Grad School Physics Seminar 2023/24

Report of Contributions

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

Welcoming talk of the Graduate School director

Thursday, 5 October 2023 09:15 (20)

Presenter(s) : Prof. SPALLIŃSKI, Michał (NCBJ)

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

Naturally small neutrino mass with asymptotic safety and gravitational-wave signatures

Thursday, 12 October 2023 09:15 (60)

I will discuss a dynamical mechanism to generate small neutrino masses, based on a UV completion through asymptotically safe gravity, in the standard model with right-handed neutrinos and in the B-L model. A small Dirac mass for the neutrinos appears more naturally in the B-L model compared to the standard model, when we account for quantum gravity corrections based on existing calculations. This mechanism can also accommodate Majorana neutrinos and pseudo-Dirac neutrinos, for various values of seesaw scale. I will discuss whether gravitational waves from first-order phase transition can distinguish these cases. In the presence of quantum scale invariance of the scalar potential – which is at odds with existing calculations in asymptotically safe quantum gravity – we find no gravitational wave signals. Forgoing this symmetry, we find an observable signal in new-generation space interferometers. However, its discriminating features are washed out due to the strong dependence of the gravitational-wave spectrum on the mass parameter of the scalar potential.

Presenter(s) : Mr CHIKKABALLI, Abhishek

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

Deeply virtual scattering in QCD

Thursday, 19 October 2023 09:15 (60)

For a long time, it was believed that the fundamental constituents of atoms were electrons and nucleons being both elementary. Experiments conducted in the late 1960s at Standford Linear Accelerator Center (SLAC) proved the existence of internal degrees of freedom in the nucleons. These ones are called quarks and gluons, or collectively partons. With QCD as the fundamental theory for strong interactions, we can describe hadronic structure via correlators of partons giving rise to the so-called parton distribution functions (PDFs) and generalized parton distributions (GPDs) when the so-called collinear factorization applies. The non-elementary nature of hadrons makes these correlators perturbatively unsolvable so we can only measure or model them.

This seminar attempts to show the different ways to access such correlators and how they provide information on the structure of the hadrons. For this purpose, different processes in QCD will be explained and the latest results in theory and phenomenology will be discussed.

Presenter(s) : MARTINEZ-FERNANDEZ, Victor

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

Measurements of 10 ps lifetime of 10+ state in 128Cs – experiment and analysis.

Thursday, 2 November 2023 09:15 (60)

In July 2022 an experiment on 128Cs was performed. Last year I told about preparing for the experiment in nuclear physics. This year I'll tell you how to perform analysis of it. That includes calibration of the detectors, overcoming expected and unexpected problems and some simulations.

Presenter(s) : NAŁĘCZ-JAWECKI, Adam (NCBJ)

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

Warsaw macro-micro model and random walk method for calculating the fusion probability of superheavy elements

Thursday, 26 October 2023 09:15 (60)

One of the important, ongoing goals in nuclear physics is the creation of superheavy elements with Z=119 and Z-120. The experiments which try to achieve this objective are very time-consuming, because of the low production cross sections. Theoretical calculations may give valuable insight into choosing the most effective reactions and bombarding energies for experimentalists.
In this talk, a new method for predicting the probability of fusion of superheavy elements will be presented. The approach uses a random walk algorithm, in which the shape evolution is governed by the density of states above the multidimensional potential energy surface (PES). The PESs were calculated within the latest version of the Warsaw macroscopic-microscopic model [1], with rotational energy included.
Three cold fusion reactions will be examined in detail: 48Ca+208Pb, 50Ti+208Pb and 54Cr+208Pb. The calculated probabilities of fusion for these reactions will be shown. The influence of angular momentum and excitation energy on ratios of symmetric and asymmetric divisions will be demonstrated. Future improvements to the method will also be discussed.

[1] P. Jachimowicz, M. Kowal, and J. Skalski, At. Data. Nucl. Data. Tables. 138, 101393 (2021).

Presenter(s) : Mr AUGUSTYN, Aleksander (NCBJ)

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

Establishment of best practices in reducing the uncertainty of neutron cross-sections with Bayesian methods

Thursday, 9 November 2023 09:15 (60)

The multiplication factor (keff) and its uncertainty are critical design parameters in nuclear reactors. Reducing this uncertainty would help in achieving more optimal design and safer operation of nuclear reactors. This uncertainty mostly comes from neutron cross-section uncertainties. It is difficult to measure the neutron cross-sections more accurately with direct measurements using currently available technologies. In this seminar three Bayesian algorithms allowing for more accurate indirect measurements are presented. The potential to ultimately reduce the keff uncertainty by applying such algorithms is presented on an example.
A list of best practices for conducting uncertainty reduction with Bayesian methods is established. The compilation of such list was motivated by absence of these practices in many papers which apply Bayesian methods for uncertainty reduction or quantification in the field of nuclear engineering. These best practices include a rigorous procedure for validation of posterior results based on so-called "synthetic experiments" and improved prior uncertainty quantification of experimental data assimilated with Bayesian algorithms.

Presenter(s) : JĘDRZEJCZYK, Michał (National Centre for Nuclear Research)

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

Discussion about the goals and organization of the PhD seminar

Thursday, 5 October 2023 09:35 (20)

Presenter(s) : WAGNER, Jakub (National Centre for Nuclear Research); MALEK, Katarzyna (NCBJ); BLUJ, Michal (NCBJ)

Contribution ID : **36** Type : **not specified**

Galactic foreground bias in CMB lensing reconstruction

Thursday, 16 November 2023 09:15 (60)

Cosmic Microwave Background (CMB) photons experience weak gravitational lensing by the large-scale structure of the Universe along their journey. The weak lensing remaps the primordial anisotropies of CMB temperature and polarisation, contaminating the measurements of primordial fluctuations. Estimating the lensing potential field and delensing the CMB maps from recent and upcoming surveys are crucial tasks to improve cosmological measurements. However, one of the main obstacles to these tasks is the presence of foreground contamination from our own galaxy.

In my talk, I will give a overview of CMB polarisation, CMB weak lensing and Galactic foreground emission, followed by my results on foreground contamination in reconstructing the lensing potential field.

Presenter(s) : DEKA, Kishan (NCBJ)

Contribution ID : **37** Type : **not specified**

Chasing the phantom: Exploring light dark matter with Forward Physics Facility.

Thursday, 23 November 2023 09:15 (60)

Light dark matter (DM) produced thermally in the early Universe is one of the main targets in dark matter searches nowadays. Probing light DM requires appropriate detection techniques. It has been recently proposed that the forward kinematic region of the LHC can be utilized for this search. The FORward Experiment Sensitivity Estimator, or FORESEE, simulation package has been introduced to study the sensitivity reach of any forward physics detector in the search for light long-lived particles or DM species. In my presentation, I will discuss the implementation of various models of light dark matter within FORESEE, providing insights into how experiments at the Forward Physics Facility at CERN can probe these models.

Presenter(s) : ADHIKARY, Jyotismita (NCBJ)

Contribution ID : **38** Type : **not specified**

Studies of CPT with D^0 mesons

Thursday, 30 November 2023 09:15 (60)

CPT symmetry is assumed to be strictly conserved in the Standard Model.
Consequently, detection of any deviation from CPT invariance would be hinting at a more fundamental theory, possibly at the Planck scale.
Current technology enables us to explore energies nearing the Planck scale by probing space-time symmetry violations.
The framework to study these deviations is called the Standard Model Extension (SME).
In particular we can test CPT violation by looking at the oscillations of the neutral D meson.
At present, the D^0 meson system is arguably the only experimental way to access effects of Lorentz and CPT violation at good sensitivity in the charm sector.
I shall give a summary of the current experimental status of CPT violation studies with D^0 mesons and
show how to extract the most stringent limits on SME CPTV parameters using LHCb (2015-2018) data and beyond.

Presenter(s) : KMIEĆ, Mateusz (NCBJ)

Contribution ID : **39** Type : **not specified**

Galaxy merging features looming in the background

Thursday, 7 December 2023 09:15 (60)

The life and evolution of galaxies in our Universe is complex and different for each of them. One of the most known and relevant stages they go through is the merging process, where individual galaxies approach each other and become one system. We are nowadays certain many of them are the product of former galaxies that merged. Such is the case of the Milky Way, archeological studies of its stellar populations have shown the trace of small galaxies that merged with it. Moreover, a major merging phase is on its way, as the neighbor Andromeda galaxy currently approaching to us.

In order to understand both what will happen with our galaxy and galaxy evolution itself, we need to find galaxy mergers in our images of the sky. In this seminar, I will explain our novel methodology for finding galaxy mergers using the low signal to noise S/N signal surrounding them in the images. We showed it is possible in Suelves, Pearson & Pollo (2023), and we are currently developing our understanding of it with the goal of applying it to the upcoming large scale LSST and Euclid surveys.

Presenter(s) : SUELVES, Luis Eduardo (NCBJ)

Contribution ID : **40** Type : **not specified**

Single Inclusive Particle Production in CGC: Beyond Eikonal Order

Thursday, 14 December 2023 09:15 (60)

Studying high-energy hadronic scattering processes to understand the structure of nuclei has been the focus of experimental and theoretical studies for more than three decades now. The Color Glass Condensate (CGC) effective theory has been developed and used to study high-energy proton-nucleus collisions in particular. One of the main approximations adopted in the Color Glass Condensate is the so-called eikonal approximation, which amounts to neglecting power-suppressed corrections in the high-energy limit. This approximation is well justified for asymptotically high energies. However, corrections to it might be sizable in practice, in particular at the Relativistic Heavy Ion Collider and the upcoming Electron-Ion Collider. Therefore, we need to bring precision in theory to analyze the upcoming data from the colliders. For this, we have to compute observables like scattering cross sections beyond the leading order of energy. Single-inclusive particle production is one of the promising channels to study CGC beyond eikonal order.

In my talk, I will briefly review the eikonal approximation and how to go beyond eikonal order. Furthermore, I will present its application to single-inclusive particle production in proton-nucleus collisions.

Presenter(s) : MULANI, Swaleha (National Centre for Nuclear Research(NCBJ), Warsaw, Poland)

Contribution ID : **41** Type : **not specified**

Latest neutrino oscillation results from T2K and upcoming analysis updates for 2024

Thursday, 21 December 2023 09:15 (60)

In this talk, I will discuss T2K's neutrino oscillation results from its 2022 analysis, mostly based on my talk at the EPS-HEP conference in Hamburg, in August 2023. I will briefly cover neutrino oscillation and its current unknowns, then talk in detail about T2K's experimental setup and how it obtains oscillation parameters. T2K performs independent oscillation analyses with two fitters that are based on different statistical approaches, although both of them produce results that are consistent with each other, as will be shown. I will then talk about upcoming updates and upgrades to T2K, along with my PhD analysis and how it will be included in T2K's 2024 oscillation analysis.

Presenter(s) : S. PRABHU, Yashwanth (NCBJ Warsaw)

Contribution ID : **42** Type : **not specified**

Gravitational wave lensing: A mismatch analysis

Thursday, 11 January 2024 09:15 (60)

The first direct detection of gravitational waves by LIGO collaboration has opened a new era of Gravitational Wave astronomy. The bending of light by massive objects is a prediction of General Relativity and this phenomenon known as gravitational lensing has now become an indispensable tool in astrophysics. Therefore, in this era of astronomy, the next most anticipated event is the detection of gravitational waves lensed by massive sources along the line of sight.

The lensed gravitational waves has many applications such as detection of Intermediate Mass BlackHoles (IMBH), Primordial Black Holes, precision cosmology etc. However, all these application needs proper modelling of lensed gravitational waveform. The incorrect template (waveform) will lead to loss of information and reduction in Signal to Noise Ratio(SNR). In this talk, I will discuss about the mismatched filtering technique to compare the lensed template with unlensed template for various lensed models.

Presenter(s) : HARIKUMAR, Sreekanth (National Centre for Nuclear Research(NCBJ))

Contribution ID : **43** Type : **not specified**

How does the ISM evolve in passive galaxies?

Thursday, 18 January 2024 09:15 (60)

Recent discoveries challenge the conventional belief that quiescent galaxies at high redshifts contain minimal interstellar medium (ISM) compared to their stellar mass. Investigating the ISM abundance in these galaxies is crucial for understanding the late evolution of massive structures. This project combines new observational data with cosmological simulations to unravel the ISM abundance in quiescent galaxies and its environmental influences. Utilizing optical/near-infrared data from deep extragalactic fields like COSMOS and EGS, and complementing it with JWST infrared data, we aim to study the evolution of passive galaxies in early Universe.

Presenter(s) : LISIECKI, Krzysztof (NCBJ BP4)

Contribution ID : **44** Type : **not specified**

Spin-entanglement in hyperon decays

Thursday, 25 January 2024 10:00 (60)

Recent results published by the BESIII collaboration revealed a substantial update in the value of the Lambda baryon decay parameter.
This development is taken as the starting point for a feasibility study of CP violation tests in strange baryon decays at next-generation J/Psi factories. The proposed formalism allows for directly comparing particle and antiparticle properties, analyzing the weight of spin-correlation and polarization terms on such tests.
Furthermore, the spin-entanglement feature of the produced Yanti-Y pair can also be exploited to provide a description for hyperon semileptonic decays. The spin-density matrix of this process is presented, along with an outlook of the possible future applications.

Presenter(s) : SALONE, Nora

Contribution ID : **45** Type : **not specified**

The evolutionary pathways of dust and cold gas in quiescent galaxies

Thursday, 29 February 2024 09:15 (60)

The evolution of galaxies is intrinsically tied to stars, but also gas, metals, and dust within the interstellar medium (ISM). These components are thought to be exclusively linked to the process of star-formation, implying that the molecular gas and dust should tightly follow each other's fate. However, the recent advent of the most powerful ground-based and space-based instruments such as the Atacama Large Millimeter/submillimeter Array (ALMA) and the James Webb Space Telescope (JWST), is providing strong evidence that even galaxies that stopped forming new stars millions, or even billions, of years ago (called quiescent galaxies or QGs), contain significant amounts of dust with respect to their stellar mass.

To overcome the observational challenges (mostly due to the significant observing time required to measure dust in QGs), we studied these objects in the state-of-the-art cosmological simulation SIMBA. In this talk, I present the main results of my work with SIMBA: the pathways for dust and cold gas in QGs up to z=2. During the talk I will show, for the first time, how different mechanisms, both internal and environmental, can affect the dust content after the cessation of the star formation. I will highlight how SIMBA predicts copious amounts of dust in QGs at high-redshifts, and paints a scenario in which quenching timescales and environments provide only a partial contribution to the evolutionary pathways of the ISM. I will finally explain the main result of my finding: a key new channel for dust re-formation in QGs. This involves a prolonged dust growth in the ISM, which activates almost independently from the evolution of the molecular hydrogen gas, presenting new exciting predictions for future observers.

Presenter(s) : LORENZON, Giuliano

Contribution ID : **46** Type : **not specified**

Shedding light onto the dark freeze-out with FIMPs

Thursday, 7 March 2024 09:15 (60)

In this presentation, I will discuss the concept of "Self Interacting Dark Matter," a hypothesis positing that the observed abundance of DM can be elucidated through a secluded dark sector engaging in self-number changing reactions. Additionally, I will introduce the freeze-in mechanism, relying on feeble couplings between the Standard Model (SM) and the dark sector. The latter is anticipated to be populated through annihilation/decay processes involving the Higgs boson. Ultimately, I will integrate both concepts, demonstrating how the dark sector can convert kinetic energy into additional dark matter through self-interactions.

Presenter(s) : CERVANTES HERNANDEZ, Juan Esau (NCBJ Warsaw)

Contribution ID : **47** Type : **not specified**

Tau neutrino appearance and the measurement of neutrino mass ordering in the flux of atmospheric neutrinos at Super-Kamiokande

Thursday, 14 March 2024 09:15 (60)

Electron and muon neutrinos are produced in the atmosphere by cosmic rays, and neutrino oscillations in the atmospheric flux lead to the production of tau neutrinos. Since 1996, Super-Kamiokande (SK) has been collecting data on atmospheric neutrinos, with an energy threshold for the detection of tau neutrinos set at 3.5 GeV. In the same energy range, matter effects give rise to a resonance of electron neutrinos or anti-neutrinos, depending on whether the neutrino mass-ordering is normal or inverted. Thus, SK can unveil the neutrino mass-ordering contingent on reducing the tau neutrino background. We present the latest measurement of tau neutrino appearance at SK and potential enhancements to the experiment's sensitivity to neutrino mass-ordering by constraining tau neutrinos with a neural network.

Presenter(s) : MANDAL, Maitrayee

Contribution ID : **48** Type : **not specified**

An introduction to search for vector boson scattering production of same sign W boson decaying to muons with pp collisions at sqrt(s) = 13.6 TeV collected by the CMS experiment

Thursday, 21 March 2024 09:15 (60)

In this presentation I will give an introduction to vector boson scattering processes at LHC. I aimed scattering two same sign W bosons leading to two same sign muons in association with two jets. To identify the muons among many other muons coming from other processes in the CMS experiment, we define a signal region with requiring two jets with large pseudorapidity separation and high invariant mass. Moreover, we first are required to identify all backgrounds contributing in our aimed analysis, then we measure their contribution in signal region so that we can measure signal events by subtraction all backgrounds from observed events in the signal region. There are two kinds of background in my analysis, one of which is non-prompt background. Non-prompt backgrounds are measured directly from data by a so-called data-driven method. Other backgrounds can be estimated with MC simulation.

Presenter(s) : MOUSAVI, Mohammad

Contribution ID : **49** Type : **not specified**

(1+1) dimensional Quantum Gravity from the Corner Proposal

Thursday, 4 April 2024 09:15 (60)

The concept of symmetries is crucial in our comprehension of modern theoretical physics. The Corner Proposal introduces a novel framework where symmetries are reinstated as foundational principles in our understanding of gravity. This aims to describe gravity using a language that is more adapted to quantization. In this presentation, I will provide an overview of the essential tools required to grasp the conceptual framework of the proposal, accompanied by simple examples for illustration. Subsequently, I will present elements of our recent research applying the proposal to the case of 1+1 dimensional gravity. Finally, I will demonstrate the framework's utility by calculating the entanglement entropy between two spatial regions—a significant challenge in quantum gravity. The result is the 1+1 dimensional equivalent of the well-established Bekenstein-Hawking area law governing the entropy of gravitational systems.

Presenter(s) : VARRIN, Ludovic

Contribution ID : **50** Type : **not specified**

Asymptotic Safety and the Litim Sannino Model

Thursday, 11 April 2024 09:15 (60)

When studying the running of coupling constants in some theories - including the Standard Model of particle physics - we may find that perturbation theory cannot be used to describe the theory for very low or very high energy scales. The assumption of an ultra-violet (UV) interacting Fixed Point (FP) can preserve the theory from running into infinity. This solution is called Asymptotic Safety (AS). I will present a toy model of non-abelian gauge fields and quarks in the large Nc limit and show how the theory at the UV FP is described by only one (small and positive) real parameter, so that all the interesting quantities are polynomials in such parameter. I will present both a perturbative and a non-perturbative analysis of the UV FP and discuss the validity of the assumption of AS as a function of the single parameter of the theory.

Presenter(s) : RIZZO, Daniele (National Center for Nuclear Research (NCBJ), Warsaw, Poland)

Contribution ID : **51** Type : **not specified**

Redshift Evolution of Lensing Galaxy Density Slopes via Model-Independent Distance Ratios

Thursday, 18 April 2024 09:15 (60)

Strong lensing (SL) systems, which are expected to be massively discovered by the LSST, provide powerful tool for studying cosmology and galaxy structure. The Einstein radius is a robust measure of the total projected mass of the lens. When combined with stellar kinematics it can be used to constrain the radial mass profiles of the lens. However, the observed angular size of the Einstein radius depends also on the cosmological model through the distance ratio D_ls/D_s. Hence, galaxy structure and cosmology become entangled.
Therefore, if one needs to use strong lenses for testing cosmological model one needs to assume the effective model of the lens mass distribution. Usually this is SIS or more general spherically symmetric power-law (PL) model. On the other hand, PL slope parameter γ is being determined from observations assuming a fiducial cosmological model (usually vanilla LCDM model). This creates a vicious circle. In this study, using a compilation of 161 well studied SL systems we attempted at characterizing the PL slope and its possible evolution with redshift using an original cosmological model independent approach. Namely, the distance ratios have been reconstructed using non-parametric regression methods, specifically Artificial Neural Networks (ANN) and Gaussian Processes (GP), applied to the data comprising the Hubble parameter H(z) from cosmic chronometers and luminosity distances D_L(z) from type Ia supernovae. Such reconstruction relates only to what the nature tells us in the data, without assuming any specific cosmological model.
We tested two approaches regarding the lens mass distribution: The first is with a single PL index characterizing the total mass (both dark and luminous). The second one distinguishes γ PL index as describing the total mass ρ{tot}(r)= ρ{tot} r^{-γ} and δ PL index describing luminous matter ρ{lum}(r)= ρ{lum} r^{-δ}. Across various methods, our results show that the total mass becomes more concentrated from redshift z~1 to the present day. In models where the density slope of luminous matter can be different from that of the total mass, we find that the density profile of luminous matter flattens over time. And this model suggests a steeper density slope for luminous mass relative to total mass, consistent with observations from detailed lensing galaxy studies. These findings offer a reference point for leveraging strong lensing systems in cosmological constraints and studying galaxy evolution, with potential applications currently being explored.

Presenter(s) : GENG, Shuaibo (National Center for Nuclear Research)

Contribution ID : **52** Type : **not specified**

Exploring the Low Surface Brightness Galaxies in Abell 194 with Transfer Learning.

Thursday, 25 April 2024 09:15 (60)

Low surface brightness galaxies (LSBGs), characterized as galaxies fainter than the night sky, hold significant importance in comprehending galaxy evolution. The upcoming large-scale surveys such as the Rubin Observatory Legacy Survey of Space and Time (LSST) and Euclid are expected to uncover a large number of LSBGs which would require accurate automated methods for their detection. We study the scope of transfer learning for the identification of LSBGs in the Abell 194 cluster with the deep data we obtained from our Hyper Suprime-Cam (HSC) observations of this cluster. We use two ensemble of transformer models that have been trained on the dark energy survey data release 1 (DES DR 1) which is two order of magnitude shallower than the data from HSC. The transformer ensemble model achieved a classification accuracy of 95% on the data from DES DR1 and achieved a recall rate of 93% on the HSC dataset. Using the transformer ensemble models we identify a sample of 171 LSBGs among which 87 are completely new from the cluster Abell 194. We further classify 28 LSBGs among them as ultra-diffuse galaxies (UDGs). We show that transfer learning from a shallow survey to a deeper survey using transformer models can be successful with appropriate data normalization. This methodology could prove valuable for identifying and analyzing astronomical data in upcoming surveys like LSST and Euclid.

Presenter(s) : THURUTHIPILLY, Hareesh (National Center for Nuclear Research (NCBJ))

Contribution ID : **53** Type : **not specified**

Study of direct photon production in Pb-Pb collisions at √sNN = 5.02 TeV with ALICE experiment's Photon Spectrometer (PHOS) at Large Hadron Collider

Thursday, 9 May 2024 09:15 (60)

The Quark-Gluon Plasma (QGP), comprising deconfined quarks and gluons, is believed to have existed in the Universe shortly after the Big Bang. As the QGP cools, it transitions into the hadronic matter that we observe today. In laboratory settings, small-scale "Big Bangs" are artificially created through high-energy heavy-ion collisions, which heat the hadronic matter above the transition temperature, approximately 150 MeV, leading to the formation of the QGP. Direct photons serve as unique probes in high-energy proton-proton and nucleus-nucleus collisions, interacting weakly with the dense and hot quark-gluon medium formed during these events. These photons escape freely, providing undistorted information about the collision's evolution. In the Photon Spectrometer of the ALICE experiment at the Large Hadron Collider at CERN, photons, originating from the collisions of lead nuclei at energy √sNN = 5.02 TeV , are measured with very high precision. By disentangling the contributions of decay, prompt and thermal photons emitted during these collisions, we can estimate the effects of cold and hot nuclear matter and gain insights into the temperature, correlations, and collective phenomena within the QGP.

Presenter(s) : MANDAL, Sushobhan

Contribution ID : **54** Type : **not specified**

TEGLIE: Transformer Encoders as strong Gravitational Lens finders In the Kilo DegreE Survey

Thursday, 6 June 2024 09:15 (60)

In this seminar, I will explore the potential of Transformer Encoders in detecting strong gravitational lenses (SGLs) within wide-area surveys. This study focuses on the Kilo Degree Survey (KiDS) as the primary dataset. Initially, the model was trained on simulated data from the Bologna Lens Challenge, designed to closely mimic actual KiDS observations. Following this, the model was refined through fine-tuning and data augmentation using real KiDS data, which included images of previously identified SGL candidates and non-lens examples. This refinement led to a substantial 70% reduction in false positives, although the precision remained lower than 1%.
This approach resulted in a catalog of 263 SGL candidates, of which 43 are newly discovered high-confidence SGLs. This seminar will highlight the difficulties in detecting rare objects such as gravitational lenses and the challenges to overcome to be ready for the next generation of wide-area surveys.

Presenter(s) : GRESPAN, Margherita (NCBJ)

Contribution ID : **55** Type : **not specified**

Search for Exotics in B decays at LHCb

Thursday, 13 June 2024 09:15 (60)

Out of all the unexpected particles discovered in the past two decades, about 30 observed exotic hadrons candidates, i.e. ones that do not fit into the paradigms of either bosonic or fermionic baryons, have masses in the same region as conventional charmonium states (charmonium-like) or bottomonium-like. For these enigmatic exotic hadrons observed to date, no scientific consensus has yet emerged to explain all of them and their formation, properties, structure by means of a single, universal theoretical principle. It is this pattern of one unexpected result after another, with the emergence of desperately few connections, that has characterized the last 20 years of experimental studies in this field. This presentation is aimed at briefly introducing this rapidly expanding field of QCD exotica and take a guided tour through the process of finding new exotics in B meson decays in data collected at LHCb experiment in the last 12 years.

Presenter(s) : JOSHI, Salil (NCBJ)