Argonne Mini-Workshop on Monte Carlo Methods

Report of Contributions

https://indico.fnal.gov/e/59808

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

Faster Monte Carlo via Low Discrepancy Sampling

Thursday, 18 May 2023 10:30 (1 hour)

Estimating an expectation or integral is important in high energy physics, Bayesian inference, image rendering, quantitative finance, and uncertainty quantification. Monte Carlo type methods are commonly used. The numerical error can be expressed as a product of three quantities: one measuring the deficit in the sampling scheme, a second measuring the roughness of the function defining the expectation or integral, and a third representing the confounding between that function and the sampling deficit. We explain how low discrepancy sampling, also known as the quasi-Monte Carlo method, can substantially improve the efficiency of these calculations. We discuss how to improve efficiency via transformations of the integral. Our data-driven error bounds advise the user when to stop simulating. We illustrate low discrepancy sampling via our QMCPy software library (qmcpy.org).

Presenter: Prof. HICKERNELL, Fred (Illinois Institute of Technology)

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

Parton Distributions and Inverse Problems in HEP

Thursday, 18 May 2023 08:30 (30 minutes)

Presenter: HOBBS, Timothy (Argonne National Laboratory)

Session Classification: Morning Session

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

Representative MC Sampling for PDFs

Thursday, 18 May 2023 09:00 (30 minutes)

Presenter: COURTOY, Aurore (Instituto de Física, UNAM)

Session Classification: Morning Session

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

Monte Carlo Methods and Lattice QCD

Thursday, 18 May 2023 09:30 (30 minutes)

Presenter: JIN, Xiaoyong (ANL)

Session Classification: Morning Session

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

Monte Carlo Methods and Gaussian Processes

Thursday, 18 May 2023 13:30 (30 minutes)

Presenter: Dr RAO, Vishwas (Argonne National Laboratory)

Session Classification: Afternoon Session

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

Monte Carlo for Theory and Event Generation in HEP

Thursday, 18 May 2023 14:00 (30 minutes)

Presenter: ISAACSON, Joshua (FNAL)

Session Classification: Afternoon Session

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

Variational Monte Carlo and Neural-Network Quantum States for Nuclear Simulation

Thursday, 18 May 2023 14:30 (30 minutes)

Presenter: LOVATO, Alessandro (ANL)

Session Classification: Afternoon Session

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

Monte Carlo for HEP Experiments

Thursday, 18 May 2023 15:00 (15 minutes)

Presenter: CHEKANOV, Sergei (ANL)

Session Classification: Discussion

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

Open discussion

Thursday, 18 May 2023 15:15 (45 minutes)

Presenter: Dr HOBBS, Timothy (Argonne National Laboratory)

Session Classification: Discussion