IBS Conference on Dark World

Report of Contributions

https://indico.ibs.re.kr/e/ic2025

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

Cosmological Quasiparticles and the Cosmological Collider

Monday, 27 October 2025 11:10 (40 minutes)

Presenter: LEE, Seung Joon (KIAS)

Session Classification: Session 1

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

Gravitational Waves for New Physics (Zoom Presentation)

Monday, 27 October 2025 11:50 (40 minutes)

Presenter: ZHAO, Yue (HKUST)

Session Classification: Session 1

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

Status of the ADMX Axion Dark Matter Search

Monday, 27 October 2025 14:30 (40 minutes)

Presenter: RYBKA, Gray (University of Washington)

Session Classification: Session 2

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

Recent Result from NaI(Tl)-based WIMP Search in COSINE-100 and Status of the Upgrade

Monday, 27 October 2025 15:10 (40 minutes)

Presenter: YU, Gyunho (IBS CUP)

Session Classification: Session 2

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

String Bundles in Multi-Axion Models and the QCD Axion Domain-Wall Problem

Monday, 27 October 2025 16:20 (40 minutes)

Presenter: TAKAHASHI, Fuminobu (Tohoku University)

Session Classification: Session 3

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

Axionic Extensions of the Standard Model

Thursday, 30 October 2025 09:30 (40 minutes)

Primary author: JEONG, Kwang Sik (Pusan National University)

Presenter: JEONG, Kwang Sik (Pusan National University)

Session Classification: Session 1

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

Welcom Remarks

Monday, 27 October 2025 11:00 (10 minutes)

Presenter: YOUN, SungWoo (IBS-DMAG)

Session Classification: Session 1

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

Recent results from Super-Kamiokande

Tuesday, 28 October 2025 10:00 (40 minutes)

Presenter: TAKEUCHI, Yasuo (Kobe University)

Session Classification: Session 1

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

CLOUD: Resolving the reactor puzzle(s) at Chooz?

Tuesday, 28 October 2025 10:40 (40 minutes)

Presenter: CABRERA, Anatael (CNRS)

Session Classification: Session 1

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

Searching for Light Dark Matter - Boosted Dark Matter

Tuesday, 28 October 2025 11:50 (40 minutes)

In the absence of a confirmed dark-matter signal in traditional dark-matter search experiments, advances in theory and experiment have opened various new possibilities of searching for dark-matter particles even lighter than GeV, e.g. boosted dark matter, direct detection with novel materials and sensors, and beam dump experiments. In this talk, I will focus on recent advancements in energetic dark-matter searches. First, I will provide a short summary of various boosting mechanisms of dark-matter particles and explain their direct searches with some potential issues. Next, I will discuss new search channels of boosted dark matter. I will also very briefly mention the importance of cosmological side studies of boosted dark matter.

Presenter: PARK, Jong-Chul (CNU)

Session Classification: Session 2

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

Multi-component dark matter from Minimal Flavor Violation

Tuesday, 28 October 2025 14:30 (40 minutes)

Presenter: OKAWA, Shohei (APCTP)

Session Classification: Session 3

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

VHE Gamma-Ray Astrophysics Overview & Future – HAWC & SWGO

Tuesday, 28 October 2025 15:10 (40 minutes)

Presenter: RHO, Chang Dong (Sungkyunkwan University)

Session Classification: Session 3

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

Understanding Galactic Dark Matter with Neural Networks

Tuesday, 28 October 2025 16:20 (40 minutes)

Recent advances in machine learning (ML), particularly neural density estimation like normalizing flows, diffusion models, and flow matching, have opened new doors for high-precision, model-independent density estimation. These techniques are highly valuable for galactic dynamics studies, as they allow us to estimate the distribution of stars in phase space (position and velocity) without relying on traditional simplified models. By combining these ML-based stellar density estimates and equations of motion solvers for inferring gravitational fields, we can measure the local dark matter density in a model-independent way. This talk presents new research opportunities in this direction, focusing on modeling objects in our local universe using neural networks and using them for understanding local galactic dark matter distribution. We anticipate that these modern machine learning-based approaches will allow us to fully utilize the potential of current and future astronomical catalogs, significantly improving our understanding of dark matter in the local universe.

Presenter: LIM, Sung Hak (IBS CTPU-PTC)

Session Classification: Session 4

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

Axion mass prediction from cosmic string network

Tuesday, 28 October 2025 17:00 (40 minutes)

Presenter: SON, Minho (KAIST)

Session Classification: Session 4

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

Looking through loops: CMB birefringence from axion strings

Wednesday, 29 October 2025 10:00 (40 minutes)

Presenter: LONG, Andrew J (Rice University)

Session Classification: Session 1

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

Dark matter around binary black hole mergers

Wednesday, 29 October 2025 10:40 (40 minutes)

Presenter: AURREKOETXEA, Josu (MIT)

Session Classification: Session 1

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

Status and Prospects of the PandaX experiment

Wednesday, 29 October 2025 11:50 (40 minutes)

Presenter: LI, Tao (Shanghai Jiao Tong University)

Session Classification: Session 2

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

Echoes of Self-Interacting Dark Matter from Binary Black Hole Mergers

Wednesday, 29 October 2025 14:30 (40 minutes)

Primary author: KIM, Jeong Han (Chungbuk National University)

Presenter: KIM, Jeong Han (Chungbuk National University)

Session Classification: Session 3

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

Primordial magnetic fields during the electroweak crossover and baryogenesis from magnetic helicity decay

Wednesday, 29 October 2025 15:10 (40 minutes)

Magnetic fields are ubiquitous in the present universe. Their existence has been discussed as a relic from the early universe, which may be a consequence of some physics beyond the Standard Model. In particular, if primordial magnetic fields were generated at high temperatures, the electroweak symmetry breaking implies a transition from the hyper- (U(1)Y) magnetic field in the high-temperature phase to the ordinary (U(1)em) magnetic field in the low-temperature phase. However, this transition process has been understood only naively. We examine the electroweak symmetry breaking from the viewpoint of symmetry-breaking pattern, and characterize the evolution of magnetic fields across the crossover in a gauge-invariant manner. In particular, we point out that the baryogenesis scenario based on primordial magnetic fields suffers from both quantitative and qualitative uncertainties. This makes the previously-proposed cosmological constraints on primordial magnetic fields, which concern two baryon asymmetry problems, less robust. Consequently, the co-genesis scenario for the intergalactic magnetic fields and the baryon asymmetry of the universe may revive

Presenter: UCHIDA, Fumio (IBS CTPU-CGA)

Session Classification: Session 3

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

A waveguide-based resonant-phase-matching Josephson traveling-wave parametric amplifier with efficient phase correction

Wednesday, 29 October 2025 16:20 (40 minutes)

Presenter: CHANG, Chung Wai Sandbo (RIKEN)

Session Classification: Session 4

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

Search for DM annual modulation with NaI-based detectors

Wednesday, 29 October 2025 17:00 (40 minutes)

Presenter: IANNI, Aldo (INFN)

Session Classification: Session 4

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

Searching for Axion Dark Matter at IBS-DMAG

Monday, 27 October 2025 17:00 (40 minutes)

Presenter: AHN, Saebyeok (IBS DMAG)

Session Classification: Session 3

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

Neutrino experiment at Yemilab

Thursday, 30 October 2025 10:10 (40 minutes)

Presenter: WON, Eunil (Korea University)

Session Classification: Session 1

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

Superheavy Kaluza-Klein particle production in the early universe

Thursday, 30 October 2025 11:20 (40 minutes)

Extra dimensions appear in the theory beyond the standard model, such as superstring theory. Kaluza-Klein modes associated with the compact extra spaces are usually never excited in the low energy effective theory below the compactification scale, and we are able to use the 4D effective theory by integrating them out. However, it might not be the case. In case that gauge fields along the compact spaces acquire time-dependent field values, which may occur in the very early universe, the time-dependence of the gauge field leads to "electric fields" along compact spaces. KK momenta can be accelerated/decelerated by the electric fields, and when KK momenta vanish, the "KK modes" are produced from vacuum in the exactly the same way as Schwinger effect in strong field QED. I will show that the KK particles are indeed produced with concrete models of 5D QED with gravity. Remarkably, KK particles are produced even if the Hubble scale is hierarchically smaller than the compactification scale. I also briefly discuss the possibility that the produced KK particles become super heavy dark matter.

Presenter: YAMADA, Yusuke (IBS CTPU-CGA)

Session Classification: Session 2

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

RES-NOVA at the interface of the Dark World

Thursday, 30 October 2025 12:00 (40 minutes)

Presenter: PATTAVINA, Luca (INFN)

Session Classification: Session 2