

CUBES 2026

Report of Contributions

Contribution ID: 5

Type: **not specified**

Cosmic Neutrino Background as a New Tool of Particle Physics and Cosmology

Saturday, 25 April 2026 09:00 (25 minutes)

Primary author: YAMAGUCHI, Masahide (IBS CTPU-CGA)

Presenter: YAMAGUCHI, Masahide (IBS CTPU-CGA)

Session Classification: Session 1

Contribution ID: 6

Type: **not specified**

1 - 2

Saturday, 25 April 2026 09:25 (25 minutes)

Primary author: PARK, Seongchan (Yonsei University)

Presenter: PARK, Seongchan (Yonsei University)

Session Classification: Session 1

Contribution ID: 7

Type: **not specified**

Cosmic Mystery of Super-early, Super-massive Black Holes: Perspectives from the Hydrodynamics+N-body Hybrid Simulations

Saturday, 25 April 2026 09:50 (25 minutes)

Primary author: KIM, Ji-hoon (Seoul National University)

Presenter: KIM, Ji-hoon (Seoul National University)

Session Classification: Session 1

Contribution ID: 8

Type: **not specified**

Search for Invisible Particles at GRANDE

Saturday, 25 April 2026 10:35 (25 minutes)

Primary author: KIM, Hong Joo (Kyungpook National University)

Presenter: KIM, Hong Joo (Kyungpook National University)

Session Classification: Session 2

Contribution ID: 9

Type: **not specified**

Neutrino Physics in IceCube

Saturday, 25 April 2026 11:00 (25 minutes)

Primary author: HA, Chang Hyon (Chung-Ang University)

Presenter: HA, Chang Hyon (Chung-Ang University)

Session Classification: Session 2

Contribution ID: **10**

Type: **not specified**

2 - 3

Saturday, 25 April 2026 11:25 (25 minutes)

Primary author: IVANOV, Boris (IBS DMAG)

Presenter: IVANOV, Boris (IBS DMAG)

Session Classification: Session 2

Contribution ID: **11**

Type: **not specified**

3 - 1

Saturday, 25 April 2026 13:30 (25 minutes)

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

Presenter: JEONG, Kwang Sik (Pusan National University)

Session Classification: Session 3

Contribution ID: 12

Type: **not specified**

Primordial Black Holes as Dark Sector Factories

Saturday, 25 April 2026 13:55 (25 minutes)

Primary author: CHANG, Jae Hyeok (Seoul National University)

Presenter: CHANG, Jae Hyeok (Seoul National University)

Session Classification: Session 3

Contribution ID: 13

Type: **not specified**

Kinetic Isocurvature Perturbation

Saturday, 25 April 2026 14:20 (25 minutes)

Primary author: SHIN, Chang Sub (Chungnam National University)

Presenter: SHIN, Chang Sub (Chungnam National University)

Session Classification: Session 3

Contribution ID: **16**

Type: **not specified**

1

Saturday, 25 April 2026 17:05 (15 minutes)

Primary author: PI, Junseung (Chungbuk National University)

Presenter: PI, Junseung (Chungbuk National University)

Session Classification: Young Researchers Session

Contribution ID: 17

Type: **not specified**

Pioneering Sub-GeV Dark Matter Limits with COSINE-100

Saturday, 25 April 2026 17:20 (15 minutes)

We report new constraints on the spin-dependent (SD) WIMP-proton cross section using the COSINE-100 experiment at the Yangyang Underground Laboratory. This analysis achieves a pioneering detection threshold of 3 and 4 pulse clusters corresponding to the measured photoelectrons. This allows us to access the unstudied few-photoelectron regime, significantly below the previous 8-photoelectron threshold. Using four years of stable data, we find no statistically significant evidence of annual modulation. Furthermore, we establish the world's most stringent SD WIMP-proton constraints for NaI(Tl) in the $1.75\text{--}2.25\text{ GeV}/c^2$ mass range. By incorporating the Migdal effect, we further extend our sensitivity into the $15\text{--}58\text{ MeV}/c^2$ regime, setting new world-leading limits. These results demonstrate the unique capability of NaI(Tl) targets to probe previously unexplored regions of the dark matter parameter space.

Primary author: KIM, Wonkyung (IBS CUP / UST)

Presenter: KIM, Wonkyung (IBS CUP / UST)

Session Classification: Young Researchers Session

Contribution ID: 18

Type: **not specified**

Probing Neutrinoless Double Electron Capture in Calcium-40 with AMoRE

Saturday, 25 April 2026 17:35 (15 minutes)

The search for neutrinoless double electron capture ($0\nu;2\text{EC}$) is a powerful probe for lepton-number violation and the Majorana nature of neutrinos. We report on a search for the $0\nu;2\text{EC}$ decay of ^{40}Ca using the AMoRE-I cryogenic detector array, which utilizes metallic magnetic calorimeters (MMCs) and ^{48}Ca - $^{100}\text{MoO}_4$ crystals. Analyzing a total exposure of $7.32 \text{ kg}\cdot\text{yr}$ ($1.39 \text{ kg}\cdot\text{yr}$ of ^{40}Ca), we find no evidence of a signal and set a lower half-life limit of $T_{1/2}^{0\nu;2\text{EC}} > 1.7 \text{ times}; 10^{22} \text{ yr}$ at 90% C.L. Furthermore, we project a sensitivity of $9.1 \text{ times}; 10^{22} \text{ yr}$ for the upcoming AMoRE-II phase. These results highlight the versatility of the AMoRE detector technology in investigating rare decay processes beyond its primary $0\nu;\beta\beta$ search program.

Primary author: SHARMA, Bijaya (IBS CUP)

Presenter: SHARMA, Bijaya (IBS CUP)

Session Classification: Young Researchers Session

Contribution ID: **19**

Type: **not specified**

4

Saturday, 25 April 2026 17:50 (15 minutes)

Primary author: GANG, Haebarg (Jeonbuk National University)

Presenter: GANG, Haebarg (Jeonbuk National University)

Session Classification: Young Researchers Session

Contribution ID: 20

Type: **not specified**

Photon Axion Enhancement around PBH

Saturday, 25 April 2026 18:05 (15 minutes)

Dark matter (DM) can be gravitationally captured around a massive compact object, forming a dense halo. If primordial black holes (PBHs) exist, surrounding dark matter particles can be accreted through gravitational attraction, leading to the formation of a DM halo with a steep spike profile near the PBH.

If the dark matter consists of axions or axion-like particles (ALPs), the high number density in the spike region can significantly enhance photon production via stimulated decay. When the axion number density exceeds a critical threshold, photon enhancement becomes efficient, potentially generating a strong electromagnetic signal.

Photons emitted from the dense DM halo surrounding a PBH may propagate to Earth and could be detected in the radio frequency range, providing a possible observational signature of axion dark matter and primordial black holes.

Primary author: JOH, Junghoon (Sungkyunkwan University)

Presenter: JOH, Junghoon (Sungkyunkwan University)

Session Classification: Young Researchers Session

Contribution ID: 21

Type: **not specified**

Cepheids as a Dark Matter Detector

Sunday, 26 April 2026 09:00 (25 minutes)

Primary author: KIM, Hyung Do (Seoul National University)

Presenter: KIM, Hyung Do (Seoul National University)

Session Classification: Session 5

Contribution ID: 22

Type: **not specified**

5 - 2

Sunday, 26 April 2026 09:25 (25 minutes)

Primary author: PARK, Hyunbae (IBS CTPU-CGA)

Presenter: PARK, Hyunbae (IBS CTPU-CGA)

Session Classification: Session 5

Contribution ID: 23

Type: **not specified**

5 - 3

Sunday, 26 April 2026 09:50 (25 minutes)

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

Presenter: KIM, Jeong Han (Chungbuk National University)

Session Classification: Session 5

Contribution ID: 24

Type: **not specified**

Two-Neutrino Beta Decay ($2\nu\beta+\beta^-$)

*Sunday, 26 April 2026 11:00 (25 minutes)***Primary author:** KIM, Choong Sun (Yonsei University)**Presenter:** KIM, Choong Sun (Yonsei University)**Session Classification:** Session 6

Contribution ID: 25

Type: **not specified**

6 - 2

Sunday, 26 April 2026 11:25 (25 minutes)

Primary author: JEONG, Yu Seon (Sungkyunkwan University)

Presenter: JEONG, Yu Seon (Sungkyunkwan University)

Session Classification: Session 6

Contribution ID: 26

Type: **not specified**

B→K+vv Excess and Dark Matter Semi-Annihilation

Sunday, 26 April 2026 11:50 (25 minutes)

In 2023, Belle II collaboration announced the observation of the B→K+vv decay channel for the first time. This decay channel provides a clean signal with high precision in theoretical calculation. However, we encounter 2.8σ deviation from the Standard Model prediction. To resolve this excess, we study scalar dark matter model with local discrete $Z_3 \times Z_3$ symmetry. Considering dark Higgs mass is 2GeV, we can explain the recent $\text{Br}(B \rightarrow K \nu \bar{\nu})$ excess reported from Belle II collaboration and relic abundance at the same time.

Primary author: KIM, Jongkuk (Kangwon National University)

Presenter: KIM, Jongkuk (Kangwon National University)

Session Classification: Session 6

Contribution ID: 27

Type: **not specified**

6 - 4

Sunday, 26 April 2026 12:15 (25 minutes)

Presenter: SHIN, Seodong (Jeonbuk National University)

Session Classification: Session 6

Contribution ID: 28

Type: **not specified**

Constraints on Generalized Neutrino Interactions in the keV Region of the Tritium β -Decay Spectrum

Saturday, 25 April 2026 11:50 (25 minutes)

The effective Lagrangian for tritium β decay in the Standard Model can be extended by introducing additional Lorentz-invariant coupling terms analogous to those of the electroweak interaction. This framework, known as Generalized Neutrino Interactions (GNIs), incorporates interactions involving light and heavy neutrinos as well as right- and left-handed neutrino currents coupled to quarks and leptons. We measure the tritium β -decay spectrum using a LiF crystal coupled to a cryogenic metallic magnetic calorimeter (MMC) over a four-month data-taking period. This presentation reports the analysis results constraining the GNI coupling constants based on a 10-day subset of the full four-month data set.

Primary author: YANG, Jeong Yeol (IBS CUP)

Presenter: YANG, Jeong Yeol (IBS CUP)

Session Classification: Session 2

Contribution ID: 29

Type: **not specified**

Quantum Entanglement and Bell Nonlocality in Top-Quark Pair Production at a Photon Linear Collider

*Saturday, 25 April 2026 15:05 (25 minutes)***Primary author:** LEE, Jae Sik (Chonnam National University)**Presenter:** LEE, Jae Sik (Chonnam National University)**Session Classification:** Session 4

Contribution ID: 30

Type: **not specified**

Fermion Effect on Gauge Tachyons and Cosmological Relaxation of the Weak scale

Saturday, 25 April 2026 15:30 (25 minutes)

Primary author: IM, Sang Hui (IBS CTPU-PTC)

Presenter: IM, Sang Hui (IBS CTPU-PTC)

Session Classification: Session 4

Contribution ID: **31**

Type: **not specified**

Higgs Mass is Natural

Saturday, 25 April 2026 15:55 (25 minutes)

Primary author: CHOI, Kang-Sin (Ewha Womans University)

Presenter: CHOI, Kang-Sin (Ewha Womans University)

Session Classification: Session 4

Contribution ID: **32**

Type: **not specified**

4 - 4

Saturday, 25 April 2026 16:20 (25 minutes)

Primary author: YI, Jaeok (KAIST)

Presenter: YI, Jaeok (KAIST)

Session Classification: Session 4

Contribution ID: **33**

Type: **not specified**

5 - 4

Sunday, 26 April 2026 10:15 (25 minutes)

Primary author: KIM, Hang Bae (Hanyang University)

Presenter: KIM, Hang Bae (Hanyang University)

Session Classification: Session 5