Contribution ID: **117** Type: **Poster plus Minioral**

Intelligent experiments through real-time AI: Fast Data Processing and Autonomous Detector Control for the sPHENIX and future EIC detectors

The upcoming sPHENIX experiment, scheduled to start data taking at the BNL Relativistic Heavy Ion Collider in 2023, and the future EIC experiments will employ sophisticated state-of-the-art, high-rate detectors to study high energy heavy ion and electron-ion collisions, respectively. The resulting large volumes of raw data far exceed available DAQ and data storage capacity.
To meet this challenge, we propose to develop a selective streaming readout system, comprising state-of-the-art AI-based fast data processing and autonomous detector control systems. This will allow us to effectively sample the full high energy collision events delivered by the accelerators, while maintaining the final data throughput for offline storage at a manageable level within the available DAQ bandwidth, storage and computing capacity. This project designs real-time AI-based algorithms operating on high-rate data streams, allowing identification of important rare physics events from abundant backgrounds in the sPHENIX's p+p and p+Au collisions, as well as in the future EIC experiments. We will co-design physics-aware high-speed deep neural networks that automatically perform complex tasks of collision event reconstruction and analysis, monitor and calibrate the beam interaction points, and align detectors in real-time. Demonstrating such a full system integration will be the first step in autonomous control loops of powerful online AI algorithms for large scale, complex high energy nuclear physics experiments. In this talk, we will present the latest progress of this project.

Minioral

Yes

IEEE Member

No

Are you a student?

No

Author: LIU, Ming Xiong (Los Alamos National Laboratory)

Presenter: LIU, Ming Xiong (Los Alamos National Laboratory)

Session Classification: Mini Oral - IV