

# Brookhaven Forum 2025: Launching the Second Century of Quantum Physics



## Report of Contributions

Contribution ID: 1

Type: **not specified**

# Physics Opportunities at Future Colliders

*Wednesday 22 October 2025 09:10 (40 minutes)*

**Presenter:** DIPETRILLO, Karri (University of Chicago)

**Session Classification:** Plenary

Contribution ID: 2

Type: **not specified**

# Searching for New Physics at the Electron-Ion Collider

*Wednesday 22 October 2025 09:50 (40 minutes)*

**Presenter:** BATELL, Brian (Chicago)

**Session Classification:** Plenary

Contribution ID: 3

Type: **not specified**

## Novel Directions in Dark Matter Direct Detection

*Thursday 23 October 2025 09:00 (40 minutes)*

**Presenter:** BLANCO, Carlos

**Session Classification:** Plenary

Contribution ID: 4

Type: **not specified**

## Origin of Ultrahigh Energy Cosmic Rays in Binary Neutron Star Mergers, and the Fascinating Physics it Entails (remote)

*Thursday 23 October 2025 10:50 (40 minutes)*

I will briefly review the observations of UHECRs, emphasizing what is robust and what remains uncertain and explain why a key piece of data strongly suggests that UHECRs are produced in BNS mergers. Then, I will discuss the likely acceleration mechanism and locus and explain how the spectral cutoff is determined; the no-free-parameter prediction of the cutoff energy for different nuclei agrees well with observations. Unique predictions which can be confirmed within a decade or so, are that neutrinos above a PeV are preceded by a co-directional gravitational wave arriving about a day earlier, and that the highest energy cosmic rays originated from r-process nuclei and are heavier than iron.

[Link](#)**Presenter:** FARRAR, Glennys**Session Classification:** Plenary

Contribution ID: 5

Type: **not specified**

# **The Strong Force Could Have Heated the Universe's First Moment**

*Friday 24 October 2025 09:00 (40 minutes)*

**Presenter:** BERGHAUS, Kim

**Session Classification:** Plenary

Contribution ID: 6

Type: **not specified**

## **Theory Status of the Muon Anomalous Magnetic Moment in the Fall of 2025**

*Thursday 23 October 2025 09:40 (40 minutes)*

**Presenter:** BLUM, Thomas (University of Connecticut)

**Session Classification:** Plenary

Contribution ID: 7

Type: **not specified**

## **Open questions in Neutrino Physics and How (Not) to Answer Them**

*Friday 24 October 2025 09:40 (40 minutes)*

**Presenter:** DEV, Bhupal (University of Maryland, College Park)

**Session Classification:** Plenary



Contribution ID: 8

Type: **not specified**

## Physics of Neutrinoless Double Beta Decay (remote)

*Friday 24 October 2025 10:50 (40 minutes)*

**Presenter:** HEEGER, Karsten (Yale University)

**Session Classification:** Plenary

Contribution ID: 9

Type: **not specified**

## **Short Baseline Neutrino Experiments: What We've learned and Where We're Going**

*Friday 24 October 2025 11:30 (40 minutes)*

**Presenter:** LONERGAN, Mark Ross

**Session Classification:** Plenary

Contribution ID: **10**

Type: **not specified**

## Particle Physics Meets Quantum Information

*Wednesday 22 October 2025 11:00 (40 minutes)*

**Presenter:** LOW, Ian (Argonne/Northwestern)

**Session Classification:** Plenary

Contribution ID: 11

Type: **not specified**

## Recent BSM Results from ATLAS and CMS (remote)

*Wednesday 22 October 2025 11:40 (40 minutes)*

The Standard Model of particle physics successfully describes many known interactions, but is known to be incomplete. In this talk, recent results of searches for beyond-the-Standard-Model signatures are reported. These use up to 140 fb<sup>-1</sup> of pp collisions collected by the ATLAS and CMS experiments at  $\sqrt{s}=13$  TeV and up to 51.8 fb<sup>-1</sup> collected at  $\sqrt{s}=13.6$  TeV. Searches for compressed electroweak supersymmetry, displaced jets, and new scalar resonances will be highlighted.

[Link](#)

**Presenter:** HANK, Michael (member@upenn.edu;faculty@upenn.edu;employee@upenn.edu)

**Session Classification:** Plenary

Contribution ID: 12

Type: **not specified**

## **Recent advances in Higgs physics and the Standard Model from ATLAS and CMS**

*Thursday 23 October 2025 11:30 (40 minutes)*

**Presenter:** MANTILLA SUAREZ, Cristina Ana (FNAL)

**Session Classification:** Plenary

Contribution ID: 13

Type: **not specified**

## **Centennial Celebration: Quantum Mechanics, Quantum Field Theory, and More**

*Wednesday 22 October 2025 16:00 (1 hour)*

**Presenter:** HAN, Tao (UPittsburgh)

**Session Classification:** Lab-Wide Open Lecture

Contribution ID: **14**

Type: **not specified**

## Welcome

*Wednesday 22 October 2025 09:00 (10 minutes)*

**Presenters:** DENTON, Peter; SZAFRON, Robert (Brookhaven National Laboratory)

**Session Classification:** Plenary

Contribution ID: 15

Type: **not specified**

## Wave Dark Matter

*Thursday 23 October 2025 16:00 (1 hour)*

We will discuss the possibility that dark matter is composed of particles lighter than about 10 eV, the prime example being an axion or axion-like-particle. In this case, the dark matter galaxy halo is best thought of as a set of waves. The astrophysical consequences, and the experimental implications for axion detection, will be discussed.

**Presenter:** HUI, Lam**Session Classification:** Special Physics Colloquium



Contribution ID: 16

Type: **not specified**

# Underpinnings of CP Violation at the High-energy Frontier

*Wednesday 22 October 2025 14:00 (18 minutes)*

**Presenter:** BAR-SHALOM, Shaouly (Technion)

**Session Classification:** Parallel Talks

Contribution ID: 17

Type: **not specified**

# Learning from Higgs Decays at NLO in SMEFT

*Wednesday 22 October 2025 14:18 (18 minutes)*

**Presenter:** DEL PIO, Clara Lavinia (Brookhaven National Laboratory)

**Session Classification:** Parallel Talks

Contribution ID: **18**

Type: **not specified**

# Higgs Coupling Measurements with Polarized Diboson Processes

*Wednesday 22 October 2025 14:36 (18 minutes)*

**Presenter:** ELLIS, Spencer (Brown University)

**Session Classification:** Parallel Talks

Contribution ID: **19**

Type: **not specified**

## **The Signals of the Doomsday**

*Wednesday 22 October 2025 14:54 (18 minutes)*

**Presenter:** SENGUPTA, Amartya (SUNY Buffalo)

**Session Classification:** Parallel Talks

Contribution ID: 20

Type: **not specified**

# High-Energy Colliders as Tests of the Born Rule

*Wednesday 22 October 2025 15:12 (18 minutes)*

**Presenter:** VARMA, Mira (Yale)

**Session Classification:** Parallel Talks

Contribution ID: 21

Type: **not specified**

# Lepton Number Violating Neutrino Self-Interactions in Supernovae

*Wednesday 22 October 2025 14:00 (18 minutes)*

**Presenter:** SULIGA, Anna (University of California, Berkeley)

**Session Classification:** Parallel Talks

Contribution ID: 22

Type: **not specified**

## **Neutrino Magnetic Moment, Charge Radius and Polarizability from MeV to GeV Neutrino Interactions**

*Wednesday 22 October 2025 14:18 (18 minutes)*

**Presenter:** CAREY, Sam (Wayne State University)

**Session Classification:** Parallel Talks

Contribution ID: 23

Type: **not specified**

## **Recent Single-Photon Searches in MicroBooNE to Explain the MiniBooNE Anomaly**

*Wednesday 22 October 2025 14:36 (18 minutes)*

**Presenter:** KUMAR, Karan (Columbia University)

**Session Classification:** Parallel Talks



Contribution ID: 24

Type: **not specified**

## **Status of the Short-Baseline Near Detector at Fermilab**

*Wednesday 22 October 2025 14:54 (18 minutes)*

**Presenter:** TUNG, Lynn (lynnt@fnal.gov)

**Session Classification:** Parallel Talks

Contribution ID: 25

Type: **not specified**

## **Searches for physics beyond the Standard Model with the Short-Baseline Near Detector**

*Wednesday 22 October 2025 15:12 (18 minutes)*

**Presenter:** NGUYEN, Vu Chi Lan (UCSB)

**Session Classification:** Parallel Talks

Contribution ID: 26

Type: **not specified**

## **Colliding light to measure tau g-2 and unveil quantum imprints of new physics**

*Thursday 23 October 2025 13:40 (18 minutes)*

**Presenter:** LIU, Jesse (NYU)

**Session Classification:** Parallel Talks

Contribution ID: 27

Type: **not specified**

# Triggering on Long-Lived Particles in the Upgraded ATLAS Detector

*Thursday 23 October 2025 13:58 (18 minutes)*

**Presenter:** CARROLL, Anthony Maurel (University of Oregon)

**Session Classification:** Parallel Talks

Contribution ID: 28

Type: **not specified**

## **Search and Prospects for Non-Resonant Higgs Boson Pair Production in the $b\bar{b} t\bar{t}$ Final State in the ATLAS Experiment**

*Thursday 23 October 2025 14:16 (18 minutes)*

**Presenter:** FUJIMOTO, Minori (SBU)

**Session Classification:** Parallel Talks

Contribution ID: 29

Type: **not specified**

## **Dark Higgs-strahlung at Belle II from displaced vertices and missing energy**

*Thursday 23 October 2025 14:34 (18 minutes)*

**Presenter:** ACANFORA, Francesca (UMass Amherst)

**Session Classification:** Parallel Talks

Contribution ID: 30

Type: **not specified**

## Synaptic Field Theory

*Thursday 23 October 2025 14:52 (18 minutes)*

**Presenter:** YI, Jaeok (KAIST)

**Session Classification:** Parallel Talks

Contribution ID: 31

Type: **not specified**

# Reducing Autocorrelation Times in HMC Simulation

*Thursday 23 October 2025 15:10 (18 minutes)*

**Presenter:** YAMAMOTO, Shuhei

**Session Classification:** Parallel Talks



Contribution ID: 32

Type: **not specified**

## Lattice calculation of $K \rightarrow \pi\pi$ decay

*Thursday 23 October 2025 13:40 (18 minutes)*

**Presenter:** TOMII, Masaaki (Columbia University)

**Session Classification:** Parallel Talks

Contribution ID: 33

Type: **not specified**

## **Light Dark Matter Search with NV Centers: Electron Spin, Nuclear Spin, and Comagnetometry**

*Thursday 23 October 2025 13:58 (18 minutes)*

**Presenter:** CHIGUSA, So (MIT)

**Session Classification:** Parallel Talks

Contribution ID: 34

Type: **not specified**

## **Spin-Dependent Scattering of Sub-GeV Dark Matter: Models and Constraints**

*Thursday 23 October 2025 14:16 (18 minutes)*

**Presenter:** MUNBODH, Pankaj (UCSC)

**Session Classification:** Parallel Talks

Contribution ID: 35

Type: **not specified**

## **Dark plasmas in the nonlinear regime: constraints from particle-in-cell simulations**

*Thursday 23 October 2025 14:34 (18 minutes)*

**Presenter:** GIFFIN, Pierce (UCSC)

**Session Classification:** Parallel Talks

Contribution ID: 36

Type: **not specified**

# Ultra-Strongly Self-Interacting Dark Matter: Cosmological Consequences and Observations

*Thursday 23 October 2025 14:52 (18 minutes)*

**Presenter:** ROBERTS, M. Grant (UCSC)

**Session Classification:** Parallel Talks

Contribution ID: 37

Type: **not specified**

## Searching for New Physics with DarkLight

**Presenter:** CLINE, Ethan (Stony Brook University)

**Session Classification:** Parallel Talks