CASPAR 2013 Cosmic-rays Acceleration, Sources and Propagation: A Rendez-vous

Report of Contributions

Contribution ID: **2** Type: **not specified**

Sources of galactic cosmic rays

Wednesday 11 September 2013 09:00 (1 hour)

Presenter: POHL, Martin (DESY, Zeuthen, Germany)

Contribution ID: **3** Type: **not specified**

Galactic cosmic-ray & gamma-ray sources

Wednesday 11 September 2013 10:00 (1 hour)

In this talk I will make a few comments on three classes of sources: supernova remnants, pulsar-wind nebulae, and gamma-ray binaries. In the first part, on SNRs, I will comment on the recent detection of hadronic gamma-rays and prospects for future population analysis. Regarding PWNe i will focus on young TeV emitting systems, from the point of view of time-dependent modeling of the multiwavelength emission. Finally, on gamma-ray binaries, I will present the recent detection of long-term variability of gamma-rays and their possible relation to stellar cycles.

Presenter: TORRES, Diego F. (IEEC-CSIC, Barcelona, Spain)

Contribution ID: **4** Type: **not specified**

Origin of galactic cosmic rays: the role of gamma-ray observations

Wednesday 11 September 2013 11:30 (1 hour)

Presenter: GABICI, Stefano (APC, Paris, France)

Contribution ID: **5** Type: **not specified**

Cosmic ray transport in the interstellar medium

Thursday 12 September 2013 09:00 (1 hour)

Presenter: SCHLICKEISER, Reinhard (Universität Bochum, Bochum, Germany)

Contribution ID: **6** Type: **not specified**

Acceleration of cosmic rays in shocks and reconnection sites

Thursday 12 September 2013 10:00 (1 hour)

I shall review the advances of our understanding of the First order Fermi acceleration of particles in shocks and sites of magnetic reconnection. I shall discuss how magnetic field generation in the shock precursor allows to accelerate cosmic rays to higher energies and how cosmic ray superdiffusion changes the accepted acceleration picture. I shall also discuss the process of fast reconnection of turbulent magnetic field and how this process provides efficient cosmic ray acceleration.

Presenter: LAZARIAN, Alex (University of Wisconsin, USA)

Contribution ID: **7** Type: **not specified**

Particle transport and acceleration in turbulence

Thursday 12 September 2013 11:30 (1 hour)

Presenter: YAN, Huirong (Peking University, Beijing, China)

Contribution ID: **8** Type: **not specified**

Cosmic ray propagation and the generalized central limit theorem

Friday 13 September 2013 09:00 (1 hour)

It is amazing to realize that in the current description of Galactic propagation of cosmic rays (CR), sources are not point-like, at least for primary species like protons and helium nuclei. Considering that sources as localized in space and time is more realistic, but leads to puzzling results.
Actually, in the Myriad model, the Galactic variance of, say, the proton flux at the Earth is infinite. Several suggestions have been made to cure this problem. One approach is to consider known local supernova remnants (SNR) and to treat the external sources as a continuous jelly. The proton and helium anomalies observed by PAMELA and CREAM can then be explained in that framework.
It is also possible to go one step further and to solve the infinite variance problem of the Myriad model by making use of the generalized central limit theorem.
I will show that the probability distribution function of the flux does exist in spite of an infinite variance. It follows a stable law with heavy tail well-known by financial analysts. The probability that the PAMELA and CREAM anomalies are sourced by local SNR can then be calculated.

Presenter: SALATI, Pierre (LAPTh, Annecy, France)

Contribution ID: **9** Type: **not specified**

Complementaries in indirect dark matter searches

Friday 13 September 2013 11:30 (1 hour)

Presenter: ULLIO, Piero (SISSA, Trieste, Italy)

Contribution ID: **11** Type: **not specified**

An almost perfect Universe - results from the Planck mission

Monday 16 September 2013 11:45 (1 hour)

The Planck satellite has mapped the cosmic microwave background (CMB) with unprecedented precision. An accurate determination of many cosmological parameters was possible and a number of early Universe scenarios could be constrained. The Planck mission, its main scientific results, and the anomalies seen in the CMB sky will be discussed in this talk. The impact of Galactic cosmic rays on the mission will also be shown.

Presenter: ENSSLIN, Torsten (MPA, Garching, Germany)

Contribution ID: **12** Type: **not specified**

Intergalactic Magnetic Field and Propagation of Ultra-High-Energy Cosmic Rays

Tuesday 17 September 2013 10:00 (1 hour)

Magnetic fields appear to be ubiquitous in astrophysical environments. The existence of magnetic fields in the large-scale structure (LSS) of the universe has been established through observations of Faraday rotation and synchrotron emission, as well as through recent gamma-ray observations, although their nature and origin remain controversial and largely unknown. In this talk, we first briefly review recent developments in our understanding of the intergalactic magnetic field (IGMF) and introduce a plausible model for it. We then describe how the IGMF affects the propagation of ultra-high-energy cosmic rays (UHECRs) that originate from extragalactic sources within the local universe. To this end, we set up hypothetical sources of UHECRs and virtual observers in the cosmic web magnetized with our model IGMF, and follow the trajectories of UHECRs in the intergalactic space. With our model IGMF, the paths of UHE protons and irons are deflected on average by about 15 and 70 degrees, respectively. But the IGMF at the same time contains UHECRs and the correlation between the observed UHECRs and the LSS is preserved. For instance, again with our model IGMF, the separation angles between the arrival directions and the nearest reference objects on the LSS are on average about 3.5 and 6 degrees for UHE protons and irons, respectively, which are much smaller than the defection angles. We discuss implications of our findings for correlation studies in current UHECR experiments.

Presenter: RYU, Dongsu (Chungnam National University, Korea)

Contribution ID: **13** Type: **not specified**

Diffusive shock acceleration at cosmological shock waves

Tuesday 17 September 2013 11:30 (1 hour)

Cosmological shock waves result from supersonic flow motions induced by hierarchical clustering of nonlinear structures in the universe. These collisionless shocks are thought to accelerate high-energy cosmic rays (CRs) via diffusive shock acceleration (DSA) mechanism. In this talk, we will review 1) the properties and energetics of shocks formed in cosmological structure formation simulations, 2) recent studies on how magnetic field amplification by CR streaming instabilities and Alfvenic drift may affect the DSA efficiency at strong shocks, 3) importance of re-acceleration of CRs at weak cosmological shocks and its implications on radio relics, 4) the nature and roles of infall shocks that form mostly in cluster outskirts, and 5) the possibility of the acceleration of ultra-high energy CRs at cluster accretion shocks.

Presenter: KANG, Hyesung (Pusan National University, Korea)

Contribution ID: **15** Type: **not specified**

Where did UHECRs come from?

Wednesday 18 September 2013 09:00 (1 hour)

Thanks to giant extensive air-showers observatories, such as the Pierre Auger Observatory and the Telescope Array, we now know that the sources of ultrahigh energy cosmic rays (UHECRs) are extragalactic. We also know that either they interact with the CMB as predicted or they run out of energy at the same energy scale of the CMB interactions! Their composition is either surprising (dominated by heavier nuclei at the highest energies) or the hadronic interactions at 100 TeV are not a standard extrapolation of LHC interaction energies.
The basic question in the field remains unanswered: what generates such extremely energetic particles that reach above 10^20 eV (100 EeV)?. Where do they come from? How do they reach these energies? What are they (protons or heavier nuclei?)? How do they interact on their way to Earth and with the Earth's atmosphere?
To answer these questions larger statistics at the highest energies is necessary. Space-based observatories can significantly improve the exposure to these extremely energetic particles. The first step to answer these questions is to place a wide field UV telescope at the International State Station to monitor the Earth's atmosphere from above. This is the goal of the JEM-EUSO mission, which stands for Extreme Universe Space Observatory (EUSO) at the Japanese Experiment Module (JEM).

Presenter: OLINTO, Angela (KICP, Chicago, USA)

Contribution ID: **18** Type: **not specified**

The Near Infrared Background: puzzles and promises

Thursday 19 September 2013 09:00 (1 hour)

I will review the present status of the understanding of the Near Infrared Background light. In particular I will focus on recent experimental and theoretical progresses that hint at the possibility that a fraction of this cosmic light traces the most distant galaxies and, even more likely, the first black holes, thus opening an exciting pathway to study the early Universe.

Presenter: FERRARA, Andrea (SNS, Pisa, Italy)

Contribution ID: **19** Type: **not specified**

Extragalactic Background Light: a Review

Thursday 19 September 2013 10:00 (1 hour)

I will provide a review of our knowledge of the Extragalactic Background Light (EBL): 1- measurements of intensity across the electromagnetic spectrum; 2- measurements of fluctuations; 3- what do all this tell us, link to models. I will highlight the CIB (Cosmic Infrared Background).

Presenter: DOLE, Hervé (Institut d'Astrophysique Spatiale, Orsay)

Contribution ID: **20** Type: **not specified**

Extragalactic messengers: some open questions

Thursday 19 September 2013 11:30 (1 hour)

Presenter: KACHELRIESS, Michael (NTNU Institutt for fysikk, Trondheim, Norway)

Contribution ID: **21** Type: **not specified**

Extragalactic propagation of UHECRs

Wednesday 18 September 2013 10:00 (1 hour)

Presenter: BONCIOLI, Denise (INFN-LNGS, L'Aquila, Italy)

Contribution ID: **22** Type: **not specified**

Propagation and interpretation of ultra-high energy cosmic rays using CRPropa

Wednesday 18 September 2013 11:30 (1 hour)

Presenter: KUEMPEL, Daniel (RWTH Aachen University, Germany)

Contribution ID: **23** Type: **not specified**

The view on cosmic rays in galaxy clusters from numerical simulations and observations

Wednesday 18 September 2013 14:30 (1 hour)

The intra cluster medium is a dynamically active environment, in which dissipation of large motions and acceleration of cosmic rays are likely ubiquitous processes. I will review the present theoretical uncertainties and firm conclusions on cosmic rays in the intra cluster medium, coming from broad-band observations and the updated cosmological numerical modelling of these systems.

Presenter: VAZZA, Franco (Hamburger Sternwarte, Hamburg, Germany)

Contribution ID: **24** Type: **not specified**

Recents results from the Pierre Auger Observatory

Monday 16 September 2013 16:00 (1 hour)

Presenter: DEMBINSKI, Hans (Karlsruher Institut für Technologie, Karlsruhe, Germany)

Contribution ID: **25** Type: **not specified**

Acceleration to ultra-high energies

Tuesday 17 September 2013 14:30 (1 hour)

Presenter: LEMOINE, Martin (IAP, Paris, France)

Contribution ID: **26** Type: **not specified**

New developments in our understanding of the origin of CRs

Monday 16 September 2013 09:15 (1 hour)

Presenter: WAXMAN, Eli (Weizmann Institute of Science, Rehovot, Israel)

Contribution ID: **27** Type: **not specified**

PeV Cosmic Rays measured by IceCube/IceTop

Monday 16 September 2013 10:15 (1 hour)

We report on the high-resolution measurements of cosmic ray spectrum and mass composition from the knee region up to 1 EeV based on one year of data collected with IceCube/IceTop. Complementary to the PeV neutrinos, IceCube measures extensive air showers of PeV cosmic rays on the surface with the IceTop array and the penetrating high energy muon bundles with the matrix of detectors in deep ice. The measured spectrum can not be explained by a simple power law beyond the knee, which confirm the other recent measurements (GAMMA, Tunka, Kascade-Grande). We observe a prominent hardening above 18 +/- 2 PeV followed by a sharp steepening beyond 130 +/- 30 PeV. In this egergy region, the composition gets heavier as indicated by the steady increase in the measured mean logarithmic mass lnA. The change in shape and amplitude of anisotropy observed by IceCube/IceTop in the arrival direction distributions of PeV cosmic rays will also be discussed.

We will present a model independent analysis of the recent cosmic ray measurements driven by the combined data from satelite, balloon and air shower experiments. We find that at least 3 different source populations needed to describe the observed spectral shape and the mass composition from 200 GeV up to 200 EeV.

Presenter: TILAV, Serap (University of Delaware, US)

Contribution ID: **28** Type: **not specified**

Neutrino astronomy with IceCube

Monday 16 September 2013 14:30 (1 hour)

Presenter: SÁNCHEZ, Juan Antonio Aguilar (Université de Genève, Geneva, Switzerland)

Contribution ID: **29** Type: **not specified**

Search for Dark Matter in the Galaxy

Friday 13 September 2013 10:00 (1 hour)

Presenter: ZAHARIJAS, Gabrijela (ICTP, Trieste, Italy)

Contribution ID: **30** Type: **not specified**

Localisation of cosmic ray sources via extended gamma and neutrino emission around them

Thursday 12 September 2013 14:45 (1 hour)

Presenter: NERONOV, Andrii (ISDC Data Centre for Astrophysics, Geneva, Switzerland)

Contribution ID: **31** Type: **not specified**

Anisotropic Cosmic Ray Diffusion and its Implications for Gamma-Ray Astronomy

Wednesday 11 September 2013 15:00 (1 hour)

Presenter: SEMIKOZ, Dmitri (AstroParticle and Cosmology (APC), Paris, France)

Contribution ID: **32** Type: **not specified**

Results from AMS-02

Tuesday 10 September 2013 10:00 (1 hour)

Presenter: GEBAUER, Iris (Karlsruhe Institute of Technology, Karlsruhe, Germany)

Contribution ID: **33** Type: **not specified**

Galactic Cosmic Rays with H.E.S.S.

Tuesday 10 September 2013 09:00 (1 hour)

Presenter: EGBERTS, Kathrin (Leopold-Franzens-Universität, Innsbruck, Austria)

Contribution ID: **34** Type: **not specified**

Modeling of Galactic Cosmic Ray propagation in our Galaxy in light of recent AMS results

Tuesday 10 September 2013 11:30 (1 hour)

Presenter: GAGGERO, Daniele (SISSA, Trieste, Italy)

Contribution ID: **35** Type: **not specified**

Galactic Magnetic Field and Cosmic Rays

Tuesday 17 September 2013 09:00 (1 hour)

Presenter: FARRAR, Glennys (NYU, New York City, US)

Contribution ID: **36** Type: **not specified**

Dark matter searches in charged cosmic rays? Really?

Friday 13 September 2013 14:30 (1 hour)

Presenter: MERTSCH, Philipp (Stanford University)

Contribution ID: **38** Type: **not specified**

Aperitif

Thursday 12 September 2013 14:30 (15 minutes)

Presenter: Mr SAVELIEV, Andrey (University of Hamburg)

Contribution ID: **39** Type: **not specified**

Welcome Speech

Monday 16 September 2013 09:00 (15 minutes)

Presenter: SIGL, Günter (Hamburg University)

Contribution ID: **40** Type: **not specified**

Welcome Speech

Tuesday 10 September 2013 08:45 (15 minutes)

Presenter: Dr EVOLI, Carmelo (II. Institut für Theoretische Physik, Universität Hamburg)