Fast Machine Learning

- **Who**: open research collaboration of Fermilab, CERN, MIT, UC San Diego, UWashington, UIC, UIUC, Columbia + industry; more institutions tuning in; including physicists, engineers, and computer scientists
  - See fastmachinelearning.org for details on people and collaboration
- **Scope**: Real-time ML for current and future HEP experiments ([indico.cern.ch/e/fml2020])
  - Application areas: embedded systems with AI, heterogeneous computing
    - real-time AI for trigger
    - coprocessors: large-scale neutrino detectors (DUNE), sky survey experiments, etc.
- **Ideas:** Ideas to further advance ML in TDAQ
  - Develop more unsupervised techniques (beyond regression, classification) such as clustering, compression, and anomaly detection
  - Develop reinforcement learning techniques for automating operation (e.g. accelerators) and calibration (e.g. detectors)
  - Integrated ML flow across devices from frontend ASICs (see July 30 Electronics/ASICs meeting) to backend FPGAs
  - Explore cutting edge compute technologies beyond CMOS (spiking, neuromorphic, photonic, etc.)
  - Explore and benchmark new heterogeneous computing hardware to find suitable solutions for specific physics algorithms
- **Within Snowmass**: contribute to Compf03-ML solicited white papers
  - Real-time machine learning (+ Instrumentation Frontier)
  - Self-driving systems for physics: triggering and data filtering, data acquisition, and instrument calibration (+ Instrumentation Frontier)