

# **2023 Chung-Ang University Beyond the Standard Model Workshop**



## **Report of Contributions**

Contribution ID: 14

Type: **not specified**

## What can we learn from neutrinos?

*Monday 20 February 2023 09:30 (1 hour)*

**Presenter:** Prof. HAGIWARA, Kaoru (KEK)

**Session Classification:** Neutrino

Contribution ID: 15

Type: **not specified**

## **Current status on dark matter and neutrino experiments - focused on CUP projects**

*Monday 20 February 2023 11:00 (40 minutes)*

I will briefly review the status of direct dark matter experiments for WIMP search. The recent results of COSINE-100 experiment will be discussed. Then, I will review the status of double beta decay experiments and discuss the perspectives of the AMoRE experiment at Yemilab.

**Presenter:** Prof. KIM, Yeongduk (IBS CUP)

**Session Classification:** Neutrino / Dark Matter

Contribution ID: **16**

Type: **not specified**

## Status of GLIMPSE

*Monday 20 February 2023 11:40 (40 minutes)*

**Presenter:** Prof. PARK, Jong-Chul (Chungnam National University)

**Session Classification:** Neutrino / Dark Matter

Contribution ID: 17

Type: **not specified**

## Neutrinos and Ultra-Light Dark Matter

*Monday 20 February 2023 14:00 (40 minutes)*

**Presenter:** Prof. CHUN, Eung Jin (KIAS)

**Session Classification:** Dark Matter

Contribution ID: **18**

Type: **not specified**

## **Addressing the Strong CP problem in Composite Higgs/ RS model - Virtual**

*Monday 20 February 2023 14:40 (30 minutes)*

**Presenter:** Prof. LEE, Seung J. (Korea Univ)

**Session Classification:** Dark Matter

Contribution ID: **19**

Type: **not specified**

## **De Sitter Self Organized Criticality of the Weak Scale**

*Monday 20 February 2023 15:10 (30 minutes)*

**Presenter:** Prof. JUNG, Sunghoon (Seoul National University)

**Session Classification:** Dark Matter

Contribution ID: 20

Type: **not specified**

## Primordial Black Holes as axion factories

*Monday 20 February 2023 16:10 (40 minutes)*

**Presenter:** Prof. PARK, Seong Chan (Yonsei Univ)

**Session Classification:** Primordial Black Holes



Contribution ID: 21

Type: **not specified**

# Supernova Axion Emissivity with $\Delta(1232)$ Resonance in Heavy Baryon Chiral Perturbation Theory

*Monday 20 February 2023 16:50 (20 minutes)*

**Presenter:** Dr HO, Shu-Yu (KIAS)

**Session Classification:** Primordial Black Holes

Contribution ID: 22

Type: **not specified**

## **Late forming PBH: Beyond the CMB era**

*Monday 20 February 2023 17:10 (20 minutes)*

**Presenter:** Dr KAWANA, Kiyoharu (KIAS)

**Session Classification:** Primordial Black Holes

Contribution ID: 23

Type: **not specified**

# The Swampland and Particle Physics - Virtual

*Tuesday 21 February 2023 09:30 (1 hour)*

**Presenter:** Prof. REECE, Matthew (Harvard Univ)

**Session Classification:** Higgs

Contribution ID: 24

Type: **not specified**

## String theoretic evidence for the Weak Gravity Conjecture

*Tuesday 21 February 2023 11:00 (40 minutes)*

**Presenter:** Dr LEE, Seung-Joo (IBS CTPU)

**Session Classification:** Higgs

Contribution ID: 25

Type: **not specified**

## Entropy, geometry and collider physics

*Tuesday 21 February 2023 11:40 (40 minutes)*

**Presenter:** Prof. KIM, Hyung Do (Seoul National University)

**Session Classification:** Higgs

Contribution ID: 26

Type: **not specified**

## Searches for BSM Higgs Bosons at the LHC

*Tuesday 21 February 2023 14:00 (40 minutes)*

**Presenter:** Prof. YANG, Un-ki (Seoul National University)

**Session Classification:** Higgs

Contribution ID: 27

Type: **not specified**

## **New discovery channels for the fermiophobic Higgs boson in type-I 2HDM with high cutoff scales**

*Tuesday 21 February 2023 14:40 (30 minutes)*

**Presenter:** Prof. SONG, Jeonghyeon (Konkuk Univ)

**Session Classification:** Higgs

Contribution ID: 28

Type: **not specified**

## Constructing the Covariant Vertices Systematically

*Tuesday 21 February 2023 15:10 (30 minutes)*

We describe a systematic algorithm for constructing the Lorentz covariant three-point vertices by studying the decay of a particle into two particles in which the masses and spins of the three particles are arbitrary. Then, we introduce a few useful and practical applications of the algorithm.

**Presenter:** Prof. CHOI, Seong Youl (Jeonbuk National University)

**Session Classification:** Higgs



Contribution ID: 29

Type: **not specified**

## Measurement of the Standard Model Higgs properties at the LHC

*Tuesday 21 February 2023 16:10 (30 minutes)*

**Presenter:** Prof. PARK, Myeonghun (Seoultech)

**Session Classification:** Higgs

Contribution ID: 30

Type: **not specified**

# Generalized Global Symmetries in Particle Physics

*Tuesday 21 February 2023 16:40 (30 minutes)*

**Presenter:** Prof. HONG, Sungwoo (KAIST)

**Session Classification:** Higgs

Contribution ID: 31

Type: **not specified**

# Positivity bounds on Higgs-portal dark matter

*Tuesday 21 February 2023 17:10 (30 minutes)*

**Presenter:** Dr YAMASHITA, Kimiko (Chung-Ang University)

**Session Classification:** Higgs

Contribution ID: 32

Type: **not specified**

## The Case of Hierarchical Higgs Masses

**Presenter:** Dr VELASCO, Liliana (Sogang University)

**Session Classification:** Higgs

Contribution ID: 33

Type: **not specified**

## The search for axions circa 2023 - Virtual

*Wednesday 22 February 2023 09:30 (1 hour)*

**Presenter:** Prof. SAFDI, Ben (UC Berkeley)

**Session Classification:** Axion

Contribution ID: 34

Type: **not specified**

## Experimental searches for axions and axion-like particles

*Wednesday 22 February 2023 11:00 (40 minutes)*

**Presenter:** Dr YOUN, SungWoo (IBS CAPP)

**Session Classification:** Axion

Contribution ID: 35

Type: **not specified**

## Detecting Hidden Photon Dark Matter via the Excitation of Qubits

*Wednesday 22 February 2023 11:40 (40 minutes)*

**Presenter:** Prof. MOROI, Takeo (Tokyo University)

**Session Classification:** Axion

Contribution ID: 36

Type: **not specified**

## Light axions in KKLT axiverse

*Wednesday 22 February 2023 14:00 (40 minutes)*

**Presenter:** Prof. CHOI, Kiwoon (IBS CTPU)

**Session Classification:** Axion



Contribution ID: 37

Type: **not specified**

## Axionic cosmic string

*Wednesday 22 February 2023 14:40 (30 minutes)*

**Presenter:** Prof. SON, Minho (KAIST)

**Session Classification:** Axion

Contribution ID: 38

Type: **not specified**

## Axion fragmentation - Virtual

*Wednesday 22 February 2023 15:10 (30 minutes)*

**Presenter:** Prof. SATO, Ryosuke (Osaka University)

**Session Classification:** Axion

Contribution ID: 39

Type: **not specified**

## Detecting axions with chiral magnetic effects

*Wednesday 22 February 2023 15:40 (40 minutes)*

We show that dark matter axions or axion-like particles (ALP) induce spontaneously alternating electric currents in conductors along the external magnetic fields due to the (medium) axial anomaly, realizing the chiral magnetic effects. We propose a new experiment to measure this current to detect the dark matter axions or ALP. These induced currents are the electron medium effects, directly proportional to the axion or ALP coupling to electrons, which depends on their microscopic physics, and also suppressed by the Fermi velocity. My talk is based on my paper, arXiv: <https://arxiv.org/abs/2207.06884>

**Presenter:** Prof. HONG, Deog Ki (Pusan National University)

**Session Classification:** Axion

Contribution ID: 40

Type: **not specified**

## The Status of Inflation - Virtual

*Thursday 23 February 2023 09:30 (1 hour)*

**Presenter:** Prof. GREEN, Daniel (UC San Diego)

**Session Classification:** Inflation / GW

Contribution ID: 41

Type: **not specified**

## **Primordial gravitational waves from first-order phase transitions**

*Thursday 23 February 2023 14:40 (1 hour)*

**Presenter:** Prof. WEIR, David (Helsinki University)

**Session Classification:** Inflation / GW

Contribution ID: 42

Type: **not specified**

## Gravitational wave cosmology

*Thursday 23 February 2023 11:00 (40 minutes)*

**Presenter:** Prof. LEE, Hyung Mok (Seoul National University)

**Session Classification:** Inflation / GW

Contribution ID: 43

Type: **not specified**

# Gravitational Waves and Neutron Star Equation of State

*Thursday 23 February 2023 11:40 (30 minutes)*

**Presenter:** Dr KIM, Young-Min (UNIST)

**Session Classification:** Inflation / GW

Contribution ID: 44

Type: **not specified**

## Gravitational Lensing in Gravitational Waves - Virtual

*Thursday 23 February 2023 16:10 (30 minutes)*

Like electromagnetic waves propagating in the universe, gravitational waves (GWs) can be gravitationally lensed by massive objects between the distant source and the observer. Consequently, considering all known types of lensing configurations—governed by not only the relative position of the source to the lens but the size, shape, and distribution of the lens mass—is possible for the gravitational lensing of GWs. In this talk, I briefly introduce my several recent/ongoing works from searching microlensed GWs to parameter estimation of strongly lensed GWs.

**Presenter:** Dr KIM, Kyungmin (Ewha Womans University)

**Session Classification:** Inflation / GW



Contribution ID: 45

Type: **not specified**

## **SM in Weyl conformal geometry and inflation predictions - Virtual**

*Thursday 23 February 2023 14:00 (40 minutes)*

**Presenter:** Prof. GHILENCEA, Dumitru (National Institute of Physics IFIN Bucharest)

**Session Classification:** Inflation / GW

Contribution ID: 46

Type: **not specified**

## Continuous spectrum on cosmological collider

*Thursday 23 February 2023 16:40 (30 minutes)*

**Presenter:** Dr AOKI, Shuntaro (Chung-Ang University)

**Session Classification:** Inflation / GW

Contribution ID: 47

Type: **not specified**

## Primordial Cosmic complexity and effect of reheating

*Thursday 23 February 2023 17:10 (20 minutes)*

We study the effect of reheating phase on the evolution of complexities in the primordial scalar fluctuations using the squeezed formalism. We study the evolution of the out-of-time correlator (OTOC) and the quantum discord starting from the inflationary epoch till the radiation-dominated epoch with different types of reheating phases. We find that, for a mode that re-enters the horizon after reheating, a finite reheating epoch clearly distinguishes the characteristic OTOC and quantum discord \textit{freeze-in} amplitude into three different classes that only depend on whether the equation of state parameter: (i)

$w_{re} = 1/3$  (ii)

$w_{re} < 1/3$ , or, (iii)

$w_{re} > 1/3$  and not on particular reheating histories. Taking the central value of  $n_s$  as and  $w_{re} = 0.25$  benchmark values, we found that the behavior of the complexities for all modes smaller than  $1.27 \times 10^{16} \text{Mpc}^{-1}$  can be classified as above. Conversely, for modes re-entering the horizon during reheating, the signature of EoS on the evolution of the complexities will be embedded in each separately.

**Presenter:** Dr SAHA, Pankaj (Seoultech)

**Session Classification:** Inflation / GW

Contribution ID: 48

Type: **not specified**

## Some thoughts on the dark side of the Universe

*Friday 24 February 2023 09:30 (40 minutes)*

**Presenter:** Prof. KO, Pyungwon (KIAS)

**Session Classification:** Dark Matter

Contribution ID: 49

Type: **not specified**

## Gravitational portals during reheating

*Friday 24 February 2023 10:10 (30 minutes)*

**Presenter:** Mr CLERY, Simon (IJCLab - Université Paris-Saclay)

**Session Classification:** Dark Matter

Contribution ID: 50

Type: **not specified**

## **Probing sterile neutrino dark matter in the PTOLEMY-like experiment**

*Friday 24 February 2023 11:10 (30 minutes)*

**Presenter:** Prof. CHOI, Ki-Young (Sungkyunkwan University)

**Session Classification:** Dark Matter

Contribution ID: 51

Type: **not specified**

## Halo-independent bounds on the non-relativistic effective theory of WIMP-nucleon scattering from direct detection and neutrino observations

*Friday 24 February 2023 11:40 (20 minutes)*

In my presentation I will talk about the halo-independent bounds on the WIMP-nucleon couplings of the non-relativistic effective Hamiltonian that drives the scattering process off nuclei of a WIMP of spin  $1/2$ . We will see that for most of the couplings the degree of relaxation of the halo-independent bounds compared to those obtained by assuming the Standard Halo Model is with few exceptions relatively moderate in the low and high WIMP mass regimes, where it can be as small as a factor of 2, while in the intermediate mass range (10 – 200 GeV) it can be as large as 1000. An exception to this general pattern, with more moderate values of the bound relaxation, is observed in the case of the spin-dependent type WIMP-proton couplings with no or a comparatively small momentum suppression, for which WIMP capture in the Sun is strongly enhanced because it is driven by scattering events off Hydrogen, the most abundant target in the Sun. Within this class of operators the relaxation is particularly small for interactions that are driven by only the velocity-dependent term, for which the solar capture signal is enhanced because of the high speed of scattering WIMPs inside the strong gravitational field of the Sun.

**Presenter:** Dr KAR, Arpan (Sogang University)

**Session Classification:** Dark Matter

Contribution ID: 52

Type: **not specified**

## **Secluded Dark Sector and Muon ( $g - 2$ ) in the Light of Modified Cosmology**

*Friday 24 February 2023 12:00 (20 minutes)*

**Presenter:** Dr GANGULY, Sougata (Chungnam National University)

**Session Classification:** Dark Matter



Contribution ID: 53

Type: **not specified**

## Electroweak precision test of axion-like particles - Virtual

*Friday 24 February 2023 14:00 (40 minutes)*

This is our on-going work that will be published soon. In the talk, we will discuss ALP contributions to EWPOs: there are several effects which have been overlooked in the literature and change the result drastically. We will also comment on the recent CDF result.

**Presenter:** Prof. ENDO, Motoi (KEK)

**Session Classification:** Flavor

Contribution ID: 54

Type: **not specified**

## **Semi-invisible B and tau decays at Belle & Belle II**

*Friday 24 February 2023 14:40 (40 minutes)*

**Presenter:** Prof. KWON, Youngjoon (Yonsei Univ)

**Session Classification:** Flavor

Contribution ID: 55

Type: **not specified**

## New approaches to semi-invisible tau and B decays

*Friday 24 February 2023 15:20 (30 minutes)*

**Presenter:** Prof. PARK, Chan Beom (Chonnam National University)

**Session Classification:** Flavor

Contribution ID: 56

Type: **not specified**

## Imprints of new physics via hadronic CP-violating observables

*Friday 24 February 2023 16:20 (30 minutes)*

**Presenter:** Dr IM, Sang Hui (IBS CTPU)

**Session Classification:** Flavor

Contribution ID: 57

Type: **not specified**

## Quark masses and CKM hierarchies from $S_4'$ modular flavor symmetry

*Friday 24 February 2023 16:50 (20 minutes)*

**Presenter:** Dr KAWAMURA, Junichiro (IBS CTPU)

**Session Classification:** Flavor

Contribution ID: 58

Type: **not specified**

## Status of heavy charged Higgs boson searches at the LHC

*Friday 24 February 2023 17:10 (20 minutes)*

In this talk, I will discuss the status of heavy charged Higgs boson searches at the LHC focusing on the 2-Higgs-doublet model. I also discuss the potential of using top quark properties for both the discovery and the characterization of charged Higgs bosons.

**Presenter:** Dr JUEID, Adil (IBS CTPU)

**Session Classification:** Flavor

Contribution ID: 59

Type: **not specified**

## **Constraints on first-order phase transitions and relevant particle physics models - Virtual**

*Thursday 23 February 2023 17:30 (30 minutes)*

**Presenter:** Prof. BIAN, Ligong (Chongqing University)

**Session Classification:** Inflation / GW