

ML4FGPA

AI based real-time event filter based on physics signatures

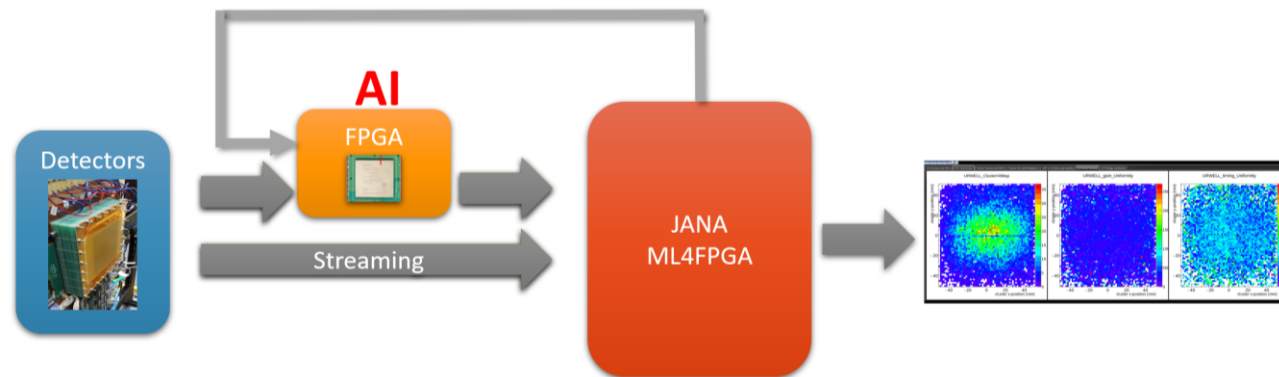
Team:

Sergey Furletov, Dmitry Romanov (speaker), Cody Dickover, Lee Belfore
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28 November 2023, AI4EIC ePIC AI Town Hall

ML4FPGA – Current status

- Funded by EIC detector R&D
- Currently have hardware and software R&D setup
- Applied different Neural Network types for different tasks
- Multiple beam tests (Jlab winter/spring 2023, Fermilab 2023)
- JANA2 plugins for communicating with FPGA (not obligatory)



Publications:

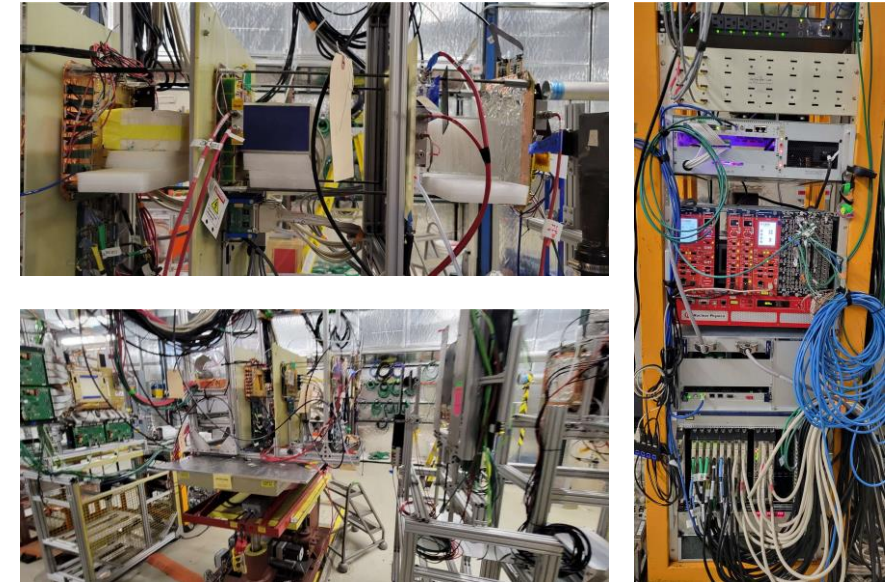
[Development of ML FPGA filter for particle identification and tracking in real time](#)

IEEE Transactions on Nuclear Science

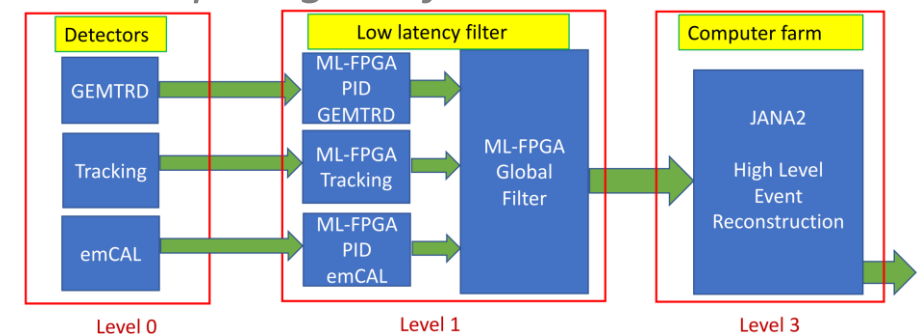
[Machine learning on FPGA for event](#)

Journal of Instrumentation 17 (06), C06009

Real data beam tests setups



Example of one of the beam test Setup diagram from 2022 at JLab



Done or ongoing AI algorithms working on FPGA

- GNN pattern recognition
- DNN/LSTM track fitting
- DNN PID estimation
- Variational autoencoders for calorimetry
- Realtime iterative clustering
- Density based clustering (evaluation in progress)
- DNN for generalized decision making

