International Conference on High Energy Particle & Astroparticle Physics (ICHEPAP2023)

Report of Contributions

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

Welcome Speech by the Director, SINP

Monday, 11 December 2023 09:40 (20 minutes)

Contribution ID: **2** Type: **Plenary Talk**

Standard Model Physics (Non Higgs) at LHC

Monday, 11 December 2023 10:00 (45 minutes)

Chair: Sunanda Banerjee

Presenter: MAL, Prolay (NISER Bhubneswar)

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

Welcome and Opening Remarks

Monday, 11 December 2023 09:30 (10 minutes)

Contribution ID: **4** Type: **Plenary Talk**

Higgs Physics (SM & BSM) at the LHC

Monday, 11 December 2023 11:30 (45 minutes)

Chair: Sunanda Banerjee

Presenter: SHARMA, Vivek (University of California, San Diego, USA)

Contribution ID: **5** Type: **Plenary Talk**

Current Status of Dark Matter (Theory)

Monday, 11 December 2023 14:30 (45 minutes)

Chair: B. Mukhopadhyay

Presenter: IBARRA, Alejandro

Contribution ID: **6** Type: **Plenary Talk**

Primordial Black Holes as Dark Matter Candidates

Monday, 11 December 2023 15:15 (45 minutes)

Chair: B. Mukhopadhyay

Presenter: LAHA, Ranjan (Indian Institute of Science)

Contribution ID: **7** Type: **Invited Talk**

Current status of Global W Mass Measurement

Monday, 11 December 2023 16:30 (30 minutes)

Chair: D. Kar/P. Mal

Presenter: ROYCHOWDHURY, Suvankar (NFN Sezione di Pisa, Italy)

Session Classification: Parallel Session 1: Collider

Contribution ID: **8** Type: **Invited Talk**

Effective Field Theory in the light of LHC Data

Monday, 11 December 2023 17:00 (30 minutes)

Chair: Prolay Mal

Presenter: GUPTA, Rick Sandeepan (TIFR, Mumbai)

Session Classification: Parallel Session 1: Collider

Contribution ID: **9** Type: **Invited Talk**

Application of Machine Learning Techniques in HEP experiments

Monday, 11 December 2023 17:30 (30 minutes)

Chair: D. Kar/P. Mal

Presenter: GANGULY, Sanmay

Session Classification: Parallel Session 1: Collider

Contribution ID: **10** Type: **Contributory Talk**

Search for Dark Matter produced in association with a Higgs Boson in proton-proton collisions at √s = 13 TeV

Monday, 11 December 2023 18:00 (20 minutes)

Chair: D. Kar/P. Mal
Abstract: Search for Dark Matter produced in association with a Higgs boson in proton–proton collisions at s = 13 TeV Ashim Roy B.N. Mandal University E-mail: ashim.roy@cern.ch On behalf of CMS collaboration Abstract A search for dark matter (DM) particles was conducted by analyzing proton-proton collision data collected by the CMS experiment at a center-of-mass energy of 13TeV at the LHC in 2016. This dataset corresponded to an integrated luminosity of 35.9 fb-1. The search was centered around events with a candidate Higgs boson and a significant amount of missing transverse momentum. To maximize the analysis's sensitivity, the investigation was carried out in five distinct Higgs boson decay channels: h ⟶ bb, h ⟶ ⌧⌧, h ⟶ t+t-, h ⟶ W+W+, and h ⟶ ZZ. The results from each of these individual channels were carefully combined to enhance the sensitivity of the analysis. However, no substantial excess beyond the expected standard model background was detected in any of the above channels. As a result, the study proceeded to establish limits on dark matter production within the framework of two simplified models.

Presenter: ROY, Ashim (Bhupendra Narayan Mandal University)

Session Classification: Parallel Session 1: Collider

Contribution ID: **11** Type: **Invited Talk**

Particle Dark Matter

Monday, 11 December 2023 16:30 (30 minutes)

Chair: D. Nieto

Presenter: MUKHOPADHYAY, Satyanarayan (IACS, Kolkata)

Session Classification: Parallel Session 1: Non Collider

Contribution ID: **12** Type: **Invited Talk**

Dark Matter in Compact Stars

Monday, 11 December 2023 17:00 (30 minutes)

Chair: D. Kerszberg

Presenter: RAJ, Nirmal (Indian Institute of Science)

Session Classification: Parallel Session 1: Non Collider

Contribution ID: **13** Type: **Contributory Talk**

CPT VIOLATION AND SAKHAROV CONDITIONS.

Monday, 11 December 2023 17:30 (20 minutes)

Chair: D. Nieto
Abstract: In this talk, we describe the impact of CPT violation on Sakharov conditions. Essentially the out-of-equilibrium condition will be modified in the presence of CPT violation since a tiny mass difference between particle and anti-particle will be naturally allowed when CPT violation is present.

Presenter: BRAHMACHARI, Biswajoy (Vidyasagar Metropolitan College)

Session Classification: Parallel Session 1: Non Collider

Contribution ID: **14** Type: **Contributory Talk**

Seesaw determination of the dark matter relic density

Monday, 11 December 2023 17:50 (20 minutes)

Chair: D. Nieto
ABSTRACT: We show that in the usual type-I seesaw framework, augmented solely by a neutrino portal interaction, the dark matter relic density can be created through freeze-in, in a manner fully determined by the seesaw interactions and the DM particle mass. This simple freeze-in scenario, where dark matter is not in a seesaw state, proceeds through slow, seesaw-induced decays of Higgs W and Z bosons. We identify two scenarios, one of which predicts the existence of an observable neutrino line.

Presenter: GUPTA, Aritra (IFIC, Valencia, Spain)

Session Classification: Parallel Session 1: Non Collider

Contribution ID: **15** Type: **Plenary Talk**

Neutrinos from Supernovae

Tuesday, 12 December 2023 09:30 (45 minutes)

Chair: Naba Mondal

Presenter: DASGUPTA, Basudeb (TIFR, Mumbai)

Contribution ID: **16** Type: **Plenary Talk**

Astrophysics with High Energy Neutrinos

Tuesday, 12 December 2023 10:15 (45 minutes)

Chair: Naba Mondal

Presenter: KARLE, Albrecht (University of Wisconsin–Madison)

Contribution ID: **17** Type: **Plenary Talk**

The hunt for Pevatrons with gamma-ray observatories

Tuesday, 12 December 2023 11:30 (45 minutes)

Chair: Naba Mondal

Presenter: CRISTOFARI, Pierre (Observatory Paris, France)

Contribution ID: **18** Type: **Plenary Talk**

Quantum Computation for High Energy Physics

Chair: Nilmani Mathur

Contribution ID: **19** Type: **Plenary Talk**

Precision Physics from Lattice QCD

Monday, 11 December 2023 12:15 (45 minutes)

Chair: Sunanda Banerjee

Presenter: KRSTIC MARINKOVIC, Marina (Eth, Zurich)

Contribution ID: **20** Type: **Invited Talk**

New Physics Searches using Novel Topologies

Tuesday, 12 December 2023 14:30 (30 minutes)

Presenter: KAR, Deepak (University of Witwatersrand, South Africa)

Session Classification: Parallel Session 2: Collider

Contribution ID: **21** Type: **Invited Talk**

Lattice QCD study of exotic hadrons

Tuesday, 12 December 2023 15:00 (30 minutes)

Presenter: MATHUR, Nilmani (Tata Institute of Fundamental Research, mumbai)

Session Classification: Parallel Session 2: Collider

Contribution ID: **22** Type: **Contributory Talk**

Unbiased exponential resummation in lattice QCD, a new way of exploring finite-density QCD

Tuesday, 12 December 2023 15:30 (20 minutes)

Abstract - A knowledge of the QCD equation of state is crucial not only for understanding the dynamics of relativistic heavy ion collision experiments, but also for knowing the young universe. One of the familiar ways to estimate this equation of state and understand QCD thermodynamics is through Taylor series of various thermodynamic observables. Recently, exponential resummation of this Taylor series has paved to be an important alternative approach of understanding the thermodynamics. Beginning from the estimate of the QCD partition function, this method is proposed for going around the otherwise expensive computations of higher order Taylor coefficients with reliable precision in lattice QCD. However, this resummation method gives biased estimates of different correlation functions which gives wrong results and thereby leads to incorrect interpretations of the thermodynamics in finite density QCD. We analyze these biased estimates order by order in chemical potential by applying cumulant expansion and compare the same with the Taylor series results in which, the calculations involve working with only the unbiased estimates of correlation functions. Although we find that this cumulant expansion eliminates stochastic bias and gives good agreement with Taylor series results order-by-order, we also find that this happens at the expense of the vital all-order resummation form of the partition function. We consequently present a new formalism of unbiased exponential resummation which provides a novel way of eliminating stochastic bias completely up to the desired order in chemical potential without losing the form of the all-order resummation. Thus, we find a new way of determining and approaching the otherwise true QCD equation of state.

Presenter: MITRA, Sabarnya (Bielefeld University, Germany)

Session Classification: Parallel Session 2: Collider

Contribution ID: **23** Type: **Contributory Talk**

Searches for heavy particles decaying to Higgs boson(s) in CMS experiment

Tuesday, 12 December 2023 15:50 (20 minutes)

Abstract: The CMS experiment at LHC has an extensive program to look for signatures of new physics to address several observed phenomena not explained by the standard model of particle physics. In this talk, I will review the recent CMS results on searches for a massive resonance decaying to final states involving one or more Higgs bosons. In this scope, I will highlight some exciting excesses of events observed in a few searches and mention the expected physics reach in the high-luminosity phase of LHC.

Presenter: CHATTERJEE, Suman (Austrian Academy of Sciences)

Session Classification: Parallel Session 2: Collider

Contribution ID: **24** Type: **Contributory Talk**

Searching for top squarks from the landscape at HL-LHC

Tuesday, 12 December 2023 16:10 (20 minutes)

Abstract: Supersymmetric models with low electroweak fine-tuning are more prevalent on the string landscape than fine-tuned models. We assume a fertile patch of landscape vacua containing the minimal supersymmetric standard model (MSSM) as a low-energy EFT. Such models are characterized by light higgsinos in the mass range of a few hundred GeV whilst top squarks are in the 1-2.5 TeV range. Other sparticles are generally beyond current LHC reach. We evaluate prospects for top squark searches of the expected natural SUSY at HL-LHC.

Presenter: DUTTA, Juhi (University of Oklahoma)

Session Classification: Parallel Session 2: Collider

Contribution ID: **25** Type: **Invited Talk**

GRAPES-III experiments at Ooty

Tuesday, 12 December 2023 14:30 (30 minutes)

Presenter: MOHANTY, Pravata

Session Classification: Parallel Session 2: Non-collider

Contribution ID: **26** Type: **Invited Talk**

Recent results from the AMS Experiment

Tuesday, 12 December 2023 15:00 (30 minutes)

Presenter: CASAUS, Jorge

Session Classification: Parallel Session 2: Non-collider

Contribution ID: **27** Type: **Invited Talk**

Applications of Machine Learning in Astroparticle Physics

Tuesday, 12 December 2023 15:30 (30 minutes)

Presenter: NIETO CASTANO, Daniel (UCM, Madrid)

Session Classification: Parallel Session 2: Non-collider

Contribution ID: **28** Type: **Plenary Talk**

Dark Matter Searches using Indirect Detection techniques

Wednesday, 13 December 2023 09:30 (45 minutes)

Chair: Basudeb Dasgupta

Presenter: KERSZBERG, Daniel (Institut de Fisica d'Altes Energies (IFAE))

Contribution ID: **29** Type: **Plenary Talk**

Dark matter searches using direct detection techniques and their future prospects

Wednesday, 13 December 2023 10:15 (45 minutes)

Chair: Basudeb Dasgupta

Presenter: WESTERDALE, Shawn (University of California, Riverside)

Contribution ID: **30** Type: **Plenary Talk**

Recent Results and Future Plans from Neutrinoless Double Beta Decay Experiments

Wednesday, 13 December 2023 11:30 (45 minutes)

Chair: Basudeb Dasgupta

Presenter: KUMAR, Krishna (University of Massachusetts, Amherst)

Contribution ID: **31** Type: **Plenary Talk**

Recent Results from Belle-II and LHCb experiments

Wednesday, 13 December 2023 14:30 (45 minutes)

Chair: James Beacham

Presenter: DEY, Biplab (Eotvos University., Dept. Atomic Phys. Hungary)

Contribution ID: **32** Type: **Plenary Talk**

Some interesting directions in Flavor Physics

Wednesday, 13 December 2023 15:15 (45 minutes)

Chair: James Beacham

Presenter: DATTA, Alakabha (University of Mississippi, USA)

Contribution ID: **33** Type: **Invited Talk**

Dark Matter Searches at the Belle-II Experiment

Wednesday, 13 December 2023 16:30 (30 minutes)

Presenter: NAYAK, Minakshi (IISC, Bengaluru)

Session Classification: Parallel Session 3: Collider

Contribution ID: **34** Type: **Invited Talk**

Select puzzles in hadronic B meson decays

Wednesday, 13 December 2023 17:00 (30 minutes)

Presenter: BHATTACHARYA, Bhubanjyoti (Lawrence Technological University)

Session Classification: Parallel Session 3: Collider

Contribution ID: **35** Type: **Invited Talk**

Theory and Phenomenology of Axion & Axion Like Particles

Wednesday, 13 December 2023 17:30 (30 minutes)

Presenter: CHAKRABORTY, Sabyasachi (Indian Institute of Technology, Kanpur)

Session Classification: Parallel Session 3: Collider

Contribution ID: **36** Type: **Contributory Talk**

Search for a heavy neutral lepton that mixes predominantly with the tau neutrino

Wednesday, 13 December 2023 18:00 (20 minutes)

We report a search for a heavy neutral lepton (HNL) that mixes predominantly with ντ . The search utilizes data collected with the Belle detector at the KEKB asymmetric energy e+e− collider. The data sample was collected at and just below the center-of-mass energies of the Y(4S) and Y (5S) resonances and has an integrated luminosity of 915 fb−1, corresponding to (836 ± 12) × 106 e+e− ⟶ τ+τ− events. We search for the production of the HNL (denoted N) in the decay τ− ⟶ π−N followed by its decay via N ⟶ μ+μ−ντ. The search focuses on the parameter-space region in which the HNL is long-lived so that the μ+μ− originate from a common vertex that is significantly displaced from the collision point of the KEKB
beams. Consistent with the expected background yield, one event is observed
in the data sample after the application of all the event-selection criteria. We report limits on the mixing parameter of the HNL with the τ neutrino
as a function of the HNL mass.

Presenter: DEY, Sourav

Session Classification: Parallel Session 3: Collider

Contribution ID: **37** Type: **Invited Talk**

Dark Matter searches at neutrino telescopes

Wednesday, 13 December 2023 16:30 (30 minutes)

Presenter: RAMEEZ, Mohamed (Tata Institute of Fundamental Research)

Session Classification: Parallel Session 3: Non-collider

Contribution ID: **38** Type: **Contributory Talk**

Solar Investigation of Multicomponent Dark Matter

Wednesday, 13 December 2023 17:00 (20 minutes)

Abstract: If multiple thermal weakly interacting massive particle (WIMP) dark matter candidates exist, then their capture and annihilation dynamics inside a massive star such as Sun could change from conventional method of study. With a simple correction to time evolution of dark matter (DM) number abundance inside the Sun for multiple dark matter candidates, significant changes in DM annihilation flux depending on annihilation, direct detection cross-section, internal conversion and their contribution to relic abundance are reported in present work.

Presenter: BANIK, Amit Dutta (Indian Statistical Institute, Kolkata)

Session Classification: Parallel Session 3: Non-collider

Contribution ID: **39** Type: **Contributory Talk**

Neutrino fog for dark matter electron scattering

Wednesday, 13 December 2023 17:20 (20 minutes)

Abstract: Low-energy neutrinos can be a significant background in the search for dark matter (DM) through direct detection. In this context, we aim to quantify the sub-GeV DM-electron scattering parameter space where the neutrino background overshadows any potential DM signal. Because DM and neutrinos have distinct energy spectra, theoretically, they can be distinguished with substantial exposure. This suggests that neutrinos should not be viewed as a hard floor but as a challenging yet distinguishable background, creating what we refer to as the 'neutrino fog'. We define the boundary of this 'neutrino fog' as the 'neutrino floor'. Notably, some well-motivated regions of the DM parameter space exist below this 'neutrino floor'.

Presenter: MAITY, Tarak (Harish-Chandra Research Institute)

Session Classification: Parallel Session 3: Non-collider

Contribution ID: **40** Type: **Contributory Talk**

Coannihilation and scotogenic fermionic dark matter

Wednesday, 13 December 2023 17:40 (20 minutes)

Abstract: Though the Standard Model assumes the neutrinos to be massless, the phenomenon of neutrino oscillation shows that they have tiny but non-zero masses. Scotogenic models, in which neutrino masses are generated at one-loop level and remain tiny due to loop suppression, are very interesting in this regard. In this model, since the beyond Standard Model (BSM) particles entering inside the neutrino-mass-loop are assumed to be odd under Z_2 symmetry, they can be considered as dark matter depending on their mass hierarchy. We have examined the phenomenology of fermionic dark matter in the singlet-triplet scotogenic model, especially in light of fermion-fermion and fermion-scalar coannihilation. In our analysis, we have considered constraints arising stability and perturbativity, electroweak precision observables, collider searches, charged lepton flavour violation (cLFV), relic density and direct detection experiments of dark matter. We find that bounds from collider and/or cLFV disfavour light fermionic dark matter of mass below 60 GeV. We also notice that fermion-scalar coannihilation is necessary to obtain viable fermionic dark matter within the mass range of 60 GeV to 100 GeV, and beyond 100 GeV fermion-scalar and fermion-fermion coannihilation play complementary roles in different regions of parameter space.

Presenter: KARAN, Anirban (IFIC (CSIC – Universitat de València), Spain)

Session Classification: Parallel Session 3: Non-collider

Contribution ID: **41** Type: **Plenary Talk**

Long Lived Particle Search (Experiment)

Thursday, 14 December 2023 11:30 (45 minutes)

Chair: A. Karle

Presenter: BEACHAM, James (Duke University / CERN, Switzerland)

Contribution ID: **42** Type: **Plenary Talk**

Long Lived Particle Search (Theory)

Thursday, 14 December 2023 10:15 (45 minutes)

Chair: A. Karle

Presenter: BHATTACHARJEE, Biplob (IISc, Bengaluru)

Contribution ID: **43** Type: **Plenary Talk**

Highlights from Heavy Ion Physics experiments

Thursday, 14 December 2023 15:15 (45 minutes)

Chair : Utpal Chattopadhyay

Presenter: CHATTOPADHYAY, Subhasis (VECC, Kolkata)

Contribution ID: **44** Type: **Plenary Talk**

Quantum Computation for High Energy Physics Experiments

Thursday, 14 December 2023 09:30 (45 minutes)

Chair: A. Karle

Presenter: GIAGU, Stefano (INFN, Rome)

Contribution ID: **45** Type: **Plenary Talk**

Cerenkov Telescope Array: the next generation ground based gamma-ray observatory

Thursday, 14 December 2023 14:30 (45 minutes)

Chair: Utpal Chattopadhyay

Presenter: TAKAHASHI, Mitsunari (ISEE, Nagoya University)

Contribution ID: **46** Type: **Invited Talk**

Dark matter searches at CMS experiment

Thursday, 14 December 2023 17:00 (30 minutes)

Presenter: GOMBER, Bhawna (University of Hyderabad)

Session Classification: Parallel Session 4: Collider

Contribution ID: **47** Type: **Invited Talk**

What LHC is telling us about paradigms of Physics beyond SM

Thursday, 14 December 2023 17:30 (30 minutes)

Presenter: GHOSH, Kirtiman (Institute of Physics, Bhubaneswar)

Session Classification: Parallel Session 4: Collider

Contribution ID: **48** Type: **Invited Talk**

Exotc Searches at the LHC

Thursday, 14 December 2023 16:30 (30 minutes)

Presenter: JAIN, Shilpi (TIFR, Mumbai)

Session Classification: Parallel Session 4: Collider

Contribution ID: **49** Type: **Invited Talk**

Searches for New Physics with Low Mass Mediators at the LHC

Thursday, 14 December 2023 18:00 (30 minutes)

Presenter: MUKHERJEE, Swagata (Indian Institute of Technology, Kanpur)

Session Classification: Parallel Session 4: Collider

Contribution ID: **50** Type: **Contributory Talk**

[Absent] Connecting dark matter and lepton flavour violation in a flavor symmetric Scot-seesaw model.

Thursday, 14 December 2023 18:30 (20 minutes)

Abstract: We have consider a model by combining type I seesaw and scotogenic part. We have fitted neutrino mass and mixing from the neutrino oscillation data. As the sctogenic model has dark Z_2 symmetry, we have studied the fermionic dark matter phenomenology in detail. As neutrino mass generation allows lepton flavor to be violated, lepton flavor violating decays put a strong constraint on our model parameters. As a collider phenomenology, we have done an analysis on the signal stregth of higgs to $$h\to \gamma\gamma decay which also put some constrain on the mass of the charged Higgs scalar.

Presenter: GANGULY, Joy (University of Engineering and Management Kolkata)

Session Classification: Parallel Session 4: Collider

Contribution ID: **51** Type: **Invited Talk**

Status and recent results of the XENONnT experiment

Thursday, 14 December 2023 16:30 (30 minutes)

Presenter: GHOSH, Sayan (Purdue University)

Session Classification: Parallel Session 4: Non-collider

Contribution ID: **52** Type: **Invited Talk**

JUSL

Thursday, 14 December 2023 17:00 (30 minutes)

Presenter: DAS, Mala (Saha Institute of Nuclear Physics, Kolkata)

Session Classification: Parallel Session 4: Non-collider

Contribution ID: **53** Type: **Contributory Talk**

Current status of the light neutralino thermal dark matter in the phenomenological MSSM

Thursday, 14 December 2023 17:30 (20 minutes)

Abstract: We explore the parameter space of the phenomenological Minimal Supersymmetric Standard Model (pMSSM) with a light neutralino thermal dark matter (m_{DM}≤m_{Higgs boson}/2) that is consistent with current collider and astrophysical constraints. We consider both positive and negative values of the higgsino mass parameter (μ). Our investigation shows that the recent experimental results from the LHC as well as from direct detection searches for dark matter by the LUX-ZEPLIN (LZ) collaboration rule out the Z-funnel region for the μ>0 scenario. The same results severely restrict the h-funnel region for positive μ, however, the allowed points can be probed easily with few more days of data from the LZ experiment. In the μ<0 scenario, we find that very light higgsinos in both the Z and h funnels might survive the present constraints from the electroweakino searches at the LHC, and dedicated efforts from experimental collaborations are necessary to make conclusive statements about their present status. We also study the impact of light stau sleptons on this parameter space.

Presenter: SENGUPTA, Rhitaja (BCTP and Physikalisches Institut der Universität Bonn, Germany)

Session Classification: Parallel Session 4: Non-collider

Contribution ID: **54** Type: **Plenary Talk**

Physics Prospects in Future DM Experiments

Friday, 15 December 2023 09:30 (45 minutes)

Chair: A. Ibarra

Presenter: BELL, Nicole (University of Melbourne)

Contribution ID: **55** Type: **Plenary Talk**

Quantum Computation for High Energy Physics

Chair: A. Ibarra

Contribution ID: **56** Type: **Invited Talk**

Machine Learning in Theoretical High Energy Physics

Presenter: KONAR, Partha (Physical Research Laboratory, Ahmedabad)

Session Classification: Parallel Session 4: Collider

Contribution ID: **57** Type: **Invited Talk**

Particle physics potentials at Polarised Beam colliders

Friday, 15 December 2023 11:30 (30 minutes)

Presenter: SINGH, Ritesh (IISER, Kolkata)

Session Classification: Parallel Session 4: Collider

Contribution ID: **58** Type: **Contributory Talk**

The upgrade of the CMS electromagnetic calorimeter: future prospects for precision timing and energy measurements at the High Luminosity LHC

Friday, 15 December 2023 12:00 (20 minutes)

Presenter: PAROLIA, Shubhi (University Di Pisa)

Session Classification: Parallel Session 4: Collider

Contribution ID: **59** Type: **Invited Talk**

Cosmic rays/gamma rays from GRBs

Friday, 15 December 2023 11:30 (30 minutes)

Presenter: JOSHI, Jagdish

Session Classification: Parallel Session 4: Non-collider

Contribution ID: **60** Type: **Contributory Talk**

Status of the MACE gamma-ray observatory

Friday, 15 December 2023 12:00 (30 minutes)

Online Talk

Presenter: BORWANKAR, Chinmay (BARC, Mumbai)

Session Classification: Parallel Session 4: Non-collider

Contribution ID: **61** Type: **Contributory Talk**

Pseudo-Dirac Neutrinos and Flavor Ratios at Icecube

Friday, 15 December 2023 12:30 (20 minutes)

The phenomena of neutrino oscillations indicate that neutrinos have nonzero masses. Since then it has prompted immense interest to find out the source of production of neutrino-mass. Neutrino mass can be either Dirac or Majorana in nature. One intermediate way is to consider tiny Majorana masses as compared to the Dirac mass terms. In this particular scenario, neutrinos are called Pseudo-Dirac, basically, neutrinos are effectively Dirac fermions with very small Majorana masses. these tiny masses induce active-sterile neutrino oscillations with almost maximal mixing along with the traditional flavor oscillations. In other words, this possibility can extend the Standard Model (SM) to include three additional sterile
eutrinos with the active ones. Since this effect is supposed to be of very small order, it can be observable through high-energy astrophysical neutrinos traveling long distances. We discuss here the different conditions that can be visible in flavor ratios due to oscillations induced by active-sterile oscillations for pseudo-Dirac neutrinos. We also provide the constraints on mass-squared differences driving these oscillations using IceCube data.

Presenter: DIXIT, Khushboo (University of Johannesburg)

Session Classification: Parallel Session 4: Non-collider

Contribution ID: **62** Type: **Plenary Talk**

Physics prospects in Future Collider Experiments

Chair: Stefano Giagu/Suchandra Dutta

Presenter: MANGANO, Michelangelo (CERN, Swtizerland)

Contribution ID: **63** Type: **not specified**

Vote of Thanks

Friday, 15 December 2023 13:00 (15 minutes)

Presenter: MAJUMDAR, Pratik (SINP, Kolkata)

Contribution ID: **64** Type: **not specified**

Tea and Goodbye

Chair: Stefano Giagu/Suchandra Dutta

Contribution ID: **65** Type: **not specified**

Contributory 2

Presenter: P. GHOSH (IACS, Kolkata)

Session Classification: Parallel Session 4: Collider

Contribution ID: **66** Type: **Contributory Talk**

Multi-Component Dark Matter: Identifying at Collider

Friday, 15 December 2023 12:20 (20 minutes)

Chair: Swagata Mukherjee

In this talk, I will demonstrate how having two WIMPs, each with different masses, and mass splitting with the NLSP, generated at a collider through a decay chain, can result in double peaks in the missing energy or missing transverse momentum distribution of the multilepton signal. I will also outline a set of criteria to identify and segregate the second peak in the missing energy spectrum, after a careful analysis of the corresponding Standard Model background contribution. (Ref. JHEP 12 (2022) 049 with Subhaditya Bhattacharya, Jayita Lahiri and Biswarup Mukhopadhyaya)

Presenter: PURUSOTTAM GHOSH (IACS, Kolkata)

Session Classification: Parallel Session 4: Collider

Contribution ID: **67** Type: **Poster**

Giant Molecular Clouds: The Epicentre of gamma-rays and neutrino Emission in the Milky Way

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: Giant molecular clouds (GMCs) are massive, dense areas of gas (mostly hydrogen) and dust in the Interstellar Medium (ISM). They provide a thick target for the Cosmic Rays (CR) to interact and produce gamma-rays and neutrinos. As these particles are neutral they are unaffected by the galactic magnetic fields and can be used to probe the origins and nature of the CR particles. In our recent work, we have estimated the diffuse emission of gamma-ray and neutrino from the Galactic plane considering a large population of GMCs in the Milky Way (MW). We considered two cases of CR distribution in our calculation: (1) the locally observed CR flux interacts with all the GMCs and (2) a radially dependent CR flux. The calculated gamma-ray and neutrino fluxes of each GMC were also compared with the sensitivity of current and future-generation detectors to find some potential source candidates. The flux from all the GMCs then stacked together and compared with the flux observed with the Fermi-LAT and IceCube detector, yielding consistent results.

Primary author: ROY, Abhijit (ARIES, Nainital)

Presenter: ROY, Abhijit (ARIES, Nainital)

Session Classification: Poster Session 1

Contribution ID: **68** Type: **Poster**

Missing energy in rare B-decays in the light of GeV scale dark matter

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract- Belle-II has reported a 2.8 sigma deviation from standard model prediction in the branching ratio of B+ ⟶ K+ +inv decay mode. We enlighten this missing energy using a GeV scale scalar dark matter in an anomaly-free U (1)B–L framework. The new vector and scalar bosons coming from the gauge extension act as mediators for dark matter by providing annihilation channels and also participate in b ⟶ s transition through one loop penguin diagrams. We constrain the new parameters by using consistency with existing bounds on B ⟶ K∗ν̄ ν branching ratio performed at the Belle II experiment and from Dark matter relic density, direct detection, and collider. We analyse couplings between the mediator and the SM fermions as well as the dark matter particle. We then investigate the b ⟶ sν̄ ν decay modes such as B ⟶ (K+, K∗)ν̄ ν, Bs ⟶ (η, η′)ν̄ ν,Bs ⟶ φν̄ ν and Bc ⟶ (Ds, D∗ s)ν̄ ν in a common parameter space, meeting the current experimental bounds of both sectors simultaneously.

Presenter: YADAV, Ajay Kumar (Central University of Karnataka)

Session Classification: Poster Session 1

Contribution ID: **69** Type: **Poster**

Bounds on Ultralight Bosons from the Event Horizon Telescope observation of Sagittarius A*

Tuesday, 12 December 2023 12:15 (1 hour)

Presenter: DUBEY, Abhishek (IISc, Bengaluru)

Session Classification: Poster Session 1

Contribution ID: **70** Type: **Poster**

Neutrinos from the Sun can discover dark matter-electron scattering

Tuesday, 12 December 2023 12:15 (1 hour)

Presenter: SAHA, Akash Kumar (IISc, Bengaluru)

Session Classification: Poster Session 1

Contribution ID: **72** Type: **Poster**

Exploring Sub-GeV Dark Matter Boosted by Diffuse Supernova Neutrino Background: Insights from XENONnT and LUX-ZEPLIN Experiments

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: In recent years, there has been a growing interest in the direct detection of sub-GeV dark matter, which is theoretically well-motivated. However, probing sub-GeV cold dark matter particles has posed a persistent challenge, as their typical momenta are insufficient to induce recoils above the thresholds of conventional direct detection experiments. Notably, even very strongly interacting dark matter within this mass range has been suggested to elude all observational bounds. However, recent studies have unveiled a novel approach to explore this elusive realm, wherein dark matter particles, typically non-relativistic, acquire semi-relativistic velocities. Here, we focus on the specific case of dark matter boosting through its interactions with the diffuse supernova neutrino background in the galaxy. This mechanism introduces a high-energy dark matter component capable of interacting with both electrons and nuclei in the detector, triggering a detectable recoil signal. Our study meticulously analyzes data from the XENONnT and LUX-ZEPLIN (LZ) experiments, culminating in the derivation of robust constraints on the scattering cross sections of sub-GeV boosted dark matter with both electrons and nucleons. Additionally, we emphasize the imperative nature of considering Earth's attenuation effects for both electron and nuclei interactions, while also highlighting the substantial role played by finite nuclear size effects in the context of nuclear scattering. Lastly, we present a comparison of our findings with existing constraints, illuminating the complementarity and significance of the LZ and XENONnT data in probing the sub-GeV dark matter parameter space, thereby emphasizing their potential to unveil this enigmatic realm.

Presenter: MAJUMDAR, Anirban (IISER, Bhopal)

Session Classification: Poster Session 1

Contribution ID: **73** Type: **Poster**

Precise probing and discrimination of third-generation scalar leptoquarks.

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: We explore the pair production of third-generation scalar leptoquark at the Large Hadron Collider to next-to-leading order accuracy in QCD, matched to parton shower for a precise probing of the stemming model. We propose to tag two boosted top-like fatjets produced from the decay of heavy leptoquarks in association with notably large missing transverse momentum and consider them as the potential signal. Such a signal demonstrates the capability of a robust discovery prospect in the multivariate analysis with different high-level observables, including jet substructure variables. Various scalar leptoquark models predict different chirality of the top quark appearing from the decay of the leptoquark carrying same electromagnetic charge. We make use of the polarization variables sensitive to the top quark polarization in order to identify the underlying theory.

Presenter: GHOSH, Anupam (PRL, Ahmedabad)

Session Classification: Poster Session 1

Contribution ID: **74** Type: **Poster**

Cosmic inflation and Muon (g–2) in minimal gauged $L_\mu - L_\tau$ mode

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: The minimal $U(1)_{L_\mu - L_\tau}$ gauge symmetry extended Standard Model (SM) is a well motivated framework that resolves the discrepancy between the theoretical prediction and experimental observation of muon anomalous magnetic moment. We envisage the possibility of identifying the beyond Standard Model Higgs of $U(1)_{L_\mu - L_\tau}$ sector, non-minimally coupled to gravity, as the inflaton in the early universe, while being consistent with the $(g-2)_\mu$ data. Although the structure seems to be trivial, we observe that taking into consideration of a complete cosmological history starting from inflation through the reheating phase to late-time epoch along with existing constraints on $U(1)_{L_\mu - L_\tau}$ model parameters leave us a small window of allowed reheating temperature. This further results into restriction of $(n_s - r)$ plane which is far severe than the one in a generic non-minimal quartic inflationary set up.

Presenter: PAUL, Arnab (IACS, Kolkata)

Session Classification: Poster Session 1

Contribution ID: **75** Type: **Poster**

Search for dark matter produced in association with a Higgs boson decaying to two taus and missing transverse momentum by using CMS data at √s = 13 TeV

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: The undetected dark matter search is performed in the final state of Higgs decaying to a pair of tau leptons with large missing transverse momentum (MET) by using the proton-proton collision data of CMS detector at CERN LHC, at the center of mass, √S=13 TeV. The benchmark models for this particular search are performed with two simplified models of DM + H productions. The first one is Z´–two–Higgs-Doublet(Z´-2HDM) model, where Z´ will decay into a standard model like Higgs boson and an intermediate heavy pseudo-scalar particle (A), which further decays into a Dirac fermionic dark matter particle. In this model, the mass of pseudo-scalar, A = 300 GeV and DM mass = 100 GeV, the Z' masses from 550 GeV to 1265 GeV are excluded. The second model, is Z´ baryonic model, where a new massive vector mediator Z´ emits a Higgs boson, which further decays to a pair of Dirac fermionic DM particles. In this model, the dark matter mass up to 1 GeV and Z' masses up to 615 GeV are excluded.

Presenter: SAHU, Bisnupriya (University of Hyderabad, India)

Session Classification: Poster Session 1

Contribution ID: **76** Type: **Poster**

Effect of co-annihilation on Big Bang Nucleosynthesis

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract : The light matter abundance of our universe is sensitive to the neutron-to-proton ratio in the cosmic soup during the first phase of BBN. We consider a generic exotic particle species which co-annihilates with nucleons potentially modifying the neutron-to-proton ratio, thereby affecting the BBN predictions. In particular, the thermal freeze-out of the particle species via the co-annihilation controls the neutron freeze-out dynamics. We find that when the mass of the particle is comparable with the nucleon mass, the co-annihilation strength can be greater than the weak interaction strength without altering the BBN predictions.

Presenter: GHOSH, Deep (IISER, Kolkata)

Session Classification: Poster Session 1

Contribution ID: **78** Type: **Poster**

In Search of Majorana Neutrinos

Tuesday, 12 December 2023 12:15 (1 hour)

Presenter: MIRZA, Ibrahim (University of Tennessee, USA)

Session Classification: Poster Session 1

Contribution ID: **79** Type: **Poster**

Review and partial combination of searches for vector-like quarks

Tuesday, 12 December 2023 12:15 (1 hour)

The LHC has yielded an unprecedented volume of data from 2016 to 2018, presenting a unique opportunity to investigate fundamental questions in particle physics. This involves probing rare processes beyond the standard model and testing the standard model's limits with greater precision, potentially leading to the discovery of new physics. To leverage this data fully, novel methods are necessary to explore new phenomena and optimize detector performance. Particularly, the focus is on exploring fermions within a wide mass range, as they have the potential to explain various phenomena within the standard model. This poster discusses the CMS experiment's efforts in searching for vector-like quarks, emphasizing the exploration of different possible final states and the prospects for discovering these particles at the high-luminosity LHC.

Presenter: KUMAR PAL, Kuldeep (NISER Bhubneswar)

Session Classification: Poster Session 1

Contribution ID: **82** Type: **Poster**

Freeze in of fermionic dark matter through flavon portal

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: We investigate the phenomenology of a non-thermal dark matter (DM) candidate in the context of flavor models that explain the hierarchy in the masses and mixings of quarks and leptons via the Froggatt-Nielsen (FN) mechanism. We point out a natural stabilizing mechanism for the DM within this framework . Also a very small coupling for the dark matter interaction with the visible sector which is a characteristic of FIMP, is naturally generated here. We explore the allowed parameter space for this DM candidate from relic abundance by solving the relevant Boltzmann equations. We find that reproducing the correct relic density requires the DM mass to be in the range (100 − 300) keV for n = 7.5 and (3 − 10) MeV for n = 8.5 where n is the U (1) FN charge of the DM fermion.

Presenter: DAS, Nandini (IACS, Kolkata)

Session Classification: Poster Session 1

Contribution ID: **83** Type: **Poster**

N2 Leptogenesis in presence of a Pseudo Dark Matter

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract:We study the N2 Leptogenesis in the presence of an extra complex singlet scalar field under U (1) symmetry extension. The VEV of the new scalar spontaneously breaks the U (1) symmetry. A remnant CP-like Z2 symmetry stabilizes the imaginary part of the complex scalar field as a Pseudo-Goldstone DM. The additional scalar which couples to RHN opens up new decay channels which can lead to a larger CP- violation in generating the lepton asymmetry.

Presenter: NARENDRA, Nimmala (IACS, Kolkata)

Session Classification: Poster Session 1

Contribution ID: **84** Type: **Poster**

Exploring axions through the photon ring of a spherically symmetric black hole

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: Axion is a pseudo-Nambu-Goldstone boson of U(1) Peccei-Quinn symmetry breaking introduced to solve the strong CP problem in Quantum Chromodynamics. Axion and axion-like particles possess certain properties that allow these particles to convert into photons when traversing through a magnetic field, making it feasible to probe them both in laboratory settings and in astrophysical environments. In this talk, I will discuss the phenomenon of photon-axion conversion occurring in the spacetime surrounding a black hole. Observations of the black hole in the center of the M87 galaxy (M87*) through the Event Horizon Telescope imaged polarized synchrotron emission at 230 GHz on event horizon scales. Specifically, the potential existence of a magnetic field around M87* could facilitate the conversion of photons into axions in close proximity to the black hole photon sphere. The unstable photon orbits around the photon sphere will generate a bright ring-like structure. The conversion of photons to axions reduces the number of photons escaping the photon sphere, resulting in a dimming effect on the bright ring. We propose the possibility of detecting these axions through high-resolution telescopes. This study focuses on the mechanism considering the black hole to be non-rotating and spherically symmetric. We also investigate the photon ring luminosities if the black hole possesses a charge parameter. Apart from U(1) electric charge, the presence of an extra dimension may induce a tidal charge with a characteristic signature. The modified luminosity of the black hole's photon ring offers a valuable means of constraining the axion's coupling and mass parameter. Thus, our findings contribute to a better understanding of photon-axion conversion in the environment of a black hole spacetime and help us explore the possible existence of extra spatial dimensions.

Presenter: SARKAR, Pratick (IACS, Kolkata)

Session Classification: Poster Session 1

Contribution ID: **85** Type: **Poster**

TIMING AND SPECTRAL ANALYSIS OF BLAZAR OJ 287: INVESTIGATING ITS POTENTIAL AS A HIGH-ENERGY NEUTRINO SOURCE

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: We conducted a study on temporal and spectral analysis of observational data from OJ 287, which was observed from April 2005 to April 2020. We used a Chi-square minimization technique for spectral analysis. Among all observations most intense flaring was observed in April 2020 and flaring was observed in soft sub-bands 0.3-2 keV. The detected flaring was dominated by the thermal process. The best fit model was (log-parabola+blackbody). Both synchrotron and inverse Compton mechanisms contribute to the generation of X-ray emissions. The observations interpreted as being driven by the inverse Compton emission mechanism typically exhibit a lower energy flux in soft sub-bands and a higher energy flux in hard sub-bands. Both the May 2015 and April 2020 observations exhibit a pattern where their energy flux values are higher in soft sub-bands and lower in hard sub-bands. This pattern indicates that in these two observations, the emission is likely influenced by the synchrotron emission mechanism. The observation of synchrotron and inverse Compton emission mechanisms suggests that the astrophysical processes occurring within the source OJ 287 involve internal shocks and give rise to gamma-ray bursts There is no possibility of emission of high energy neutrinos from OJ 287 because flaring takes place due to thermal process in soft sub-bands.

Presenter: NEUPANE, Rajendra (Central Department of Physics, Kirtipur, Kathmandu, Nepal)

Session Classification: Poster Session 1

Contribution ID: **86** Type: **Poster**

ML-Based Top Taggers: Performance, Uncertainty and Impact of Tower & Tracker Data Integration

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract : Machine learning algorithms have the capacity to discern intricate features directly from raw data. We demonstrated the performance of top taggers built upon three machine learning architectures: a BDT that uses jet-level variables (high-level features, HLF) as input, while a CNN (miniature version of ResNet) trained on the jet image, and a GNN (LorentzNet) trained on the particle cloud representation of a jet utilizing the 4-momentum (low-level features, LLF) of the jet constituents as input. We found significant performance enhancement for all three classes of classifiers when trained on combined data from calorimeter towers and tracker detectors. The high resolution of the tracking data not only improved the classifier performance in the high transverse momentum region, but the information about the distribution and composition of charged and neutral constituents of the fat jets and subjets helped identify the quark/gluon origin of subjets and hence enhances top tagging efficiency. The LLF-based classifiers, such as CNN and GNN, exhibit significantly better performance when compared to HLF-based classifiers like BDT, especially in the high transverse momentum region. Nevertheless, the LLF-based classifiers trained on constituents' 4-momentum data exhibit substantial dependency on the jet modeling within Monte Carlo generators. The composite classifiers, formed by stacking a BDT on top of a GNN/CNN, not only enhance the performance of LLF-based classifiers but also mitigate the uncertainties stemming from the showering and hadronization model of the event generator. We have conducted a comprehensive study on the influence of the fat jet's reconstruction and labeling procedure on the efficiency of the classifiers.

Presenter: SAHU, Rameswar (IOP, Bhubaneshwar)

Session Classification: Poster Session 1

Contribution ID: **87** Type: **Poster**

Neutrino mass and leptogenesis in a hybrid seesaw model with a spontaneously broken CP

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: We introduce a novel hybrid framework combining type I and type II seesaw models for neutrino mass where a complex vacuum expectation value of a singlet scalar field breaks CP spontaneously. Using pragmatic organizing symmetries we demonstrate that such a model can simultaneously explain the neutrino oscillation data and generate observed baryon asymmetry through leptogenesis. Interestingly, natural choice of parameters leads to a mixed leptogenesis scenario driven by nearly degenerate scalar triplet and right handed singlet neutrino fields for which we present a detailed quantitative analysis.

Presenter: PRAMANICK, Rohan (IIT, Kharagpur)

Session Classification: Poster Session 1

Contribution ID: **88** Type: **Poster**

Constraining NSIs through CEvNS measurements at the European Spallation Source

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: The European Spallation Source (ESS), currently under construction in Sweden, will provide an intense pulsed neutrino flux allowing for high-statistics measurements of coherent elastic neutrino-nucleus scattering (CEvNS) with advanced nuclear recoil detectors. In this paper, we investigate in detail the possibility of constraining non-standard neutrino interactions (NSIs) through such precision CEvNS measurements at the ESS, considering the different proposed detection technologies, either alone or in combination. We first study the sensitivity to neutral-current NSI parameters that each detector can reach in 3 years of data taking. We then show that operating two detectors simultaneously can significantly improve the expected sensitivity on flavor-diagonal NSI parameters. Combining the results of two detectors turns out to be even more useful when two NSI parameters are assumed to be nonvanishing at a time. In this case, suitably chosen detector combinations can reduce the degeneracies between some pairs of NSI parameters to a small region of the parameter space.

Presenter: CHATTERJEE, Sabyasachi (Karlsruhe Institute of Technology)

Session Classification: Poster Session 1

Contribution ID: **89** Type: **Poster**

CMB signature of non-thermal Dark Matter

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract-The basic idea of this work is to achieve the observed relic density of a non-thermal dark matter(DM) and its connection with Cosmic Microwave Background (CMB) via additional relativistic degrees of freedom which are simultaneously generated during the period TBBN to TCMB from a long-lived dark sector particle.. To realize this phenomena we minimally extend the type-I seesaw scenario with a Dirac fermion singlet(χ) and a complex scalar singlet (φ) which transform non-trivially under an unbroken symmetry ⊠3. χ being the lightest particle in the dark sector acts as a stable dark matter candidate while the next to lightest state φ operates like a long lived dark scalar particle. The initial density of φ can be thermally produced through either self-interacting number changing processes (3φ⟶2φ) within dark sector or the standard annihilation to SM particles (2φ⟶2 SM). The late time (after neutrino decoupling) non-thermal decay of φ can produce dark matter in association with active neutrinos. The presence of extra relativistic neutrino degrees of freedom at the time of CMB can have a significant impact on ΔNeff. Thus the precise measurement of ΔNeff by current PLANCK 2018 collaboration and future experiments like SPT-3G and CMB-S4 can indirectly probe this non-thermal dark matter scenario which is otherwise completely secluded due to its tiny coupling with the standard model.

Presenter: JEESUN, SK (IACS, Kolkata)

Session Classification: Poster Session 1

Contribution ID: **90** Type: **Poster**

Measurement of energy correlators inside jets

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract: The investigation of jet production and the jet substructure in proton-proton collisions at the Large Hadron Collider holds great importance. They serve as vital tools for conducting precise tests of Quantum Chromodynamics, improving the understanding of proton structure, and also provides essential details to study physics beyond the Standard Model. Here, we present the latest jet measurements using data from the Compact Muon Solenoid, from which the strong coupling constant is derived.

Presenter: BARMAN, Soumyadip (Visva-Bharati University, Shantiniketan)

Session Classification: Poster Session 1

Contribution ID: **91** Type: **Poster**

Cannibal dark matter decoupled from standard model: cosmological constraints

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract : We study the cosmology of an internally thermalized dark matter (DM), which is either coupled only gravitationally with the standard model (SM) sector, or may have a very feeble non-gravitational interaction that does not thermalize the two sectors. In the former scenario, the DM may undergo number-changing self-scatterings in the early Universe, eventually freezing out to the observed DM abundance. If these reactions, such as a 3 to 2 process, take place when the DM is non-relativistic, DM cannibalizes itself to cool much slower than standard non-relativistic matter during the cannibal phase. We find that depending upon the DM self-couplings, a scalar cannibal DM with mass in the range of around 80 eV to 700 TeV can make up the observed DM density and satisfy all the constraints, when the initial DM temperature (T_DM) is lower than the SM one (T_SM), with T_SM/9100<T_DM<T_SM/1.1. In the latter scenario, we further investigate the origin of the initial DM energy density in the Universe at the post-inflationary reheating epoch, and determine to what extent inflaton-mediated DM-SM scattering reactions can modify the temperature of the DM, thereby changing the initial conditions of DM temperature evolution during its non-relativistic phase. In each scenario, we evaluate the cosmological constraints from the cosmic-microwave background power spectrum, the big-bang nucleosynthesis limits on the relativistic degrees of freedom, the Lyman-alpha limits on the DM free-streaming length, and the Bullet Cluster constraints on DM elastic self-scatterings.

Primary author: GHOSH, Avirup

Co-authors: MUKHOPADHYAY, Satyanarayan; GOPE, Sourav (IACS, Kolkata)

Presenter: GOPE, Sourav (IACS, Kolkata)

Session Classification: Poster Session 1

Contribution ID: **92** Type: **Poster**

The First Search for High-Energy Neutrino Emission from Galaxy Mergers

Tuesday, 12 December 2023 12:15 (1 hour)

Presenter: BOURI, Subhodip (IISc, Bengaluru)

Session Classification: Poster Session 1

Contribution ID: **93** Type: **Poster**

The Hunt for Non-Resonant Signals of Axion-Like Particles at the LHC

Tuesday, 12 December 2023 12:15 (1 hour)

Abstract : We will discuss an Effective Field Theory which extends the SM by an Axion-Like Particle (ALP) and mainly focus on the interactions of a light ALP to heavy SM particles. The talk is dedicated to the role of the LHC in probing ALP couplings particularly with the Higgs boson and the gauge bosons. We discuss a recent proposal to hunt for ALP signals in the non-resonant regime, i.e. when the ALP is kinematically too light to be on-shell. We use high-energy LHC probes for this, and examine the Higgs-strahlung process and the production of the diboson and triboson final states. Working in a gauge-invariant framework, we obtain the upper limits on ALP couplings to the Higgs boson and the electroweak bosons from the reinterpretation of latest LHC Run II data. The constraints inferred on ALP couplings are very competitive for ALP masses up to 100 GeV. Projections for HL-LHC will also be discussed, demonstrating the power of future dedicated analyses at ATLAS and CMS.

Presenter: BISWAS, Tisa (Calcutta University)

Session Classification: Poster Session 1

Contribution ID: **95** Type: **Plenary Talk**

Physics prospects in Future Collider Experiments

Friday, 15 December 2023 10:15 (45 minutes)

Chair: A.Ibarra

Presenter: MANGANO, Michelangelo

Contribution ID: **96** Type: **Invited Talk**

Machine Learning in Theoretical High Energy Physics

Tuesday, 12 December 2023 16:00 (30 minutes)

Presenter: KONAR, Partha (PRL, Ahmedabad)

Session Classification: Parallel Session 2: Non-collider