

# **First MODE Workshop on Differentiable Programming**

## **Report of Contributions**

Contribution ID: 1

Type: **not specified**

# Opening Lecture: Differentiable programming and design optimization

*Monday, September 6, 2021 1:55 PM (45 minutes)*

**Presenter:** BAYDIN, Atılım Güneş (University of Oxford)

**Session Classification:** Opening and Keynote Lectures

Contribution ID: 2

Type: **not specified**

# **Keynote Lecture: Generalization Properties of Deep Neural Networks Through The Prism of Interpolation**

*Monday, September 6, 2021 3:55 PM (50 minutes)*

**Presenter:** Prof. BELKIN, Mikhail (Halicioğlu Data Science Institute, UCSD)

**Session Classification:** Opening and Keynote Lectures

Contribution ID: 3

Type: **not specified**

## **Keynote Lecture: JAX for scientific computing**

*Monday, September 6, 2021 2:55 PM (50 minutes)*

**Presenter:** Dr PASZKE, Adam (Google Brain)

**Session Classification:** Opening and Keynote Lectures

Contribution ID: 4

Type: **not specified**

## **Machine Learning application to volcano eruption forecasting using muography**

*Monday, September 6, 2021 5:25 PM (20 minutes)*

**Presenter:** OLAH, Laszlo (Hungarian Academy of Sciences (HU))

**Session Classification:** Applications in Muon Tomography

Contribution ID: 5

Type: **not specified**

## **Role of AI in the industrial applications of muon tomography**

*Monday, September 6, 2021 5:50 PM (20 minutes)*

**Presenter:** MARTINEZ RUIZ DEL ARBOL, Pablo (Universidad de Cantabria and CSIC (ES))

**Session Classification:** Applications in Muon Tomography

Contribution ID: 6

Type: **not specified**

## **Material identification in nuclear waste drums using muon scattering tomography and multivariate analysis**

*Monday, September 6, 2021 6:15 PM (20 minutes)*

**Presenter:** STOWELL, Patrick (University of Sheffield)

**Session Classification:** Applications in Muon Tomography

Contribution ID: 7

Type: **not specified**

# TomOpt: PyTorch-based Differential Muon Tomography Optimisation

*Monday, September 6, 2021 6:40 PM (30 minutes)*

**Presenter:** STRONG, Giles Chatham (Universita e INFN, Padova (IT))

**Session Classification:** Applications in Muon Tomography



Contribution ID: 8

Type: **not specified**

## Optimization of LHCb calorimeter

*Tuesday, September 7, 2021 9:00 AM (20 minutes)*

**Presenter:** BOLDYREV, Alexey (NRU Higher School of Economics (Moscow, Russia))

**Session Classification:** Applications in Particle Physics

Contribution ID: 9

Type: **not specified**

## **Generation of Calorimeter Showers with Normalizing Flows: CaloFlow**

*Tuesday, September 7, 2021 10:40 AM (20 minutes)*

**Presenter:** KRAUSE, Claudius (Rutgers University)

**Session Classification:** Applications in Particle Physics

Contribution ID: **10**

Type: **not specified**

## **Optimization of HEP accelerators**

*Tuesday, September 7, 2021 10:15 AM (20 minutes)*

**Presenter:** LINS COTT EDELEN, Auralee

**Session Classification:** Applications in Particle Physics

Contribution ID: **11**

Type: **not specified**

## **CMS Open data application of INFERNO**

*Tuesday, September 7, 2021 9:25 AM (20 minutes)*

**Presenter:** LAYER, Lukas (Universita e INFN, Padova (IT))

**Session Classification:** Applications in Particle Physics

Contribution ID: 12

Type: **not specified**

# Automatic Differentiation for error analysis in lattice QCD

*Tuesday, September 7, 2021 9:50 AM (20 minutes)*

**Presenter:** RAMOS MARTINEZ, Alberto (Univ. of Valencia and CSIC (ES))

**Session Classification:** Applications in Particle Physics

Contribution ID: 13

Type: **not specified**

# Quantum Machine Learning

**Presenter:** CHANG, Su Yeon (EPFL - Ecole Polytechnique Federale Lausanne (CH))

**Session Classification:** Applications in Particle Physics

Contribution ID: 14

Type: **not specified**

# DNN for distortion fluctuation calibration of ALICE TPC

*Tuesday, September 7, 2021 11:35 AM (20 minutes)*

**Presenter:** KABUS, Maja (Warsaw University of Technology (PL))

**Session Classification:** Applications in Nuclear Physics

Contribution ID: 15

Type: **not specified**

## **Neural networks for jet-energy subtraction in heavy-ion collisions**

*Tuesday, September 7, 2021 12:00 PM (20 minutes)*

**Presenter:** HAVENER, Laura Brittany (Yale University (US))

**Session Classification:** Applications in Nuclear Physics



Contribution ID: 16

Type: **not specified**

# In-medium heavy-quark interaction via deep learning

*Tuesday, September 7, 2021 1:15 PM (20 minutes)*

**Presenter:** SHI, Shuzhe (McGill University)

**Session Classification:** Applications in Nuclear Physics

Contribution ID: 17

Type: **not specified**

## **Machine Learning Applications for CBM at FAIR**

*Tuesday, September 7, 2021 12:50 PM (20 minutes)*

**Presenter:** KHAN, Shahid (University of Tuebingen)

**Session Classification:** Applications in Nuclear Physics

Contribution ID: 18

Type: **not specified**

## **Deep learning stochastic processes with QCD phase transition**

*Tuesday, September 7, 2021 12:25 PM (20 minutes)*

**Presenter:** WANG, Lingxiao (Frankfurt Institute for Advanced Studies)

**Session Classification:** Applications in Nuclear Physics

Contribution ID: **19**

Type: **not specified**

## **Cosmology in the machine learning era**

*Tuesday, September 7, 2021 2:30 PM (20 minutes)*

**Presenter:** VILLAESCUSA-NAVARRO, Francisco (OATS-INAf)

**Session Classification:** Applications in AstroHEP

Contribution ID: 20

Type: **not specified**

## Gravitational Waves Detectors

*Tuesday, September 7, 2021 2:55 PM (20 minutes)*

**Presenter:** Dr BAWAJ, Mateusz (Università degli Studi di Perugia)

**Session Classification:** Applications in AstroHEP

Contribution ID: 21

Type: **not specified**

# Optimization of Optical and Radio Detectors for high-energy Neutrinos

*Tuesday, September 7, 2021 3:20 PM (20 minutes)*

**Presenter:** GLASER, Christian (RWTH Aachen)

**Session Classification:** Applications in AstroHEP

Contribution ID: 22

Type: **not specified**

## **Targeted dark matter substructure inference with differentiable strong lensing**

*Tuesday, September 7, 2021 3:45 PM (20 minutes)*

**Presenter:** COOGAN, Adam (University of Amsterdam)

**Session Classification:** Applications in AstroHEP

Contribution ID: 23

Type: **not specified**

## Cherenkov Telescopes

*Tuesday, September 7, 2021 4:10 PM (20 minutes)*

**Presenter:** MAIER, Gernot

**Session Classification:** Applications in AstroHEP



Contribution ID: 24

Type: **not specified**

## **AI In Neutrinoless Double Beta Decay Searches**

*Tuesday, September 7, 2021 5:00 PM (20 minutes)*

**Presenter:** ADAMS, Corey (Argonne National Laboratory)

**Session Classification:** Applications in Neutrino Detection

Contribution ID: 25

Type: **not specified**

# Machine Learning Techniques for Water Cherenkov Event Reconstruction

*Tuesday, September 7, 2021 5:25 PM (20 minutes)*

**Presenter:** PROUSE, Nick (Queen Mary University of London)

**Session Classification:** Applications in Neutrino Detection

Contribution ID: 26

Type: **not specified**

## **Scalable, End-to-End, Deep-Learning-Based Data Reconstruction Chain for 3D Particle Imaging Detectors**

*Tuesday, September 7, 2021 5:50 PM (20 minutes)*

**Presenter:** DRIELSMA, François (Universite de Geneve (CH))

**Session Classification:** Applications in Neutrino Detection

Contribution ID: 27

Type: **not specified**

## **Dark matter and its ML-enhanced direct detection**

*Tuesday, September 7, 2021 6:15 PM (20 minutes)*

**Presenter:** TUNNELL, Christopher (Rice University)

**Session Classification:** Applications in Neutrino Detection

Contribution ID: 28

Type: **not specified**

## **P-ONE: Test Case for ML Based Detector Design**

*Tuesday, September 7, 2021 6:40 PM (20 minutes)*

**Presenter:** HAACK, Christian (III. Physikalisches Institut B, RWTH Aachen University)

**Session Classification:** Applications in Neutrino Detection

Contribution ID: 29

Type: **not specified**

## **Gradient-based probabilistic inference in Pyro.ai**

*Wednesday, September 8, 2021 2:30 PM (20 minutes)*

**Presenter:** Dr OBERMEYER, Fritz (Broad Institute)

**Session Classification:** Progress in Computer Science

Contribution ID: **30**

Type: **not specified**

## **CERN GRID on Kubernetes**

*Wednesday, September 8, 2021 4:15 PM (20 minutes)*

**Presenter:** HEINRICH, Lukas Alexander (CERN)

**Session Classification:** Progress in Computer Science

Contribution ID: **31**

Type: **not specified**

## **Efficient and modular implicit differentiation**

*Wednesday, September 8, 2021 2:55 PM (20 minutes)*

**Presenter:** Dr BLONDEL, Mathieu (Google Brain)

**Session Classification:** Progress in Computer Science



Contribution ID: 32

Type: **not specified**

## **Neos: upstream optimization for downstream inference**

*Wednesday, September 8, 2021 3:50 PM (20 minutes)*

**Presenter:** SIMPSON, Nathan Daniel (Lund University (SE))

**Session Classification:** Progress in Computer Science

Contribution ID: 33

Type: **not specified**

## Quantum Machine Learning

*Wednesday, September 8, 2021 4:40 PM (20 minutes)*

**Presenter:** CHANG, Su Yeon (EPFL - Ecole Polytechnique Federale Lausanne (CH))

**Session Classification:** Progress in Computer Science

Contribution ID: 35

Type: **not specified**

## **GENETIS: Evolving Antennas for Ultra-High Energy Neutrino Detection**

*Tuesday, September 7, 2021 7:05 PM (15 minutes)*

**Presenter:** MACHTAY, Alexander (Ohio State University)

**Session Classification:** Applications in Neutrino Detection