Machine learning on and near the front end

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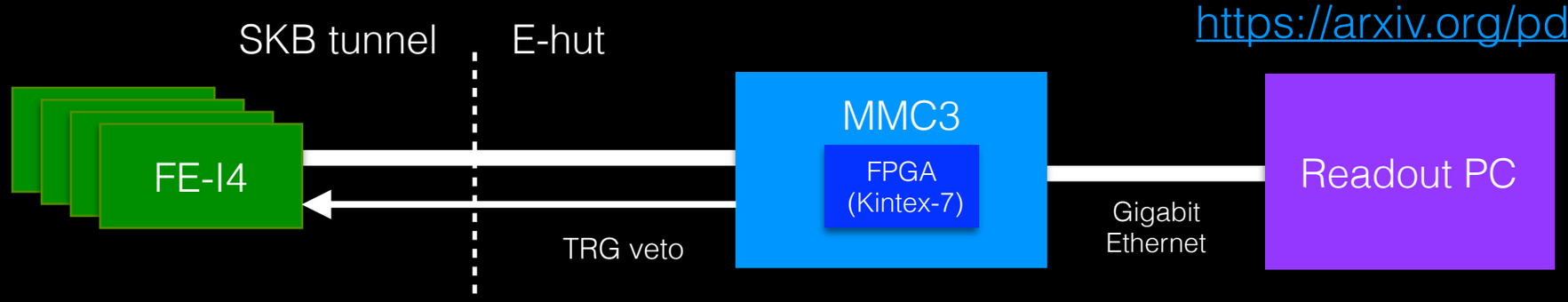
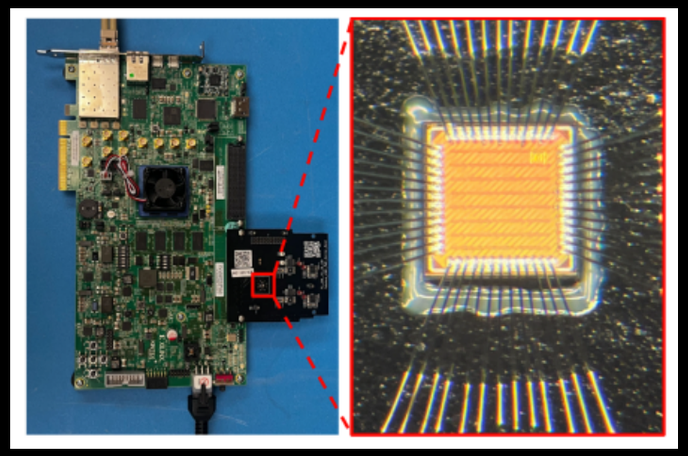
- ML on the front end has many possible applications in gaseous detectors for HEP and NP
- Example given below: gamma-ray blind directional neutron detectors
- The general approach could form a collaborative RDC6 + RDC4 + RDC5 white paper

  - The BEAST TPC detects fast neutrons by measuring the 3D ionization distribution of nuclear recoils.
  - X-rays are the dominant background and are currently filtered out at MMC3.

https://arxiv.org/pdf/1901.06657



- The plan is to implement an ML discriminator at the frontend.
- Embedded FPGA (eFPGA) under development by SLAC has the capability of running ML at the frontend. The FE-I4 chip, which is currently used, will be modified to integrate eFPGA.



https://arxiv.org/pdf/2404.17701