SuGAR 2024

Report of Contributions

https://events.icecube.wisc.edu/e/SuGAR2024

Contribution ID: **1** Type: **not specified**

Remote presentation

Presenter: BLASI, Pasquale (GSSI)

Session Classification: Presentations

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

Remote presentation

Presenter: DE MITRI, Ivan (Gran Sasso Science Institute)

Session Classification: Presentations

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

In-person presentation

Presenter: ZWEIBEL, Ellen (University of Wisconsin–Madison)

Session Classification: Presentations

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

AMS-02 results and perspectives for future measurements with a magnetic spectrometer

Monday, 14 October 2024 09:45 (45 minutes)

Presenter: ZUCCON, Paolo (Trento University and INFN-TIFPA)

Session Classification: Presentations

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

In-person presentation

Presenter: MOSKALENKO, Igor (Stanford University)

Session Classification: Presentations

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

In-person presentation

Presenter: MERTSCH, Philipp

Session Classification: Presentations

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

In-person presentation

Presenter: MERTEN, Lukas (RUB)

Session Classification: Presentations

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

Remote presentation

Presenter: MOHANTY, Pravata Kumar (Tata Institute of Fundamental Research)

Session Classification: Presentations

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

Progresses in γ−ray Astronomy and Cosmic-ray ResearchProgresses in γ−ray Astronomy and Cosmic-ray Research

Tuesday, 15 October 2024 09:45 (45 minutes)

Presenter: CAO, Zhen (Institute of High Energy Physics)

Session Classification: Presentations

Contribution ID: **10** Type: **not specified**

In-person presentation

Presenter: NEGRO, Michela

Session Classification: Presentations

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

In-person presentation

Presenter: DÍAZ VÉLEZ, Juan Carlos (University of Wisconsin–Madison)

Session Classification: Presentations

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

Galactic Gamma Ray Sources as seen by HAWC

Tuesday, 15 October 2024 14:00 (45 minutes)

Presenter: GOODMAN, Jordan (UMD)

Session Classification: Presentations

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

In-person presentation

Presenter: MORLINO, Giovanni (INAF/Osservatorio Astrofisico di Arcetri)

Session Classification: Presentations

Contribution ID: **14** Type: **not specified**

In-person presentation

Presenter: PARK, Nahee

Session Classification: Presentations

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

Remote presentation

Presenter: LÓPEZ-COTO, Rubén (IAA-CSIC)

Session Classification: Presentations

Contribution ID: **16** Type: **not specified**

In-person presentation

Presenter: HALZEN, Francis (University of Wisconsin–Madison)

Session Classification: Presentations

Contribution ID: **17** Type: **not specified**

In-person presentation

Presenter: AHLERS, Markus (Niels Bohr Institute - University of Copenhagen)

Session Classification: Presentations

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

In-person presentation

Presenter: GOSSAN, Sarah (Hofstra University)

Session Classification: Presentations

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

In-person presentation

Presenter: FANG, Ke (University of Wisconsin–Madison)

Session Classification: Presentations

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

In-person presentation

Presenter: MERTEN, Lukas (RUB)

Session Classification: Presentations

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

In-person presentation

Presenter: GIACINTI, Gwenael (Tsung-Dao Lee Institute, SJTU)

Session Classification: Presentations

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

In-person presentation

Presenter: HOOPER, Dan

Session Classification: Presentations

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

In-person presentation

Presenter: KRIZMANIC, John (NASA/GSFC)

Session Classification: Presentations

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

In-person presentation

Presenter: KAWATA, Kazumasa

Session Classification: Presentations

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

In-person presentation

Presenter: LINDEN, Tim (Stockholm University)

Session Classification: Presentations

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

Symposium's Summary

Thursday, 17 October 2024 14:00 (30 minutes)

Presenter: TOSCANO, Simona (Université Libre de Bruxelles)

Session Classification: Summary

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

Galactic CR sources: Insights from the diffuse emission, TeV halos, and the CR anisotropy (remote)

Wednesday, 16 October 2024 16:45 (45 minutes)

We present two models of CR transport in the Galaxy. One with isotropic diffusion, and another one with anisotropic diffusion, where CRs are propagated in Galactic magnetic field models. In both models, CRs are injected at discrete transient sources in the disc. We calculate the corresponding diffuse Galactic gamma-ray emissions. We find that the emission at >~ 100 TeV is very clumpy, and does not correlate with the gas density along the line of sight. It is substantially different from the relatively smoother emission detected by Fermi at ~ GeV energies. We then discuss how many PeVatrons would be detectable in our simulations (hadronic and leptonic), and compare our predictions with LHAASO data. We show that this allows to place interesting constraints on the nature and properties of PeVatrons.
Moreover, we suggest that extended gamma-ray sources of a hadronic origin should exist in the data. We show that such a source may exist in the AS-gamma data at 398-1000 TeV. We also discuss the case of another type of extended sources, TeV halos, and show that some may lead to the appearance of spurious "mirage" gamma-ray sources with no counterparts.
Finally, we discuss the implications of the observed TeV-PeV cosmic-ray anisotropies, and present a new calculation of their expected angular power spectrum.

Primary author: Prof. GIACINTI, Gwenael (Tsung-Dao Lee Institute, SJTU)

Presenter: Prof. GIACINTI, Gwenael (Tsung-Dao Lee Institute, SJTU)

Session Classification: Presentations

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

Recent Results on Cosmic Ray Spectrum and Anisotropy from the GRAPES-3 Experiment (remote)

Tuesday, 15 October 2024 09:00 (45 minutes)

The GRAPES-3 experiment, situated in Ooty, India, uses a dense array of plastic scintillator detectors and a large-area tracking muon detector to measure all charged particles and the muonic components of cosmic ray showers, respectively. The experiment has measured the cosmic ray proton spectrum in the energy range of 50 TeV to 1.3 PeV, and the relative proton composition was determined using muon multiplicity distributions. A spectral hardening was observed beyond 166 TeV, challenging the simple power-law description extending to the knee energy. Furthermore, two significant small-scale anisotropic structures in the cosmic ray arrival distribution were detected at a median energy of 16 TeV, consistent with results from the HAWC and ARGO-YBJ experiments. This presentation will highlight these findings, along with updates on the status of the detector upgrades and future plans.

Primary author: MOHANTY, Pravata Kumar (Tata Institute of Fundamental Research)

Presenter: MOHANTY, Pravata Kumar (Tata Institute of Fundamental Research)

Session Classification: Presentations

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

Galactic gamma-ray PeVatron observations and non-thermal processes in galactic sources (remote)

Wednesday, 16 October 2024 09:00 (45 minutes)

Cosmic rays are ultrarelativistic particles that permeate the Milky Way, propagating through the Galactic turbulent magnetic fields. The mechanisms under which these particles increase their energy can be reasonably described by current theories of acceleration and propagation of cosmic rays. There are, however, still many open questions as to how to reach petaelectronvolt (PeV) energies, the maximum energy believed to be attained in our Galaxy, and in which astrophysical sources (dubbed PeVatrons) this ultra-high energy acceleration happens. In this contribution, I will present the theoretical conditions for plasma acceleration to these energies, and the Galactic sources in which these conditions are possible. These theoretical predictions are then confronted with the latest experimental results, summarising the state-of-the-art of our current knowledge of PeVatrons. I finally describe future prospects to keep advancing the understanding of these elusive objects, still unidentified more than one hundred years after the discovery of cosmic rays.

Primary author: LÓPEZ-COTO, Rubén (IAA-CSIC)

Presenter: LÓPEZ-COTO, Rubén (IAA-CSIC)

Session Classification: Presentations

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

Searching for Galactic PeVatrons with the Tibet ASgamma Experiment

Thursday, 17 October 2024 11:00 (45 minutes)

The Tibet Air Shower (AS) array and the underground water-Cherenkov-type muon detector (MD) array have been operating successfully since 2014 at an altitude of 4,300 m in Tibet, China. The surface AS array determines the primary energies and arrival directions, while the MD array enables us to drastically reject background cosmic rays by counting the number of muons in each air shower. Recently, using these AS+MD arrays, we succeeded for the first time in observing sub-PeV gamma rays from the Crab Nebula and sub-PeV diffuse gamma rays from the Galactic disk. On the other hand, it is believed that there are PeVatrons in our Galaxy, which accelerate PeV cosmic rays. PeV cosmic rays accelerated by the source interact with surrounding molecular clouds and emit sub-PeV gamma rays through neutral pion decay. Therefore, sub-PeV gamma-ray observations are crucial for PeVatron searches. In this presentation, we will review sub-PeV gamma-ray observations with the Tibet ASgamma experiment and discuss the most energetic cosmic-ray source "PeVatron" in our Galaxy.

Primary author: Dr KAWATA, Kazumasa

Presenter: Dr KAWATA, Kazumasa

Session Classification: Presentations

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

Multi-messenger modeling of Galactic cosmic-ray acceleration and transport

Monday, 14 October 2024 16:00 (45 minutes)

Recent observation of LHAASO's detection of several ultrahigh energy gamma ray sources and IceCube's observation of the Galactic plane in neutrinos are clear a indication of Galactic cosmic ray sources with energies in the PeV range. However, up to now the exact acceleration processes are still unknown. Therefore, modeling the acceleration and propagation of those particles in the source and on their way to Earth can help to understand their origin.

In this talk, I will show recent improvements of CRPropa's, an open source simulation framework, ensemble averaged approach to model the diffusive propagation of charged cosmic rays in arbitrary magnetic fields. This includes more sophisticated models of spatial diffusion, allowing for changing Eigenvalues of the diffusion tensor and anomalous diffusion. Besides diffusive shock acceleration, also momentum diffusion can now be taken into account. Furthermore, our advances to model hadron-hadron interactions with CRPropa will be shown. Combining the two will allow us to build a more consistent model of the complete cosmic-ray lifetime, from acceleration to arrival at Earth.

Presenter: MERTEN, Lukas (RUB)

Session Classification: Presentations

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

In-person presentation

Presenter: KRIZMANIC, John (NASA/GSFC)

Session Classification: Presentations

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

In-person presentation

Presenter: KRIZMANIC, John (NASA/GSFC)

Session Classification: Presentations

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

Results from the DAMPE space mission (remote)

Monday, 14 October 2024 13:15 (45 minutes)

The space-based DAMPE (DArk Matter Particle Explorer) detector has been taking data since its successful launch in December 2015. Its main scientific goals include the indirect search for dark matter signatures in the cosmic electron and gamma-ray spectra, the measurements of galactic cosmic ray fluxes from tens of GeV up to hundreds of TeV and high energy gamma ray astronomy above a few GeV.
A review of the detector features and the main mission results will be given.
In particular, results on proton and helium, which revealed new spectral features, will be described.
Ongoing analyses on light, medium, and heavy mass nuclei will be outlined, together with results on secondary-to-primary flux ratios.

Primary author: DE MITRI, Ivan (GSSI and INFN)

Presenter: DE MITRI, Ivan (GSSI and INFN)

Session Classification: Presentations

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

HAWC Observations of the Spectrum, Composition and Anisotropy of Cosmic Rays Below the Knee

Tuesday, 15 October 2024 13:15 (45 minutes)

The HAWC Gamma-Ray Observatory is an extensive air-shower detector array located at 4100 m a.s.l. on the slopes of Volcán Sierra Negra at 19°N in the state of Puebla, Mexico. While HAWC is designed to study the sky in gamma-rays between 500 GeV and 100 TeV, it is also sensitive to showers from primary cosmic rays in the TeV to to multi-PeV energy range. We report on the latest measurements of the energy spectrum, mass composition and arrival direction distribution of cosmic rays at energies from TeV's to 1 PeV. The cosmic-ray energy spectrum measured by HAWC covers a range that includes the part of the energy region dominated by direct experiments up to just below the knee and shows a cut-off in the total spectrum at tens of TeV's. We have also estimated the energy spectrum for H+He nuclei, including the observation of a softening at around 24 TeV. Unfolding studies in this energy region indicate that this is the result of individual cut-offs in the spectra of H and He, first observed by direct experiments. Our results also indicate the existence of a cut-off between 100 and 300 TeV in the heavy component of cosmic rays and a hardening in the spectra of the light cosmic ray nuclei at around 100 TeV.

Primary author: DÍAZ VÉLEZ, Juan Carlos (University of Wisconsin–Madison)

Presenter: DÍAZ VÉLEZ, Juan Carlos (University of Wisconsin–Madison)

Session Classification: Presentations

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

Are Supernova Remnants as Cosmic Ray Factories? Yes, but…

Wednesday, 16 October 2024 16:00 (45 minutes)

First-principles plasma simulations have been pivotal in helping developing a theory of ion and electron acceleration at shocks, and in particular in SNRs. I discuss what we have learned about particle acceleration efficiency, spectra, and maximum energy, and contrast these results with multi-wavelength emission from SNRs. Despite compelling evidence of hadron acceleration in these sources, there are both theoretical and observational open questions that prevent us from claiming that SNRs can accelerate CRs up to the knee.

Primary author: CAPRIOLI, Damiano (University of Chicago)

Presenter: CAPRIOLI, Damiano (University of Chicago)

Session Classification: Presentations

Contribution ID: **37** Type: **not specified**

Spectral Signatures of Local Cosmic Ray Sources

Monday, 14 October 2024 14:00 (45 minutes)

I will discuss possible origins of spectral features observed at low and high energies.

Primary author: MOSKALENKO, Igor (Stanford University)

Presenter: MOSKALENKO, Igor (Stanford University)

Session Classification: Presentations

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

The Unexpected TeV Emitters in the Galactic Plane

Wednesday, 16 October 2024 14:00 (45 minutes)

Recent multi-messenger observations of the Galactic plane have revealed new classes of gamma-ray emitters at energies reaching into the multi-tens of TeV range, challenging our previous understanding based on lower-energy data. These unexpected sources include TeV halos—extended gamma-ray emissions around isolated pulsars that cannot be explained as traditional pulsar wind nebulae—as well as X-ray binaries and supernova remnants exhibiting emissions up to 100 TeV. In this talk, we will present recent findings from studies utilizing data from HAWC, Fermi-LAT and IceCube. Furthermore, we will discuss theoretical interpretations that shed light on these observations and explore their implications for high-energy astrophysical processes.

Primary author: FANG, Ke (University of Wisconsin–Madison)

Presenter: FANG, Ke (University of Wisconsin–Madison)

Session Classification: Presentations

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

IceCube: Status of the Search for Cosmic Ray Sources

Wednesday, 16 October 2024 09:45 (45 minutes)

Below the geographic South Pole, the IceCube project has transformed one cubic kilometer of natural Antarctic ice into a neutrino detector. IceCube detects more than 100,000 neutrinos per year in the GeV to 10 PeV energy range. Among those, we have isolated a flux of high-energy neutrinos originating beyond our Galaxy, with an energy flux that is comparable to that of the extragalactic high-energy photon flux observed by the NASA Fermi satellite. With a decade of data, we have identified their first sources, which point to the obscured dense cores associated with the supermassive black holes at the centers of active galaxies as the origin of high-energy neutrinos and high-energy cosmic rays. We recently also observed neutrinos originating in our own Milky Way which is, interestingly, not a prominent feature in the neutrino sky.

Primary author: Mr HALZEN, Francis (UW-Madison)

Presenter: Mr HALZEN, Francis (UW-Madison)

Session Classification: Presentations

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

Investigating the CREDIT history of supernova remnants as cosmic-ray sources

Monday, 14 October 2024 15:15 (45 minutes)

Supernova remnants (SNRs) have long been suspected to be the primary sources of Galactic cosmic rays. Over the past decades, great strides have been made in the modelling of particle acceleration, magnetic field amplification, and escape from SNRs. Yet, while many SNRs have been observed in non-thermal emission in radio, X-rays, and gamma-rays, there is no evidence for any individual object contributing to the locally observed flux. Here, we propose a particular spectral signature from individual remnants that is due to the energy-dependent escape from SNRs. For young and nearby sources, we predict fluxes enhanced by tens of percent in narrow rigidity intervals; given the percent-level flux uncertainties of contemporary cosmic-ray data, such features should be readily detectable. We model the spatial and temporal distribution of sources and the resulting distribution of fluxes with a Monte Carlo approach. The decision tree that we have trained on simulated data is able to discriminate with very high significance between the null hypothesis of a smooth distribution of sources and the scenario with a stochastic distribution of individual sources. We suggest that this cosmic-ray energy-dependent injection time (CREDIT) scenario be considered in experimental searches to identify individual SNRs as cosmic-ray sources.

Primary authors: MERTSCH, Philipp; STALL, Anton (TTK, RWTH Aachen University); LOO, Chun Khai (TTK, RWTH Aachen University)

Presenter: MERTSCH, Philipp

Session Classification: Presentations

Contribution ID: **41** Type: **not specified**

Young stellar cluster as cosmic ray sources

Tuesday, 15 October 2024 15:15 (45 minutes)

In the last decade or so, several young stellar clusters in pour Galaxy have been associated with diffuse gamma-ray sources detected from GeV to multi-TeV enegy band, supporting the idea that efficient particle acceleration is taking place in those objects. Particle acceleration may occur through different mechanisms: i) at the termination shock of stellar winds produced by massive stars, ii) at the shock of supernove exploding inside the cluster or iii) due to the second order Fermi acceleration in the highly turbulente environment generated by winds and SN explotions. Which mechanism dominate remains to be understood.
In this talk I will review the acceleration models applied to stellar clusters, highlighting the prediction for the resulting gamma-ray emission.

Primary author: MORLINO, Giovanni (INAF/Osservatorio Astrofisico di Arcetri)

Presenter: MORLINO, Giovanni (INAF/Osservatorio Astrofisico di Arcetri)

Session Classification: Presentations

Contribution ID: **42** Type: **not specified**

IceCube's Galactic Neutrinos: Diffuse Emission or Hidden Sources?

Thursday, 17 October 2024 09:45 (45 minutes)

The IceCube Neutrino Observatory has recently reported strong evidence for neutrino emission from the Galactic plane. The signal is consistent with model predictions of diffuse emission from cosmic ray propagation in the interstellar medium. However, due to IceCube's limited potential of identifying individual neutrino sources, it is also feasible that unresolved Galactic sources could contribute to the signal. I will discuss the contribution of this quasi-diffuse emission and examine whether this hypothesis can be tested by the upcoming KM3NeT detector or the planned future facility IceCube-Gen2.

Primary author: AHLERS, Markus (Niels Bohr Institute - University of Copenhagen)

Presenter: AHLERS, Markus (Niels Bohr Institute - University of Copenhagen)

Session Classification: Presentations

Contribution ID: **43** Type: **not specified**

The Fermi view of the Galactic diffuse gamma-ray emission

Tuesday, 15 October 2024 11:00 (45 minutes)

In our pursuit of understanding the origins and mechanisms of Galactic cosmic rays, diffuse gamma-ray emission serves as a vital indirect probe of cosmic ray propagation within the Milky Way. This presentation will provide an overview of the diffuse gamma-ray emissions observed by the Fermi Large Area Telescope (Fermi-LAT), emphasizing the intricate connections with cosmic ray interaction and propagation through the interstellar medium.

Primary author: NEGRO, Michela

Presenter: NEGRO, Michela

Session Classification: Presentations

Contribution ID: **44** Type: **not specified**

Interaction of Cosmic Rays at Mesoscopic Scales

Wednesday, 16 October 2024 15:15 (45 minutes)

I will discuss some recent work on the interaction of cosmic rays with turbulent, diffuse, multi-phase gas in the interstellar medium and beyond. Our work focuses on spatial scales which are typically not resolved by global simulations but are large compared to kinetic scales, and to the cosmic ray mean free path, so the fluid approximation holds. Phenomena at these scales are potentially observable and provide tests of the underlying models. These results were obtained in collaboration with Roark Habegger, Hanjue Zhu, Ka Ho Yuen, Ka Wai Ho, and Nick Gnedin, and were funded by DoE, NASA and the NSF.

Primary authors: ZWEIBEL, ELLEN GOULD (Univ. Wisconsin-Madison); Prof. ZWEIBEL, Ellen (Univ. Wisconsin-Madison)

Presenter: ZWEIBEL, ELLEN GOULD (Univ. Wisconsin-Madison)

Session Classification: Presentations

Contribution ID: **45** Type: **not specified**

Science Results of 9 Years of Measurements from CALET Operation on the International Space Station

Monday, 14 October 2024 11:00 (45 minutes)

Operating nearly flawlessly for nine years from October 2015, the Calorimetric Electron Telescope (CALET) has been measuring the properties of the cosmic radiation. CALET was designed to achieve the primary objectives of measuring the spectra of electrons/positrons through the TeV energy decade to search for nearby sources and/or signatures of dark matter processes and measure the spectra of the hadronic components up to a PeV. Combined with secondary science goals of measuring the relative abundances of the ultra-heavy galactic cosmic ray (UHGRC) component above Z=28 (nickel) and past Z=40 (zirconium) and of measuring gamma-rays potentially in the TeV region, CALET's measurements are designed to provide detailed investigations of the processes involved in cosmic-ray acceleration, including understand the relationship between volatile and refractory material in this process, as well as the subsequent propagation in the galaxy. CALET also monitors the sky for X-ray and soft gamma-ray transients using the CALET Gamma-Ray Burst Monitor (CGBM). Additionally, CALET has demonstrated exceptional sensitivity to space weather events vis-à-vis the observation of variability in the flux of geomagnetically trapped particles, especially using on-board measurements of precipitating electrons. The science results obtained during the first 9 years of CALET operation, including the breaks in spectral indices observed in the all-electron and hadronic spectra, will be presented and discussed.

Primary author: KRIZMANIC, John (NASA/GSFC)

Presenter: KRIZMANIC, John (NASA/GSFC)

Session Classification: Presentations

Contribution ID: **46** Type: **not specified**

A Multi-Messenger View of the Milky Way

Thursday, 17 October 2024 09:00 (45 minutes)

I will discuss the origin of the high-energy neutrino observed from the Galactic Plane by IceCube in a multi-messenger context. Observations of diffuse gamma-ray emission, resolved gamma-ray sources (in particular, TeV halos), and the cosmic ray spectrum each bear on this question. IceCube data, in turn, can be used to test cosmic-ray transport models, and models of origin of the Galactic cosmic rays.

Primary author: HOOPER, Dan

Presenter: HOOPER, Dan

Session Classification: Presentations

Contribution ID: **47** Type: **not specified**

Galactic Cosmic Rays: loose ends or shaking pillars? (remote)

Monday, 14 October 2024 09:00 (45 minutes)

I will discuss some of the open problems related to the origin of Galactic cosmic rays, in terms of both acceleration and transport.

Primary author: BLASI, Pasquale (GSSI)

Presenter: BLASI, Pasquale (GSSI)

Session Classification: Presentations

Contribution ID: **48** Type: **not specified**

Excesses in Cosmic-Ray Antinuclei

Thursday, 17 October 2024 13:15 (45 minutes)

Observations by AMS-02 on the International Space Station have tentatively detected approximately 10 events that are consistent with antihelium nuclei. Such a detection would be of significant theoretical interest due to the difficulty in producing any detectable antihelium flux through standard model interactions. In this talk, I will discuss the state of these observations, the state of models that are capable of producing such observations – and the possibility that dark matter may first be detected due to its exceedingly rare annihilations into heavy antinuclei states, compared to more standard processes that produce gamma rays, positrons, or antiprotons.

Primary author: LINDEN, Tim (Stockholm University)

Presenter: LINDEN, Tim (Stockholm University)

Session Classification: Presentations

Contribution ID: **49** Type: **not specified**

Introduction

Monday, 14 October 2024 08:45 (15 minutes)

Presenter: DESIATI, Paolo (University of Wisconsin–Madison)

Session Classification: Introduction

Contribution ID: **50** Type: **not specified**

Multi-messenger search for the hadronic accelerators in our Galaxy

Tuesday, 15 October 2024 16:00 (45 minutes)

The origin of cosmic rays has been a century-old question. As it is challenging to utilize the directional information of cosmic rays to learn about their origin, observing the gamma rays and neutrinos generated by the interactions of cosmic rays around the source regions has been considered to be the best way to study the origin of cosmic rays. In the last decades, there have been remarkable improvements in the measurements of cosmic rays, gamma rays and neutrinos. This rich multi-messenger data should provide a consistent picture of the hadronic accelerators in our Galaxy. I will summarize current observations of multi-messenger observations focusing on the hadronic accelerators in our Galaxy and discuss what near-future observations may advance our current understanding.

Primary author: PARK, Nahee (Queen's University)

Presenter: PARK, Nahee (Queen's University)

Session Classification: Presentations

Contribution ID: **51** Type: **not specified**

Turbulent tales of stellar collapse and rebirth

Wednesday, 16 October 2024 13:15 (45 minutes)

The next Galactic core-collapse supernova will offer an unparalleled opportunity to probe the explosive rebirth of massive star to compact object across all cosmic messengers. In this talk, I will outline what multi-messenger observations can tell us about stellar evolution, the nascent compact object population, and fundamental physics. I will discuss the current prospects for detection of gravitational waves from core-collapse supernovae, and before outlining how we can seek to improve them through experimental and analytical techniques over the next twenty years. To conclude, I will muse on the impact of these topics on our understanding of the central engines driving sources of Galactic cosmic rays.

Primary author: GOSSAN, Sarah (Hofstra University)

Presenter: GOSSAN, Sarah (Hofstra University)

Session Classification: Presentations