Contribution ID: **23** Type: **Plenary**

Track Reconstruction using Geometric Deep Learning in the Straw Tube Tracker (STT) at the PANDA Experiment

Thursday 2 June 2022 11:30 (15 minutes)

The main purpose of the PANDA (anti-Proton ANnihilation at DArmstadt) experiment at FAIR (Facility for Anti-proton and Ion Research) is to study strong interactions at the scale where quarks form hadrons. In PANDA, a continuous beam of anti-protons ($\bar{p}$), 1.5 GeV/c to 15 GeV/c, will impinge on a fixed hydrogen (p) target inside the High Energy Storage Ring (HESR). This creates optimal conditions for various hadron physics studies, in particular for hyperon physics.

To perform a physics study at PANDA, identifying and collecting interesting physics signals with PANDA starts with efficient particle track reconstruction. The track reconstruction process strongly depends on the detector geometry and the momenta of particles. PANDA's Straw Tube Tracker (STT) will be the main component for charged track reconstruction. It has a hexagonal geometry, consisting of 4224 gas-filled tubes arranged in 26 layers and six sectors. Together with low momentum (100 MeV/c up to 1.5 GeV/c) particles, the track reconstruction becomes a considerable challenge for any reconstruction algorithm. In the low momentum region, the particle trajectories are strongly curved in the PANDA solenoid field. In my work, I investigate geometric deep learning (GDL) as a potential solution to this problem.

In GDL, the Graph Neural Networks (GNNs) are expected not only to capture the non-Euclidean nature of detector geometry but also efficiently reconstruct complex particle tracks. In the current work, the track reconstruction in STT is performed in 2D *i.e.* in (x, y) using GNNs and findings will be presented at this conference.

Consider for young scientist forum (Student or postdoc speaker)

Yes

Primary author: Mr AKRAM, Adeel (PANDA Collaboration)

Co-author: Dr JU, Xiangyang (Lawrence Berkeley National Laboratory)

Presenter: Mr AKRAM, Adeel (PANDA Collaboration)

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