Prospecting for New Physics through Flavor, Dark Matter, and Machine Learning

Report of Contributions

https://indico.fnal.gov/e/AspenWinter2023

Contribution ID: **0** Type: **not specified**

Muon g-2 experiment

Monday, 27 March 2023 08:10 (25 minutes)

Summary

Presenters: POLLY, Chris (Urbana); POLLY, Chris (Fermilab)

Session Classification: Muon g-2

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

What kind of New Physics for a muon (g-2) anomaly?

Monday, 27 March 2023 08:35 (25 minutes)

Summary

Presenter: PAGÈS, Julie (UZH)

Session Classification: Muon g-2

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

muon g-2 lattice

Monday, 27 March 2023 09:00 (25 minutes)

Summary

Presenters: NEIL, Ethan; NEIL, Ethan (University of Colorado, Boulder)

Session Classification: Muon g-2

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

BSM in the Neutrino Sector

Monday, 27 March 2023 09:45 (25 minutes)

Summary

Presenter: MACHADO, Pedro (Fermilab)

Session Classification: Neutrinos

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

Signatures for New Physics in Short-Baseline Liquid Argon Neutrino Experiments

Monday, 27 March 2023 16:30 (25 minutes)

Summary

Presenters: PALAMARA, Ornella (Fermilab); PALAMARA, Ornella (Fermilab)

Session Classification: Neutrinos

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

Machine Learning for Neutrinos

Monday, 27 March 2023 10:10 (25 minutes)

Summary

Presenters: TERAO, Kazuhiro (SLAC National Accelerator Laboratory); TERAO, Kazuhiro

Session Classification: Neutrinos

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

Naturalness In Your Face

Monday, 27 March 2023 16:55 (25 minutes)

Summary

Presenter: KOREN, Seth (University of Chicago)

Session Classification: LHC 1

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

BSM searches at CMS

Monday, 27 March 2023 17:20 (25 minutes)

Summary

Presenter: STROBBE, Nadja (University of Minnesota)

Session Classification: LHC 1

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

BSM searches at ATLAS

Wednesday, 29 March 2023 11:00 (25 minutes)

Summary

Presenter: ALPIGIANI, Cristiano (University of Washington, Seattle)

Session Classification: LHC 1

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

Dark Matter Misalignment Through the Higgs Portal

Monday, 27 March 2023 18:15 (25 minutes)

Summary

Presenters: BATELL, Brian (CERN); BATELL, Brian (Perimeter Institute); BATELL, Brian (University of Pittsburgh)

Session Classification: Dark Sectors 1

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

FASER and the FPF

Monday, 27 March 2023 18:40 (25 minutes)

Summary

Presenter: FENG, Jonathan (UC Irvine)

Session Classification: Dark Sectors 1

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

Higgs at ATLAS and CMS

Thursday, 30 March 2023 10:10 (25 minutes)

Summary

Presenters: KONIGSBERG, Jacobo (University of Florida); KONIGSBERG, jacobo (univ of florida)

Session Classification: LHC 2 + Machine Learning 2

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

Public Lecture: Casting a Wide Net for Dark Matter

Wednesday, 29 March 2023 17:30 (1 hour)

Summary

Presenter: TAIT, Tim (UC Irvine)

Session Classification: Public Lecture

Contribution ID: **15** Type: **not specified**

Uncertainties in the era of ML

Tuesday, 28 March 2023 09:45 (25 minutes)

Summary

Presenter: GHOSH, Aishik

Session Classification: Machine Learning 1

Contribution ID: **16** Type: **not specified**

Machine Learning for Event Generation and Fast Simulation

Tuesday, 28 March 2023 10:10 (25 minutes)

LHC run 3 has just started and in the years leading up to 2040, we will see a 20-fold increase in available data. This forthcoming dataset will have enormous potential for a deeper understanding of the Standard Model and possible physics beyond it. At the same time, the endless possibilities of new physics hiding in this dataset pose a challenge, both for our analyses and also our simulation algorithms.
Modern machine learning has become a standard tool in our numerical tool box. In recent years, we have not only seen applications to boost the performance of existing algorithms, but also new analysis or simulation strategies. I will highlight how advancements in modern Machine Learning, especially using invertible networks also known as normalizing flows, help speed up crucial bottlenecks in event generation and detector simulation.

Summary

Presenter: KRAUSE, Claudius (ITP Heidelberg)

Session Classification: Machine Learning 1

Contribution ID: **17** Type: **not specified**

Anomaly Detection

Tuesday, 28 March 2023 10:35 (25 minutes)

Summary

Presenter: MIKUNI, Vinicius Massami (Universitaet Zuerich (CH))

Session Classification: Machine Learning 1

Contribution ID: **18** Type: **not specified**

Dark Photons

Thursday, 30 March 2023 17:50 (25 minutes)

Summary

Presenter: LIU, Zhen (University of Minnesota)

Session Classification: Dark Sectors 3

Contribution ID: **19** Type: **not specified**

Darkquest

Tuesday, 28 March 2023 08:25 (25 minutes)

Summary

Presenter: FENG, Yongbin (Fermilab)

Session Classification: Dark Sectors 2

Contribution ID: **24** Type: **not specified**

Cosmological Considerations for Dark Sectors with Light Mediators

Thursday, 30 March 2023 16:30 (25 minutes)

Summary

Presenter: SHELTON, Julia (Jessie) (UIUC)

Session Classification: Cosmology

Contribution ID: **25** Type: **not specified**

Particle physics models that predict dark matter in the form of primordial black holes

Thursday, 30 March 2023 16:55 (25 minutes)

Primordial black hole is a dark matter candidate in a variety of existing models of physics beyond the standard model, including supersymmetry models and models with asymmetric dark matter. I will review the formation of black holes in such scenarios, as well as the effects of predicted PBHs on astrophysics and cosmology.

Summary

Presenter: KUSENKO, Alexander (UCLA)

Session Classification: Cosmology

Contribution ID: **27** Type: **not specified**

Astrophysical searches for particle dark matter using neural simulation-based inference

Wednesday, 29 March 2023 10:10 (25 minutes)

The complexity of astrophysical data and presence of unknowable systematics poses significant challenges to robustly characterizing signatures of dark matter in many datasets using conventional methods. I will describe how overcoming these challenges will require a qualitative shift in our approach to statistical inference, bringing together several recent advances in probabilistic machine learning, differentiable programming, and simulation-based inference. I will showcase applications of these methods to the analysis of Fermi gamma-ray data, with implications for the Galactic Center Excess, and the analysis of stellar kinematics of stars bound to dwarf galaxies, aiming to uncover the latent dark matter density profiles with implications for the nature of self-interactions in the dark sector.

Summary

Presenter: MISHRA SHARMA, Siddharth (New York University)

Session Classification: Dark Matter Indirect Detection

Contribution ID: **28** Type: **not specified**

Indirect Detection

Wednesday, 29 March 2023 09:45 (25 minutes)

Summary

Presenter: LEANE, Rebecca (SLAC)

Session Classification: Dark Matter Indirect Detection

Contribution ID: **29** Type: **not specified**

Machine Learning for Particle Astrophysics

Wednesday, 29 March 2023 10:35 (25 minutes)

Summary

Presenter: BUCKLEY, Matthew (Fermilab)

Session Classification: Dark Matter Indirect Detection

Contribution ID: **30** Type: **not specified**

Kaon Theory

Thursday, 30 March 2023 08:00 (25 minutes)

Summary

Presenter: ZUPAN, Jure (U. Cincinnati)

Session Classification: Kaons

Contribution ID: **31** Type: **not specified**

NA62

Thursday, 30 March 2023 08:25 (25 minutes)

Summary

Presenter: BIINO, Cristina (CERN)

Session Classification: Kaons

Contribution ID: **32** Type: **not specified**

KOTO

Thursday, 30 March 2023 08:50 (25 minutes)

Summary

Presenter: WAH, Yau (University of Chicago)

Session Classification: Kaons

Contribution ID: **33** Type: **not specified**

Higgs Theory

Thursday, 30 March 2023 09:45 (25 minutes)

Summary

Presenters: WAGNER, Carlos (Argonne National Laboratory); WAGNER, Carlos (University of Chicago and Argonne National Laboratory); WAGNER, Carlos (ANL and University of Chicago)

Session Classification: LHC 2 + Machine Learning 2

Contribution ID: **35** Type: **not specified**

Machine Learning at CMS

Thursday, 30 March 2023 10:35 (25 minutes)

Summary

Presenters: NGADIUBA, Jennifer (FNAL); NGADIUBA, Jennifer (Caltech)

Session Classification: LHC 2 + Machine Learning 2

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

Five predictions for the next five years

Wednesday, 29 March 2023 08:00 (25 minutes)

Summary

Presenter: SORENSEN, Peter (LBL)

Session Classification: Dark Matter Direct Detection

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

Sensors for DM Detection at the meV Scale

Wednesday, 29 March 2023 08:25 (25 minutes)

Summary

Presenter: KURINSKY, Noah

Session Classification: Dark Matter Direct Detection

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

Seeing the invisible: the search for low-mass axion dark matter

Wednesday, 29 March 2023 08:50 (25 minutes)

Summary

Presenters: SALEMI, Chiara (MIT); SALEMI, Chiara (UNC Chapel Hill)

Session Classification: Dark Matter Direct Detection

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

Dark Sector Theory

Tuesday, 28 March 2023 08:00 (25 minutes)

Summary

Presenter: POSPELOV, Maxim (University of Minnesota)

Session Classification: Dark Sectors 2

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

Dark Sectors at Belle II

Thursday, 30 March 2023 18:15 (25 minutes)

Summary

Presenter: TORASSA, Ezio

Session Classification: Dark Sectors 3

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

Dark Sectors at LHCb

Thursday, 30 March 2023 18:40 (25 minutes)

Summary

Presenter: DELANEY, Blaise (Cambridge)

Session Classification: Dark Sectors 3

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

Heavy Flavors at Belle II: Prospecting for New Physics with b & c quarks and tau leptons

Friday, 31 March 2023 08:00 (25 minutes)

Summary

Presenter: RONEY, Michael (University of Victoria)

Session Classification: Heavy Flavor Physics 2

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

Long-Lived Particles Decaying to the Third Generation (and a far-future look)

Friday, 31 March 2023 09:45 (25 minutes)

Summary

Presenter: FARRINGTON, Sinead

Session Classification: LHC 3 + Snowmass

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

Machine Learning at LHCb

Friday, 31 March 2023 08:25 (25 minutes)

Summary

Presenter: NOLTE, Niklas (MIT)

Session Classification: Heavy Flavor Physics 2

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

Top Partners via Chromomagnetic Coupling at LHC

Friday, 31 March 2023 10:35 (25 minutes)

Summary

Presenter: SIMMONS, Elizabeth (University of California, San Diego)

Session Classification: LHC 3 + Snowmass

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

Pythia

Friday, 31 March 2023 10:10 (25 minutes)

Summary

Presenters: SKANDS, Peter (Monash University); SKANDS, Peter Skands (Fermilab)

Session Classification: LHC 3 + Snowmass

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

LDMX

Tuesday, 28 March 2023 08:50 (25 minutes)

Summary

Presenter: MANTILLA SUAREZ, Cristina Ana (FNAL)

Session Classification: Dark Sectors 2

Contribution ID: **61** Type: **not specified**

Neutrinos at the LHC

Monday, 27 March 2023 10:35 (25 minutes)

Presenters: HAN, Tao (University of Wisconsin); HAN, Tao (University of Pittsburgh)

Session Classification: Neutrinos

Contribution ID: **62** Type: **not specified**

Machine Learning for Triggering

Tuesday, 28 March 2023 11:00 (25 minutes)

Presenter: DUARTE, Javier (University of California San Diego)

Session Classification: Machine Learning 1

Contribution ID: **63** Type: **not specified**

ALP theory

Tuesday, 28 March 2023 16:30 (25 minutes)

Presenter: DROR, Jeff (UC Santa Cruz)

Session Classification: Axion Like Particles

Contribution ID: **64** Type: **not specified**

Hybrid Cosmological Collider of Axion

Tuesday, 28 March 2023 16:55 (25 minutes)

If a light axion is present during inflation and becomes part of dark matter afterwards, its quantum fluctuations contribute to dark matter isocurvature. In this article, we introduce a whole new suite of cosmological observables for axion isocurvature, which could help test the presence of axions, as well as its coupling to the inflaton and other heavy spectator fields during inflation such as the radial mode of the Peccei-Quinn field. They include correlated clock signals in the curvature and isocurvature spectra, and mixed cosmological-collider non-Gaussianities involving both curvature and isocurvature fluctuations with shapes and running unconstrained by the current data. Taking into account of the existing strong constraints on axion isocurvature fluctuations from the CMB, these novel signals could still be sizable and potentially observable. In some models, the signals, if observed, could even help us significantly narrow down the range of the inflationary Hubble scale, a crucial parameter difficult to be determined in general, independent of the tensor mode.

Presenter: LI, Lingfeng (Brown U.)

Session Classification: Axion Like Particles

Contribution ID: **65** Type: **not specified**

ADMX

Tuesday, 28 March 2023 17:20 (25 minutes)

Presenters: DU, Nick (Lawrence Livermore National Labs); DU, Nick (University of Washington)

Session Classification: Axion Like Particles

Contribution ID: **66** Type: **not specified**

Heavy Flavors at LHCb

Tuesday, 28 March 2023 18:15 (25 minutes)

Presenter: COUTINHO, Rafael Silva (Syracuse University)

Session Classification: Heavy Flavor Physics 1

Contribution ID: **67** Type: **not specified**

Heavy Flavors at ATLAS and CMS

Tuesday, 28 March 2023 18:40 (25 minutes)

Presenter: ONYISI, Peter (University of Texas at Austin)

Session Classification: Heavy Flavor Physics 1

Contribution ID: **68** Type: **not specified**

Heavy Flavors Theory

Tuesday, 28 March 2023 19:05 (25 minutes)

Presenter: FAROUGHY, Darius (Rutgers University)

Session Classification: Heavy Flavor Physics 1

Contribution ID: **70** Type: **not specified**

Machine Learning at ATLAS

Thursday, 30 March 2023 11:00 (25 minutes)

Presenter: WHITESON, Daniel (UC Irvine)

Session Classification: LHC 2 + Machine Learning 2

Contribution ID: **71** Type: **not specified**

Precision Theory for Heavy Flavor Physics

Friday, 31 March 2023 08:50 (25 minutes)

Presenter: MISIAK, Mikolaj

Session Classification: Heavy Flavor Physics 2

Contribution ID: **72** Type: **not specified**

Snowmass Summary: The Road Ahead

Friday, 31 March 2023 11:00 (25 minutes)

Summary

Presenter: CHIVUKULA, R. Sekhar (UC San Diego)

Session Classification: LHC 3 + Snowmass

Contribution ID: **73** Type: **not specified**

Spacetime fluctuations in quantum gravity and the experiment GQuEST

Monday, 27 March 2023 19:05 (25 minutes)

Presenter: ZUREK, Kathryn (Berkeley Lab)

Session Classification: Dark Sectors 1

Contribution ID: **74** Type: **not specified**

Poster: Manifesting hidden dynamics of a sub-component dark matter

Thursday, 30 March 2023 19:05 (5 minutes)

Summary

Presenter: SHIN, Seodong (Jeonbuk National University)

Session Classification: Poster Session

Contribution ID: **75** Type: **not specified**

Poster: A Cookbook of Flavorful Modifications to the Froggatt-Nielsen Mechanism

Thursday, 30 March 2023 19:10 (5 minutes)

Summary

Presenter: FRASER, Katie (Harvard)

Session Classification: Poster Session

Contribution ID: **76** Type: **not specified**

Composite states in the Standard Model and beyond

Thursday, 30 March 2023 19:15 (5 minutes)

Summary

Co-authors: DOBRESCU, Bogdan (Fermilab); WAGMAN, Michael (Fermilab)

Presenter: ASSI, Benoit (Fermilab)

Session Classification: Poster Session

Contribution ID: **77** Type: **not specified**

Poster

Thursday, 30 March 2023 19:20 (5 minutes)

Presenter: SZEWC, Manuel (University of Cincinnati)

Session Classification: Poster Session

Contribution ID: **78** Type: **not specified**

Poster

Thursday, 30 March 2023 19:25 (5 minutes)

Presenter: BERNREUTHER, Elias (Fermilab)

Session Classification: Poster Session

Contribution ID: **79** Type: **not specified**

Opening Remarks

Monday, 27 March 2023 08:00 (10 minutes)

Session Classification: Muon g-2

Contribution ID: **80** Type: **not specified**

Poster: milliQan - A search for milli-charged particles at the LHC Run3

Thursday, 30 March 2023 19:30 (5 minutes)

Presenter: HAAS, Andrew (NYU)

Session Classification: Poster Session

Contribution ID: **81** Type: **not specified**

Poster

Thursday, 30 March 2023 19:35 (5 minutes)

Presenter: BAHL, Henning

Session Classification: Poster Session