The ATLAS jet trigger

- In the ATLAS detector, jets are triggered using a two-level trigger system:
  - Level 1 (L1): Trigger Towers are smallest units that measure the energy deposition of penetrating particles.
  - Jet objects are defined by a sliding window algorithm that runs over all trigger towers (full calorimeter).
  - Events in L1 are triggered based on the energy in these jet objects.

- High-Level Trigger (HLT):
  - The HLT evaluates events in a more advanced procedure using the full information of the calorimeter systems.
  - The full calorimeter is read out in topological clusters in order to achieve a sufficient noise suppression.
  - For the jet reconstruction, a full anti-kt algorithm with a radius of 0.4 or 1.0 is applied on the topological clusters.

Jet trigger monitoring

- Online and offline monitoring are essential in order to guarantee and crosscheck the correct functionality of jet triggers.
- Online monitoring: simple kinematic plots provide fast information about the status of the triggers such that problems can be observed by the shifter.
- Offline monitoring: more complex kinematic and efficiency plots

Monte-Carlo based calibration

- Calibration constants are derived from Monte Carlo simulations matching particle jets to offline jets.
- In the central region of the detector and for jet $p_T > 85$ GeV, the jet energy scale of trigger jets and offline jets agrees to within 2% (left plot) and the MC-based corrections correctly reproduce the particle-level in simulation (right plot).

Data based calibration

- Relative jet energy scale calibration constants are derived by balancing central jets and forward jets within the same event.
- Good agreement of calibration constants derived from trigger and offline jets.

Jet data scouting

- The HLT is the crucial step deciding whether or not an event is fully reconstructed and saved to the physics_Main stream.
- In any case, events are also saved in the DataScouting stream in a partially reconstructed format, i.e. only jet information is stored.
- The DataScouting stream offers much larger statistics for lower-$p_T$ jets with respect to the standard physics stream.
- The calibration of trigger jets and the observed excellent energy scale agreement is a crucial step towards use of trigger jets for physics analysis.

Comparison between jets in the DataScouting and physics_Main stream (left) and the rates of the data scouting chain with the sum of the rates of all single jet triggers (right)