

Feedback from Ralf on implementing LOMV in L1Topo

Calibration

L1 jets are “anything but” calibrated

- Best available right now are jFEX jets
- Roughly scaled to offline in 3 $|\eta|$ bins
- Only really works at the threshold of the future single-jet L1 triggers
- ET(L1)/ET(offline) not constant in ET

More realistic calibrations deemed too costly in FPGA resources and/or latency

jFEX jets are in good agreement between firmware and Athena -> can be used directly for training

Timing

In Topo2+3 boards, after sorting step, only 1 BC (25 ns) left for “decision algos” (that’s what this would be)

- For implementing a small NN, may have to do some time-(de)multiplexing to keep number of DSPs down
- Nothing new but may need a couple of iterations to get implementation right
- BDTs can in principle be built to have extremely low latency, but grow fast with dimensionality of inputs
- Fisher discriminant might be somewhat simpler but questionable performance

Feedback from Ralf (cont'd)

Inputs/Outputs

At L1, (small) jets only have ET, eta and phi

- No jet masses etc
- But should be enough to detect the relevant features (back-to-back)
- Wonders if ET and phi shouldn't even be enough (though considering the poor calibration that may not be true)

Question: what run-time parameters would need to be loaded at SoR (e.g. thresholds)?

Which output bits for L1Topo->CTP?

Testing

Don't have special test vectors: for validation/debugging Ralf simply generates them from regular data

- Re-encodes L1 Objects to how they would be seen on the L1Topo realtime path in P1
- To test these one then needs the actual hardware (or spares in the lab)
- Toolchain is not very user friendly but hoped to improve in the coming months
- More practical would be to write a testbench to simulate FW in Vivado
- Also needs Athena impl. to assess rates