

# **Digital Twins for Nuclear and Particle physics - NPTwins 2024**

## **Report of Contributions**

Contribution ID: 1

Type: **not specified**

## Final discussion and wrap up

*Wednesday, 18 December 2024 14:30 (1 hour)*

Contribution ID: 2

Type: **not specified**

## Intro

*Monday, 16 December 2024 11:00 (15 minutes)*

**Presenters:** BATTAGLIERI, Marco (Istituto Nazionale di Fisica Nucleare); DI BELLO, Francesco Armando (University of Geneva); Dr PILLONI, Alessandro (UniME & CT); SCHIAVI, Carlo (Istituto Nazionale di Fisica Nucleare); Dr TORRE, Riccardo (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 3

Type: **not specified**

## Hadron spectroscopy theory and AI

*Monday, 16 December 2024 11:15 (30 minutes)*

**Presenter:** FOX, Geoffrey (University of Virginia)

**Session Classification:** Talks

Contribution ID: 4

Type: **not specified**

## Physics constrained GAN for amplitude extraction

*Monday, 16 December 2024 11:45 (30 minutes)*

**Presenter:** MONTANA, Gloria (Jefferson Lab)

**Session Classification:** Talks

Contribution ID: 5

Type: **not specified**

## **Point cloud-based diffusion models for the Electron-Ion Collider**

*Monday, 16 December 2024 12:15 (30 minutes)*

**Presenter:** SATO, Nobuo (Jefferson Lab)

**Session Classification:** Talks

Contribution ID: 6

Type: **not specified**

## **Machine Learning for Hadron Spectroscopy**

*Monday, 16 December 2024 14:40 (30 minutes)*

**Presenter:** FERNANDEZ-RAMIREZ, Cesar (UNED)

**Session Classification:** Talks

Contribution ID: 7

Type: **not specified**

## **AI for hadron spectroscopy phenomenology**

**Presenter:** BIBRZYCKI, Łukasz (AGH University of Krakow)

**Session Classification:** Talks



Contribution ID: 8

Type: **not specified**

# Simulating the LHCb experiment with Machine Learning

*Monday, 16 December 2024 15:10 (30 minutes)*

**Presenter:** ANDERLINI, Lucio (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 9

Type: **not specified**

## **Training with Real Rata: Signal Extraction via Density Ratios**

*Monday, 16 December 2024 15:40 (30 minutes)*

**Presenter:** GLAZIER, Derek Ian

**Session Classification:** Talks

Contribution ID: **10**

Type: **not specified**

## **Anomaly detection for BSM using AI/ML**

*Monday, 16 December 2024 16:40 (30 minutes)*

**Presenter:** MORAN, Patrick (The College of William & Mary)

**Session Classification:** Talks

Contribution ID: 11

Type: **not specified**

## **AI in ICSC/terabit**

*Monday, 16 December 2024 17:10 (30 minutes)*

**Presenter:** ANDERLINI, Lucio (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 12

Type: **not specified**

## Fast simulation with ATLAS

*Tuesday, 17 December 2024 09:00 (30 minutes)*

**Presenter:** CORCHIA, Federico Andrea Guillaume (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 13

Type: **not specified**

## Identification of HF jets/tau

*Tuesday, 17 December 2024 10:00 (30 minutes)*

**Presenter:** D'ANNIBALLE, Gabriele (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 14

Type: **not specified**

## **Global particle flow reconstruction**

*Tuesday, 17 December 2024 09:30 (30 minutes)*

**Presenter:** DREYER, Etienne (Weizmann Institute of Science)

**Session Classification:** Talks

Contribution ID: 15

Type: **not specified**

## **Charmed-hadron rec in ALICE using AI/ML**

*Tuesday, 17 December 2024 11:00 (30 minutes)*

**Presenter:** CAMERLINGO, Maria Teresa (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks



Contribution ID: 16

Type: **not specified**

# Unfolding Particle Detector Effects in HEP with Generative AI

*Tuesday, 17 December 2024 11:30 (30 minutes)*

**Presenter:** LI, Yaohang (Old Dominion University)

**Session Classification:** Talks

Contribution ID: 17

Type: **not specified**

## **Data smearing and acceptance correction using AI**

*Tuesday, 17 December 2024 12:00 (30 minutes)*

**Presenter:** VITTORINI, Tommaso (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 18

Type: **not specified**

## **Simulation based inference at the LHC**

*Tuesday, 17 December 2024 14:30 (30 minutes)*

**Presenter:** SANDESARA, Jay (University of Wisconsin Madison)

**Session Classification:** Talks

Contribution ID: 19

Type: **not specified**

## **Plug the physics into the AI: inductive bias, and the case of enforcing symmetries in neural networks**

*Tuesday, 17 December 2024 15:00 (30 minutes)*

**Presenter:** VISCHIA, Pietro (Universidad de Oviedo and Instituto de Ciencias y Tecnologías Espaciales de Asturias (ICTEA))

**Session Classification:** Talks

Contribution ID: 20

Type: **not specified**

## AI for Experiment Optimization

*Tuesday, 17 December 2024 15:30 (30 minutes)*

**Presenter:** DORIGO, Tommaso (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 21

Type: **not specified**

## Quantum computing applications for HEP

*Monday, 16 December 2024 17:40 (30 minutes)*

**Presenter:** ZULIANI, Davide (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 22

Type: **not specified**

## AI for real time data-reduction

*Tuesday, 17 December 2024 16:30 (30 minutes)*

**Presenter:** ROSSI, Fabio (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 23

Type: **not specified**

## **AI for low-level data reconstruction**

*Tuesday, 17 December 2024 17:00 (30 minutes)*

**Presenters:** DE VITA, Raffaella; DE VITA, Raffaella (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks



Contribution ID: 24

Type: **not specified**

## **The Italian center for HPC (ICSC)**

*Wednesday, 18 December 2024 09:00 (30 minutes)*

**Presenter:** SALOMONI, Davide (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 25

Type: **not specified**

## **Determining parton distribution functions accurately and precisely with Machine Learning**

*Wednesday, 18 December 2024 09:30 (30 minutes)*

**Presenter:** NOCERA, Emanuele Roberto (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks

Contribution ID: 26

Type: **not specified**

## **Kernel Methods**

*Wednesday, 18 December 2024 10:00 (30 minutes)*

**Presenter:** ROSASCO, Lorenzo (Università di Genova)

**Session Classification:** Talks

Contribution ID: 27

Type: **not specified**

## Reinforcement learning

*Wednesday, 18 December 2024 11:00 (30 minutes)*

**Presenter:** SEMINARA, Agnese

**Session Classification:** Talks

Contribution ID: 28

Type: **not specified**

## **Recent developments in zero-th order optimization algorithms**

*Wednesday, 18 December 2024 11:30 (30 minutes)*

**Presenter:** RANDO, Marco (Università di Genova)

**Session Classification:** Talks

Contribution ID: 29

Type: **not specified**

## **The NPLM method: ML for signal-agnostic searches and beyond**

*Wednesday, 18 December 2024 12:00 (30 minutes)*

**Presenter:** LETIZIA, Marco (Università di Genova)

**Session Classification:** Talks

Contribution ID: **30**

Type: **not specified**

## **Greetings from the Director**

*Monday, 16 December 2024 14:30 (10 minutes)*

**Presenter:** TAIUTI, Mauro Gino (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Talks