TAUN 2024, The 8th TAUN collaboration meeting

Report of Contributions

https://indico.ibs.re.kr/e/779

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

General algorithm for embedding 4D geometries in 5D braneworld models

Monday, 25 November 2024 09:30 (30 minutes)

We develop a general algorithm that enables the consistent embedding of any four-dimensional static and spherically symmetric geometry into any five-dimensional single-brane braneworld model, characterized by an injective and nonsingular warp factor. Furthermore, we supplement the algorithm by introducing a method that allows one to, in principle, reconstruct 5D field theories that support the aforementioned geometries.

Presenter: Dr NAKAS, Theodoros (CTPU-CGA)

Session Classification: CTPU-CGA

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

Understanding ghosts in scalar-tensor theories of gravity

Monday, 25 November 2024 10:00 (30 minutes)

Pushing beyond the boundaries of general relativity has long been a major goal in both theoretical and experimental physics, especially in the pursuit of a quantum theory of gravity and the explanation of cosmological phenomena like dark energy and cosmic acceleration. Constructing modified gravity models often leads to additional degrees of freedom, but these can also introduce problematic, non-physical elements, such as “ghosts” and Ostrogradsky instabilities. Such instabilities render the theory unviable by causing unboundedness in the Hamiltonian, leading to the breakdown of predictability.
In this work, we investigate the nature and origin of ghost instabilities within scalar-tensor theories of gravity. We begin with simple toy models, which serve as a controlled environment for understanding the mechanisms by which ghost degrees of freedom emerge. These models help illustrate how adding higher-order derivative terms or modifying the kinetic structure can lead to the appearance of ghosts, even when the theory initially seems stable. The final aim is to progressively go to R+f(G) Gauss-Bonnet gravity and see why, in opposition with f(R) models, there are ghosts in these theories.

Presenter: Mr LE GRIX, Joffrey (CTPU-CGA)

Session Classification: CTPU-CGA

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

Opening Remark

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

Closing Remark

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

Wavefunction Matching in Nuclear Lattice EFT

Monday, 25 November 2024 11:20 (30 minutes)

Ab initio calculations play a crucial role in understanding nuclear properties. One of the primary challenges is performing accurate calculations for systems with complex interactions that are difficult for the chosen computational method to handle. In this talk, the wavefunction matching approach will be introduced as a method to address these challenges in nuclear physics. Additionally, a brief overview of nuclear lattice EFT will be provided.

Presenter: Dr KIM, Myungkuk (CENS)

Session Classification: CENS

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

Precision Frontier from Nuclear Decay

Monday, 25 November 2024 10:50 (30 minutes)

Nuclear decay has been utilized for decades to study weak interaction and structure of nuclei. In particular, it has served as a probe of New Physics through a high-precision measurement for the coefficient of - angular correlation, Fierz interference term, and asymmetry. Combining the precision frontier with the high-energy one from LHC constrains the coupling of exotic weak current at per-mil level, which is equivalent to a hypothetical TeV-mass particle search. The unitarity test of Cabibbo-Kobayashi-Maskawa (CKM) matrix is another exemplar of the crossroad of two frontiers. Here we have focused on the extraction of |V ud |, which can be obtained directly from the -decay properties of nuclei. A recent experiment at the INFN Legnaro National Laboratory aiming to measure the branching ratio of 10 C superallowed decay will be presented.

Presenter: Dr HA, Jeongsu (CENS)

Session Classification: CENS

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

General Purpose Large Liquid Scintillator Detector at Yemilab

Monday, 25 November 2024 14:20 (30 minutes)

Presenter: Dr LEE, Jaison (CUP)

Session Classification: CUP

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

Recent advances and future of COSINE-100

Monday, 25 November 2024 14:50 (30 minutes)

Presenter: Dr YU, Gyunho (CUP)

Session Classification: CUP

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

CosmiXs: Cosmic messenger spectra for indirect dark matter searches

Monday, 25 November 2024 13:00 (30 minutes)

The spectra of stable particles such as photons, positrons, antiprotons and neutrinos are one of the main ingredients to calculate the fluxes of cosmic rays and radiation searched for in indirect detection experiments. The modeling of the whole process is however very complicated since after dark matter annihilation or decay, a number of phenomena occur: including resonance decays, parton showering, hadronization and hadron decays. Therefore the modeling itself cannot be performed from first principles. I will discuss some progress in this direction and present CosmiXs which uses VINCIA to properly model electroweak corrections, and handles the polarization information. I will then move to the modeling of antideuterons and discuss briefly the associated theoretical uncertainties (The dataset can be found in this repo: https://github.com/ajueid/CosmiXs)
Talk is based on:
https://arxiv.org/abs/2411.04815
https://arxiv.org/abs/2312.01153
https://arxiv.org/abs/2303.11363
https://arxiv.org/abs/2202.11546

Presenter: Dr JUEID, Adil (CTPU-PTC)

Session Classification: CTPU-PTC

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

Machine Learning for Galactic Dynamics: Neural Stellar Density Estimation for Mapping Dark Matter in the Local Universe

Monday, 25 November 2024 13:30 (30 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 equation 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 along 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: Dr LIM, Sung Hak (CTPU-PTC)

Session Classification: CTPU-PTC

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

Revisiting Chiral Magnetic Effects and Axions

Monday, 25 November 2024 15:40 (30 minutes)

Presenter: Prof. HONG, Deogki

Session Classification: CAPP

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

Accelerating Axion Haloscope Experiments: Strategies and Innovations at CAP

Monday, 25 November 2024 16:30 (20 minutes)

Presenter: Dr AHN, Danho

Session Classification: CAPP

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

But what is axion haloscope?

Monday, 25 November 2024 16:10 (20 minutes)

Presenter: Dr AHN, Saebyeok

Session Classification: CAPP