Parallelizing Unpacking and Clustering

• Motivation
  • CMS is evaluating the use of GPUs in the HLT for Run3
  • Including *mkFit* in HLT workflow for Run3

• Parallel Unpacker Implementation
  • Unpacking of raw data from CMS Silicon Strip with SoA format
  • Parallelizing “three threshold” clustering algorithm
  • Multi-event processing
    • OpenMP with nested parallelism in CPU
    • CUDA streams in GPU

• Performance Results
  • CPU (2x14 cores Broadwell) throughput: 400-560 (events/s)
  • GPU (P100) throughput: 546-649 (events/s)

• Next Steps
  • Integrate unpacker into CMSSW
  • *mkFit* hit producer: convert clusters to global coordinates
  • Investigate OpenCL implementation for FPGA