

The 4th Workshop on New Physics Opportunities at Neutrino Facilities

Report of Contributions

Contribution ID: 2

Type: **not specified**

DM searches using SK LOWE data

I will cover what is not covered by the plenary talk, focusing on low-energy data

Primary author: CHOI, Koun (IBS)

Presenter: CHOI, Koun (IBS)

Session Classification: Contributed talks II

Contribution ID: 3

Type: **not specified**

Plenary2

Contribution ID: 4

Type: **not specified**

Plenary3

Contribution ID: 5

Type: **not specified**

Plenary4

Contribution ID: 6

Type: **not specified**

Plenary IV

Contribution ID: 7

Type: **not specified**

Plenary V

Contribution ID: 8

Type: **not specified**

Contributed talks

Contribution ID: 9

Type: **not specified**

White paper discussion

Contribution ID: **10**

Type: **not specified**

Physics at the SND@LHC

We review the physics at the SND@LHC and its recent achievements.

Primary author: CHOI, Ki-Young (Sungkyunkwan University)

Presenter: CHOI, Ki-Young (Sungkyunkwan University)

Session Classification: Contributed talks II

Contribution ID: 11

Type: **not specified**

Searching for ν_τ disappearance in the SHiP experiment

We study the expected sensitivity to the mixing between sterile and tau neutrinos directly from the tau neutrino disappearance in the high-energy fixed target experiment. Here, the beam energy is large enough to produce tau neutrinos at the target with large luminosity. During their propagation to the detector, the tau neutrino may oscillate into sterile neutrino. By examining the energy spectrum of the observed tau neutrino events, we can probe the mixing between sterile and tau neutrinos directly. In this paper, we consider Scattering and Neutrino Detector (SND) at SHiP experiment as a showcase, which uses 400 GeV protons from SPS at CERN, and expect to observe 6,300 tau and anti-tau neutrinos from the 2×10^{20} POT for 5 years operation. Assuming the uncertainty of 10%, we find the sensitivity $|U_{\tau 4}|^2 \sim 0.08$, (90% CL) for $\Delta m_{41}^2 \sim 500 \text{ eV}^2$ with 10% signal-to-background ratio. We also consider a far SND at the end of the SHiP Hidden Sector Decay Spectrometer (HSDS), in which case the sensitivity would be enhanced to $|U_{\tau 4}|^2 \sim 0.02$. Away from this mass, the sensitivity becomes lower than $|U_{\tau 4}|^2 \sim 0.15$ for Δm_{41}^2 lesssim 100 eV^2 or Δm_{41}^2 gtrsim 10^4 eV^2 .

Primary authors: YOO, Seong Moon (Sung Kyun Kwan University); Dr KIM, Sung Hyun (Gyeongsang National University); Prof. CHOI, Ki-Young (Sungkyunkwan University); Prof. KIM, Yeong Gyun (Gwangju National University of Education); LEE, Kang Young (GNU); LEE, Kyong Sei (Korea University); Dr PARK, Byungdo (Gyeongsang National University); Dr SOHN, Jong Yoon (Gyeongsang National University); Prof. YOON, Chun Sil (Gyeongsang National University)

Presenter: YOO, Seong Moon (Sung Kyun Kwan University)

Session Classification: Contributed talks II

Contribution ID: 12

Type: **not specified**

Secret neutrino interaction at rare meson decay and neutrino experiments

Secret coupling of neutrinos to a new light vector boson, Z' , with a mass smaller than few hundred MeV is motivated within a several scenarios which are designed to explain various anomalies in particle physics and cosmology. Due to the longitudinal component of the massive vector boson, the rates of three-body decay of charged mesons (M) such as the pion, kaon and D mesons to the light lepton plus neutrino and Z' ($M \rightarrow l\nu Z'$) are enhanced by a factor of $(m_M/m_{Z'})^2$ and followed by the subsequent decay of Z' into the pair of neutrino and anti-neutrino. On the other hand, the standard two body decay $M \rightarrow l\nu$ is suppressed by a factor of $(m_l/m_M)^2$ due to chirality.

Consequently, this new interaction can be examined through meson decay experiments, involving the detection of the charged lepton, and in neutrino experiments, which change the neutrino spectrum. The strongest current bound comes from kaon decay experiment the NA62 experiment. We investigate the potential of future neutrino experiments for identifying specifically ν_τ appearance in probing secret neutrino interactions.

Primary author: BAKHTI, Pouya (JBNU)

Co-authors: Dr RAJAEI, Meshkat (JBNU); Prof. SHIN, Seodong (Jeonbuk National University)

Presenter: BAKHTI, Pouya (JBNU)

Session Classification: Contributed talks I

Contribution ID: 13

Type: **not specified**

N_eff constraints on the Dark Axion Portal

Axions and dark photons are common in many extensions of the Standard Model. The dark axion portal—an axion coupling to the dark photon and photon—can significantly modify their phenomenology. We study the cosmological constraints on the dark axion portal from Cosmic Microwave Background (CMB) bounds on the energy density of dark radiation, ΔN_{eff} . By computing the axion-photon-dark photon collision terms and solving the Boltzmann equations including their effects, we find that light axions are generally more constrained by ΔN_{eff} than from supernova cooling or collider experiments. However, with dark photons at the MeV scale, a window of parameter space is opened up above the supernova limits and below the experimental exclusion, allowing for axion decay constants as low as $f_a \sim 10^4$ GeV. This region also modifies indirectly the neutrino energy density, thus relaxing the cosmological upper bound on the sum of ne

Primary authors: HONG, Heejoung; SON, Minho (Korea Advanced Institute of Science and Technology); Prof. YOU, Tevong (King's College London); Dr MIN, Ui

Presenter: HONG, Heejoung

Session Classification: Contributed talks I

Contribution ID: 14

Type: **not specified**

Reactor antineutrino flux from neutrino- ^{13}C neutral current interactions

We focus on the potential of neutrino - ^{13}C neutral current interactions in clarifying the reactor antineutrino flux around the 6 MeV region. The interactions produce 3.685 MeV photon line via the process of de-excitation of ^{13}C in organic liquid scintillators, which can be observed in reactor neutrino experiments. We expect the future measurements of neutrino - ^{13}C cross section in JUNO and IsoDAR@Yemilab at low energies might help testing the reactor flux models with the assistance of excellent particle identification.

Primary authors: SHIN, Chang Sub (Institute for Basic Science); RAJAEE, Meshkat (JBNU); PARK, Min-Gwa (Jeonbuk National University); BAKHTI, Pouya (JBNU); Prof. SHIN, Seodong (Jeonbuk National University)

Presenter: PARK, Min-Gwa (Jeonbuk National University)

Session Classification: Contributed talks I

Contribution ID: 15

Type: **not specified**

Analyzing light sterile neutrino at DUNE and the role of beam tune, neutral current and near detector

The Deep Underground Neutrino Experiment (DUNE) is an upcoming long baseline neutrino experiment. In addition to exploring the yet unknown parameters in the standard three flavor neutrino sector, an ancillary goal of DUNE is to probe the subdominant effects induced by new physics such as a light eV-scale sterile neutrino. DUNE utilizes a wide band beam and provides us with an opportunity to utilize different beam tunes. We demonstrate that combining information from different beam tunes (low energy and medium energy) available at DUNE impacts its ability to probe some of the sterile parameters and modifies the allowed regions. We also perform a comparative analysis with different configurations including the addition of neutral current channels and using the simulated near detector data. We illustrate how using these various configurations can help us in exploring the sterile neutrino parameter space.

Primary authors: MASUD, Mehedi (IBS-CTPU); MEHTA, Poonam (Jawaharlal Nehru University); PARVEEN, Sabila (Jawaharlal Nehru University); BISHAI, Mary (Brookhaven National Laboratory)

Presenter: MASUD, Mehedi (IBS-CTPU)

Session Classification: Contributed talks I

Contribution ID: 16

Type: **not specified**

BSM at DUNE

Monday, 3 June 2024 09:30 (30 minutes)

Presenter: YU, Jaehoon (The University of Texas at Arlington)

Session Classification: Plenary1: New opportunities at accelerator experiments I

Contribution ID: 17

Type: **not specified**

BSM at Beam Dump Experiments

Monday, 3 June 2024 10:00 (30 minutes)

Presenter: KIM, Doojin (University of Florida)

Session Classification: Plenary1: New opportunities at accelerator experiments I

Contribution ID: **18**

Type: **not specified**

TBA

Monday, 3 June 2024 11:00 (30 minutes)

Presenter: Prof. NG, Kenny (Chinese University of Hong Kong)

Session Classification: Plenary 2: New opportunities at atmospheric neutrino experiments
I

Contribution ID: 19

Type: **not specified**

BSM probes from Supernovae

Monday, 3 June 2024 11:30 (30 minutes)

Presenter: YUN, Seokhoon (IBS-CTPU)

Session Classification: Plenary 2: New opportunities at atmospheric neutrino experiments
I

Contribution ID: 20

Type: **not specified**

BSM in JUNO

Monday, 3 June 2024 14:00 (30 minutes)

Presenter: LI, Yufeng (Institute of High Energy Physics)

Session Classification: Plenary 3: New opportunities at solar neutrino experiments

Contribution ID: 21

Type: **not specified**

Liquid Scintillator Counter at Yemilab

Monday, 3 June 2024 14:30 (30 minutes)

Presenter: WON, Eunil (Korea University)

Session Classification: Plenary 3: New opportunities at solar neutrino experiments

Contribution ID: 22

Type: **not specified**

BSM at KamLAND

Monday, 3 June 2024 16:00 (30 minutes)

Presenter: Prof. HATA, Kazumi (Tohoku University)

Session Classification: Plenary 4: Reactor neutrino experiments in East Asia

Contribution ID: 23

Type: **not specified**

Status of RENE

Monday, 3 June 2024 16:30 (30 minutes)

Presenter: Prof. YANG, Byoungsu (Chonnam National University)

Session Classification: Plenary 4: Reactor neutrino experiments in East Asia

Contribution ID: 24

Type: **not specified**

Status of NEON and NEOS II

Monday, 3 June 2024 17:00 (30 minutes)

Presenter: KO, Young Ju (IBS)

Session Classification: Plenary 4: Reactor neutrino experiments in East Asia

Contribution ID: 25

Type: **not specified**

BSM at T2SK/HK near detectors

Tuesday, 4 June 2024 09:30 (30 minutes)

Presenter: Mr LI, Weijun (Oxford University)

Session Classification: Plenary 5: New opportunities at accelerator experiments II

Contribution ID: 26

Type: **not specified**

Status of JSNS2

Tuesday, 4 June 2024 10:00 (30 minutes)

Presenter: PARK, Jungsic (Kyungpook National University)

Session Classification: Plenary 5: New opportunities at accelerator experiments II

Contribution ID: 27

Type: **not specified**

BSM at SND/FASERnu/FPF

Tuesday, 4 June 2024 10:30 (30 minutes)

Presenter: Dr JEONG, Yu Seon (Chung-Ang University)

Session Classification: Plenary 5: New opportunities at accelerator experiments II

Contribution ID: 28

Type: **not specified**

BSM at SK/HK far detectors

Tuesday, 4 June 2024 11:30 (30 minutes)

Presenter: TAKHISTOV, Volodymyr (QUP, KEK & Kavli IPMU)

Session Classification: Plenary 6: New opportunities at atmospheric neutrino experiments II

Contribution ID: 29

Type: **not specified**

BSM at IceCube

Tuesday, 4 June 2024 12:00 (30 minutes)

Presenter: ROTT, Carsten (Sungkyunkwan University)

Session Classification: Plenary 6: New opportunities at atmospheric neutrino experiments II