Contribution ID: **181** Type: **Oral**

Machine Learning for Improved Analyses of High Resolution Gaseous Detector Data

Thursday, 9 November 2023 14:45 (15 minutes)

Advances in computer vision techniques over the past decade have enabled high performance, real-time analyses of 2D and 3D images, opening up the possibility of not only classification and regression tasks, but also more complicated tasks like object detection, key point detection, and semantic segmentation of image data. In this talk, we detail examples of machine learning techniques applied to data from micro-patterned gaseous detectors (MGPDs) for (1) improving particle identification, (2) improving low-energy angular resolution and directional head/tail performance in prototypes for the proposed CYGNUS experiment, and (3) improving signal efficiencies in the rare event search for the Migdal effect. The deep learning algorithms discussed here can, in principle, be applied to both 2D and 3D images, and are thus suitable both for gas TPCs with optical readout or charge readout.

Early Career

Yes

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Session Classification: RDC6

Track Classification: RDC Parallel Sessions: RDC6: Gaseous Detectors