Energy Radiation Sources

   June 11, 2014 (11:30 AM - 11:50 AM)

   I will describe how knowledge of the space radiation backgrounds is crucial for detecting transient sources of radiation (pending approval of my travel by DoN).

8. **Mattia Di Mauro**, University of Turin and INFN Turin
Talk: Composition of the Isotropic diffuse gamma-ray background and dark matter constraints.

June 9, 2014 (3:40 PM - 4:00 PM)

Co-authors: F. Donato, P. D. Serpico, M. Ajello, L. Latronico, F. Calore, T. Bringmann, D. Sanchez, G. Lamanna.
The nature of the Isotropic gamma-ray Background (IGRB) measured by the Large Area Telescope (LAT) on the Fermi gamma-ray space Telescope (Fermi) remains partially unexplained. Recently we have computed the diffuse gamma-ray emission from unresolved Active Galactic Nuclei (AGN) with a large viewing angle with respect to the line-of-sight (MAGN). Our results demonstrate that the MAGN can contribute from 10% up to nearly the entire measured IGRB. We evaluate a theoretical uncertainty on the flux of almost an order of magnitude. We have also derived the gamma-ray flux from unresolved BL Lacertae, a class of AGN with the jet emission aligned with the line of sight. The diffuse emission from these objects grows from about 10% of the measured IGRB at 100 MeV to ?100% of the data level at 100 GeV. At energies greater than 100 GeV, our predictions naturally explain the IGRB data, accommodating their softening with increasing energy. Uncertainties are estimated to be within of a factor of two of the best fit flux up to 500 GeV. We have also demonstrated that MAGN and BL Lacertae sources together with Flat Spectrum Radio Quasar, Pulsar and Star Forming Galaxie populations could explain the spectra of IGRB intensity in the entire energy range (200 MeV 500 GeV). A more exotic contribution to the IGRB invokes the pair annihilation of dark matter (DM) weakly interacting massive particles (WIMPs) into gamma-rays. We have evaluated the room left for galactic DM at high latitudes by including photons from both prompt emission and inverse Compton scattering, emphasizing the impact of the newly discovered contribution from galactic and extragalactic sources. We demonstrate that the IGRB has the potential to be one of the most competitive future ways to test the DM WIMP hypothesis, once the present uncertainties on galactic and extragalactic sources are even slightly reduced. In fact, if MAGN contribute even at 90% of the maximal level consistent with our current understanding, thermally produced WIMPs would be severely constrained as DM candidates for masses up to several TeV.

9. **Alberto Dominguez**, University of California, Riverside
Talk: The measurement of the expansion rate of the Universe from gamma-ray attenuation

June 10, 2014 (3:00 PM - 3:20 PM)

We discuss the detection of the cosmic gamma-ray horizon (CGRH) that is independent of any extragalactic background light (EBL) model, which allows us to measure the Hubble constant by using gamma-rays. The CGRH is a fundamental quantity in cosmology. It gives an estimate of the opacity of the Universe to very-high energy (VHE) gamma-ray photons due to photon-photon pair production with the EBL. Our CGRH detection is possible thanks to a multiwavelength catalog of blazars that includes the latest data analysis from the Fermi satellite and Cherenkov telescopes. Interestingly, the observed CGRH is compatible with the current knowledge of the EBL. We show how the detection of the CGRH allows us to measure the expansion rate of the Universe from gamma-ray attenuation. The value of the Hubble constant that we derive is compatible with present-day measurements using well established methods such as local distance ladders and cosmological probes. We also discuss an observational strategy aimed to reduce the uncertainties in the Hubble constant estimate from our novel and independent technique.

10. **Fiorenza Donato**, Torino University
Talk: Anisotropies in gamma-rays

June 10, 2014 (10:50 AM - 11:10 AM)

I will present recent results on the computation of anisotropies in the gamma-ray sky. I will discuss the anisotropy coming from galactic dark matter pair annihilation, as well as from different populations of astrophysical sources.

11. **Ke Fang**, Kavli Institute for Cosmological Physics
Talk: The TA Cosmic Ray Excess and High Energy Neutrinos

June 11, 2014 (9:50 AM - 10:10 AM)

The Telescope Array (TA) has observed a statistically significant excess in cosmic-rays with energies above 57 EeV in a 20 degree radius circle centered on coordinates (R.A. = 146.7, Dec. = 43.2). We test the spacial correlation between this excess and 2 of the 28 high energy neutrinos recently observed by IceCube. We also discuss possible scenarios that relate ultrahigh energy cosmic rays to high energy neutrinos.

12. **Brian Fields**, University of Illinois
Talk: Cosmic Rays and the Star-Forming Contribution to the GeV Background

June 9, 2014 (2:40 PM - 3:00 PM)

13. **Nicolao Fornengo**, University of Torino and INFN
Talk: Particle dark matter searches in the anisotropic sky

June 10, 2014 (11:30 AM - 11:50 AM)

Anisotropies in the electromagnetic emission produced by dark matter annihilation or decay in the extragalactic sky are a recent tool in the quest for a particle DM evidence. The talk will discuss the features and the relative size of the various auto- and cross-correlation electromagnetic signals that can be envisaged for dark matter anisotropy studies, then extending the search to comprise the correlation with specific gravitational tracers of DM distribution in the Universe (weak-lensing cosmic shear, large-scale-structure matter distribution and CMB lensing).

14. **Dimitrios Giannios**, Purdue
Talk: The fate of TeV photons from blazars

June 10, 2014 (2:20 PM - 2:40 PM)

Co-authors: L. Sironi
The interaction of TeV photons from blazars with the extragalactic background light produces a relativistic beam of electron-positron pairs streaming through the intergalactic medium (IGM). The fate of the beam energy is uncertain. By means of two- and three-dimensional particle-in-cell simulations, we study the non linear evolution of dilute ultra-relativistic pair beams propagating through the IGM. For cold beams, we show that the oblique instability governs the early stages of evolution, but its exponential growth terminates -- due to self-heating of the beam in the transverse direction -- when only a negligible fraction of the beam energy has been transferred to the IGM plasma. Further relaxation of the beam proceeds through quasi-longitudinal modes, until a fraction $sim 10%$ of the beam energy being ultimately transferred to the IGM plasma, irrespective of the beam-plasma parameters. Blazar induced beams are in general hot. The fraction of beam energy deposited into the IGM is, then, much smaller than $sim10%$. It follows that at least $sim 90%$ of the beam energy is still available to power the GeV emission produced by inverse Compton up-scattering of the Cosmic Microwave Background by the beam pairs.

15. **Yoshiyuki Inoue**, ISAS/JAXA
Talk: Does the near-infrared extragalactic background light excess come from the extragalactic sky?

June 10, 2014 (2:00 PM - 2:20 PM)

Extragalactic background light (EBL) is one of the most fundamental observables in the sky. In the optical and infrared bands, it is widely believed that galaxies explain the EBL. However, the IRTS and AKARI measurements reported an excess in the NIR EBL. On the contrary, gamma-ray observations independently confirm that the level of EBL is the same as galaxy counts. If this excess originated in the extragalactic sky, it will strongly affect the extragalactic gamma-ray background. In this talk, I will review the current EBL constraints from gamma-ray observations and discuss their problems. Then, I would like to introduce possible extragalactic origins of the NIR EBL excess.

16. **Eiji Kido**, Institute for Cosmic Ray Research, University of Tokyo
Talk: Recent results from the Telescope Array experiment

June 9, 2014 (11:10 AM - 11:30 AM)

Co-authors: The Telescope Array Collaborations
Recent results from the Telescope Array experiment are shown in this talk.

17. **Alan Kogut**, NASA / GSFC
Talk: The Case for a Bright Extragalactic Radio Background

June 9, 2014 (9:30 AM - 9:50 AM)

The high-latitude radio sky is dominated by a bright isotropic component. While the existence of this isotropic component has been known for approximately 50 years, its origin is unclear. Assigning it to a local (Galactic) origin requires the Galaxy to be anomalous in several ways, while an extragalactic origin requires a new population of faint sources. I discuss several tests pointing to an extragalactic origin and suggest new measurements that could help resolve the issue.

18. **Kumiko Kotera**, Institut d'Astrophysique de Paris
Talk: Synchrotron pair echo/halo from ultrahigh energy cosmic rays: a robust scenario to explain extreme TeV blazar observations

June 11, 2014 (11:10 AM - 11:30 AM)

Co-authors: Foteini Oikonomou, Kohta Murase
The observation of the spectra and time variabilities in extreme TeV blazars challenge our understanding of the emission mechanisms in these objects. Most leptonic scenarios and those involving ultrahigh energy cosmic ray cascades in the intergalactic medium could give an explanation to the observations, but at the cost of stretching and tuning the astrophysical parameters. We present here an alternative channel, guaranteed and robust to the main unknown, i.e., the intergalactic magnetic fields, to reproduce the measurements: synchrotron pair echo and halo effect, seeded by ultrahigh energy cosmic rays in the magnetized environement surrounding the source (e.g., a filament).

19. **Naoko Kurahashi Neilson**, University of Wisconsin
Talk: Cosmic Neutrinos in IceCube

June 9, 2014 (10:50 AM - 11:10 AM)

20. **Brian Lacki**, NRAO/IAS
Talk: All Radiation Backgrounds from Star-Forming Galaxies

June 9, 2014 (2:20 PM - 2:40 PM)

I describe my results in calculating the extragalactic backgrounds from star-forming galaxies at all energies. First, I construct very simple models of galaxies using relations like the Schmidt law. This lets me estimate quantities including the galactic size, gas mass, and metallicity using just the star-formation rate, star-formation mode (normal vs. starburst), and redshift as input. Then I can use a simple one-zone model of radiative transfer and Starburst99 synthesized spectra to calculate the ultraviolet to infrared spectra of galaxies. I also calculate the nonthermal emission, including radio and gamma rays, from these galaxies with one-zone models of cosmic ray populations. Finally, I put it all together and calculate the extragalactic background as well as the source counts at different wavelengths. I discuss the implications of these results. How much of the gamma-ray background do star-forming galaxies make up? (About half.) Are previous predictions for microJy radio source counts correct? (Yes.) And can star-forming galaxies make up the mysterious ARCADE GHz radio background? (No.)

21. **Miguel A Mostafa**, Penn State
Talk: First results from the HAWC Observatory

June 9, 2014 (10:10 AM - 10:30 AM)

Co-authors: HAWC Collaboration
The HAWC array (with 300 water-Cherenkov detectors) will be completed this year. We have been running with 1/3 of the full array since August 2013. I will present the most recent analyses using ~one year of the data from HAWC-111.

22. **Kohta Murase**, Institute for Advanced Study
Talk: Multimessenger Approaches to the Origin of IceCube Neutrinos

June 11, 2014 (9:10 AM - 9:30 AM)

23. **Foteini Oikonomou**, Pennsylvania State University
Talk: Anisotropies in the arrival directions of ultra-high energy cosmic rays: current status and prospects with a next-generation instrument

June 10, 2014 (9:50 AM - 10:10 AM)

Co-authors: Kumiko Kotera, Filipe Abdalla
The arrival directions of the ultra-high energy cosmic rays (UHECRs) detected at the Pierre Auger Observatory to date impose constraints on the distribution and other properties of UHECR sources. I will present the results of searches for a correlation of UHECR arrival directions with the local matter distribution with the latest Auger data. A next-generation UHECR instrument may allow for significant progress in the search for the expected UHECR anisotropy signal by overcoming the limitation of low statistics. I will present the results of a study of the prospects for the detection of anisotropies of UHECRs which focuses on the lower energy range of future instruments (E > 50 EeV), where the sources are numerous enough to imprint a clustering pattern in the sky, and thus possibly in the particle arrival directions. In particular I will show the potential for a statistical discrimination between different astrophysical models which are parametrised by the number density of UHECR sources, the possible bias of the UHECR accelerators with respect to the galaxy distribution, and the unknown UHECR composition and fraction of protons at the highest cosmic ray energies.

24. **Maria Petropoulou**, Purdue University
Talk: The role of hadronic cascades in GRB models of efficient neutrino production

June 11, 2014 (9:30 AM - 9:50 AM)

We investigate the effects of hadronic cascades on the gamma-ray burst (GRB) prompt emission spectra in scenarios of efficient neutrino production. By assuming a fiducial GRB spectrum and a power-law proton distribution extending to ultra-high energies, we calculate the proton cooling rate and the neutrino emission produced through photopion processes. For this, we employ a numerical code that follows the formation of the hadronic cascade by taking into account non-linear feedback effects, such as the evolution of the target photon field itself due to the contribution of secondary particles. We show that in cases of efficient efficient high energy neutrino production, the emission from the hadronic cascade distorts and may even dominate the GRB spectrum. Taking this into account, we constrain the allowable values of the ratio $eta_p=L_p/L_{gamma}$, where $L_{p,gamma}$ are the isotropic equivalent proton and gamma-ray luminosities. For the maximum allowable value of eta_p, we calculate the (maximum) efficiency in neutrino emission from a single burst and show that it ranges between 0.003-0.3 for photon compactnesses in the range 0.7-70, respectively. We also discuss the role of the Bethe-Heitler pair production process in the hadronic cascade and in the neutrino spectral shapes as well as the implications of other parameters on our results, such as the magnetic field strength.

25. **Vahe Petrosian**, Stanford University (Physics and KIPAC)
Talk: On The Contribution of Discrete Sources to the Background Radiations

June 9, 2014 (4:00 PM - 4:20 PM)

Co-authors: Jack Singal
Estimates of the contribution of classes of sources to the background radiations in different bands can be obtained directly from source counts (so-called LogN-LogS) or from the luminosity function and its cosmological evolution from samples with known redshifts. Both methods provide incomplete information primarily due to the flux limit of the surveys and other selection biases, and therefore require extrapolation to lower fluxes or higher redshifts for estimation of the true contribution to the background. Because of the multivariate nature of the problem and the incomplete data, determination of the correlations between the variables play a crucial role in these processes. For example, when considering the luminosity function at any wavelength band other than optical, not only the flux limit of the the observations in the band come into play, but also the limits involved in the optical observations which were necessary for determining the redshift. Thus, the correlations between the characteristics in the band and the optical band come into play. We will address all these issues and describe methods to overcome the difficulties.

26. **Jennifer Siegal-Gaskins**, Caltech
Talk: Constraining the origin of the gamma-ray background with anisotropy

June 10, 2014 (11:10 AM - 11:30 AM)

27. **Jack Singal**, University of Richmond
Talk: The Cosmic Radio Background - Five Years of an Enigma

June 9, 2014 (9:10 AM - 9:30 AM)

The radio sky features an isotropic component that appears to be several times brighter than previously expected. Explanations for the origin of this radio background that have been proposed, whether extragalactic or Galactic, invariably raise more questions than answers. I will provide an overview of the radio background and review explanations for its origin.

28. **Miguel A Sánchez-Conde**, KIPAC/SLAC, Stanford
Talk: Cosmological dark matter annihilation signals: theoretical predictions

June 10, 2014 (3:40 PM - 4:00 PM)

Co-authors: Anna Franckowiak, Michael Gustafsson, Gabrijela Zaharijas, on behalf of the Fermi LAT Collaboration
The Isotropic Gamma-ray Background (IGRB) up to 820 GeV has been recently measured by the Fermi LAT using 50 months of data. Understanding the origin of this IGRB is a crucial task that requires to identify and model every possible contributor in detail. Dark matter (DM) annihilation signals integrated over all cosmic epochs have been proposed to account for a portion of the measured IGRB intensity. We refine previous estimates of this cosmological DM annihilation signal by adopting a combination of two independent but complementary theoretical strategies that greatly benefit from both, our latest knowledge of DM halo formation and evolution, and state-of-the-art N-body cosmological simulations. This double approach enables us to significantly lower the theoretical uncertainties in the predicted cosmological DM annihilation signal when compared to previous works, and thus on the derived DM limits using the new LAT IGRB measurements. These limits will be presented in a companion talk by G. Zaharijas.

29. **Hajime Takami**, KEK
Talk: Arrival distribution of ultra-high-energy cosmic rays and implications to their sources

June 10, 2014 (9:30 AM - 9:50 AM)

The origin of ultra-high-energy cosmic rays (UHECRs) is still one of the biggest mystery in astrophysics. The arrival distribution of UHECRs provides us with a hint of their origin even if it is either isotropic or anisotropic. We discuss how the origin can be unveiled from the arrival distribution with numerical simulations.

30. **Tonia M Venters**, NASA GSFC
Talk: The Impact of Electromagnetic Cascades of Energetic Particles on the Extragalactic Gamma-ray Background

June 10, 2014 (2:40 PM - 3:00 PM)

Co-authors: Vasiliki Pavlidou
As very high energy (VHE) photons propagate through the extragalactic background light (EBL), they interact with the soft photons of the EBL and initiate electromagnetic cascades of photons and electrons. The collective intensity of a cosmological population emitting at VHEs (such as blazars) will be attenuated at the highest energies through interactions with the EBL and enhanced at lower energies by the resulting cascade. As such, depending on the space density and spectra of the sources and the model of the EBL, cascade radiation can provide a significant contribution to the extragalactic gamma-ray background (EGB). Through deflections of the charged particles of the cascade, an intergalactic magnetic field (IGMF) may leave an imprint on the anisotropy properties of the EGB. The impact of a strong IGMF is to isotropize lower energy cascade photons, inducing a modulation in the anisotropy energy spectrum of the EGB. We discuss the implications of cascade radiation for the origins of the EGB and the nature of the IGMF, as well as insight that will be provided by data from the Fermi Large Area Telescope in the upcoming years.

31. **Tessa Vernstrom**, University of British Columbia
Talk: The Radio Background: Recent estimates from discrete and extended sources

June 9, 2014 (2:00 PM - 2:20 PM)

Co-authors: Scott, Douglas; Wall, J.V.; Condon, J.J.; Cotton, B.; Perley, R.; Kellermann, K.; Norris, R.

32. **Abigail Vieregg**, University of Chicago
Talk: Radio Detection of Ultra-high Energy Neutrinos

June 9, 2014 (11:30 AM - 11:50 AM)

Overview of radio techniques to discover and study ultra-high energy neutrinos.

33. **Gabrijela Zaharijas**, ICTP and INFN, Trieste
Talk: Cosmological dark matter annihilation signals: experimental constraints

June 10, 2014 (4:00 PM - 4:20 PM)

Co-authors: Fermi LAT collaboration
The measurement of the Isotropic gamma ray background by the Fermi LAT based on the 50 months of data and extending to 820 GeV is used to set novel constraints on a cosmological signal from dark matter. As presented in detail in Sánchez-Conde's talk, we adopt a combination of two complementary theoretical strategies to predict dark matter annihilation signal, which results in significantly lower uncertainties in derived dark matter limits when compared to previous works. The new limits are comparable to the ones set by the observation of dwarf spheroidal galaxies and Milky Way halo for sub-TeV dark matter masses, while they improve upon them at the high mass end due to the significant energy extension of the isotropic measurement.