

Carlo VARNI¹

b-Jet Triggers

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¹ INFN e Università di Genova [Genova, IT]



b-jet Triggers

- **One of the areas where FTK will have biggest impact**
 - Challenge of b-jet Triggers:
 - Tracking critical to b-tagging / Costly in terms of CPU/ time
 - Need to be in position to take full advantage with FTK
- **ATLAS Phase-2 Upgrade**
 - Hardware Track Trigger (HTT)

b-jet trigger code is being re-designed for AthenaMT.
This is the time for new ideas !

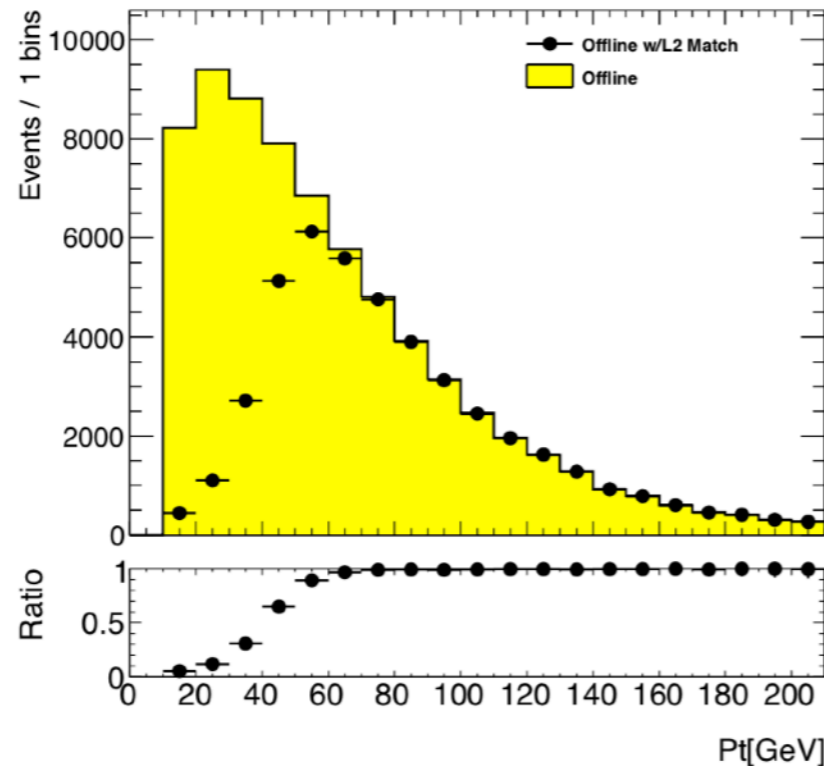
b-jet Triggers w/ FTK

- **One of the areas where FTK will have biggest impact**
 - Need to be in position to take full advantage with FTK
 - Preliminary results from John show big improvements can be expected
 - Lower thresholds can be achieved
 - Increase efficiency

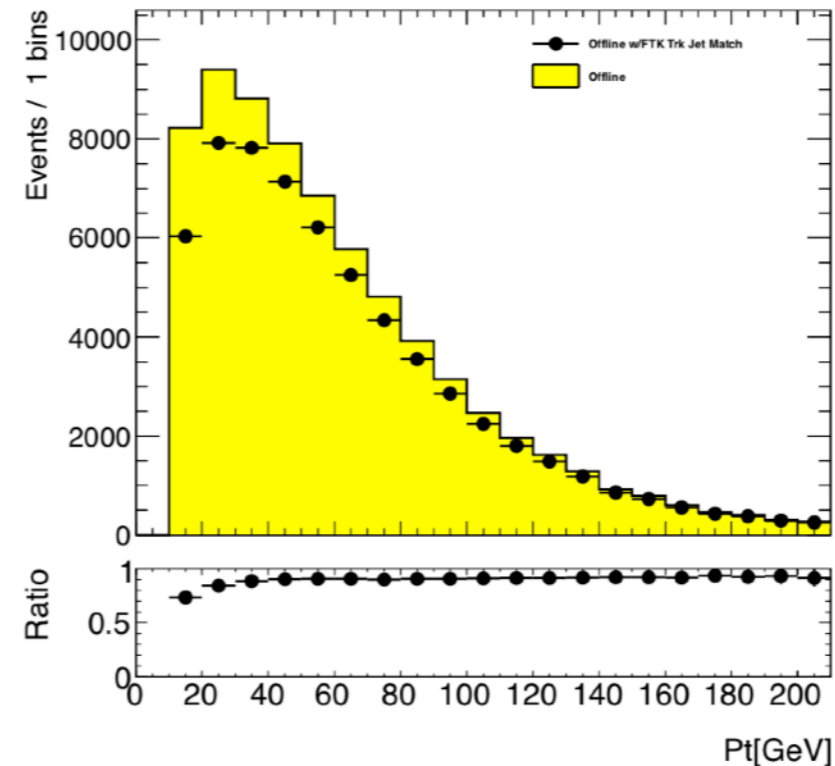
To-be performed again

Turn-ons w.r.t. offline jets

L1_J20 turn on

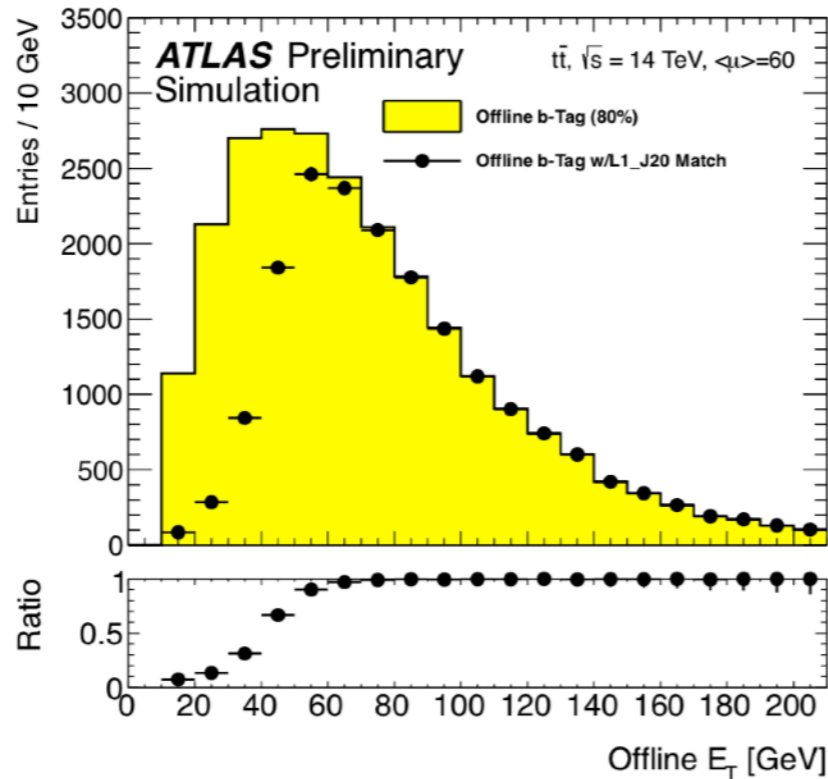


FTK Track Jet turn on

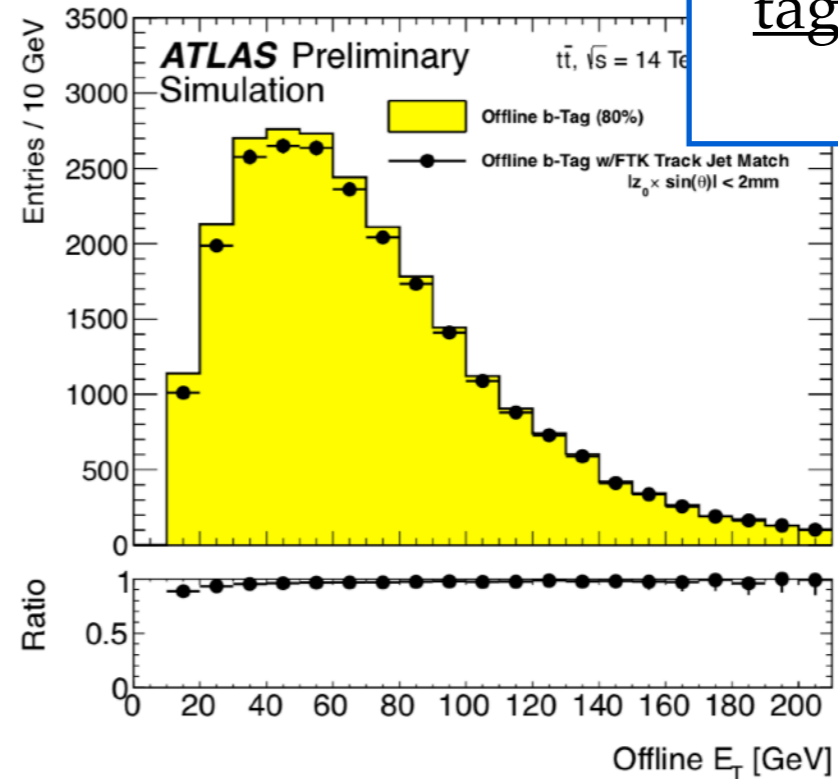


b-jet Triggers w/ FTK

L1_J20 turn on

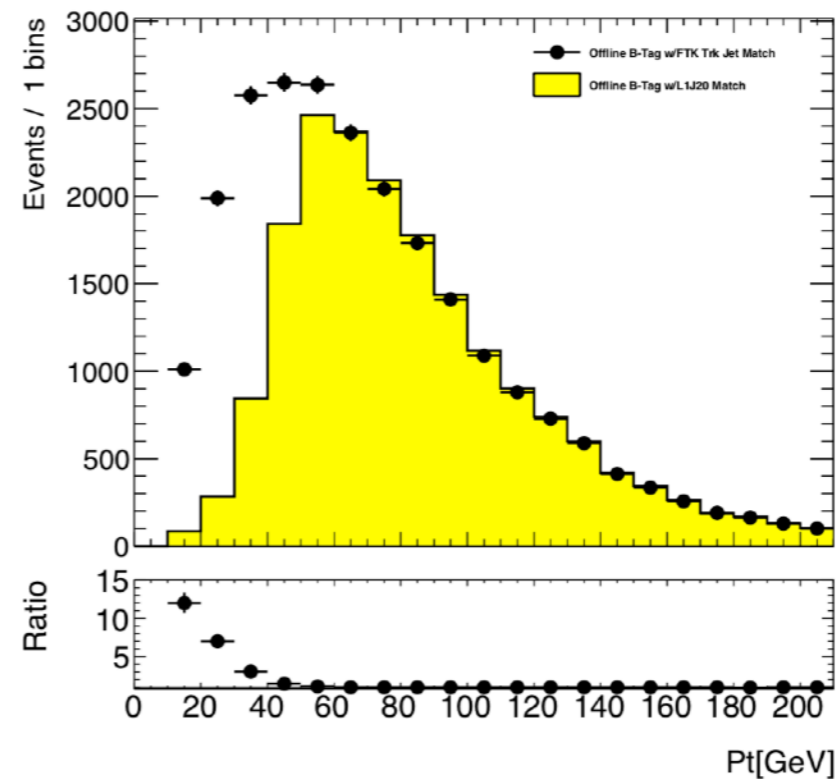


FTK Track Jet turn on



Turn-ons w.r.t. b-tagged jets (80% IP2D)

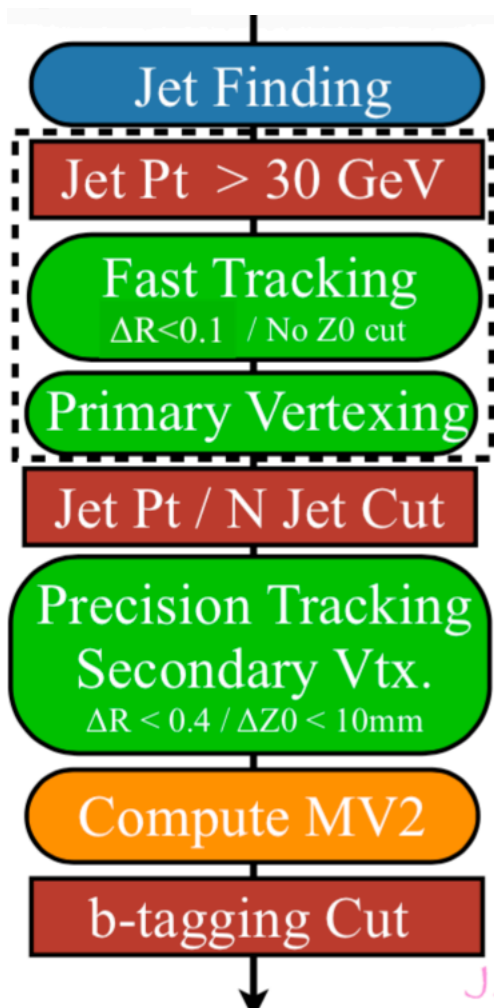
Comparison of jets selected w/ FTK Trk jets (black) and L1_J20 (yellow)



b-jet Triggers w/ FTK

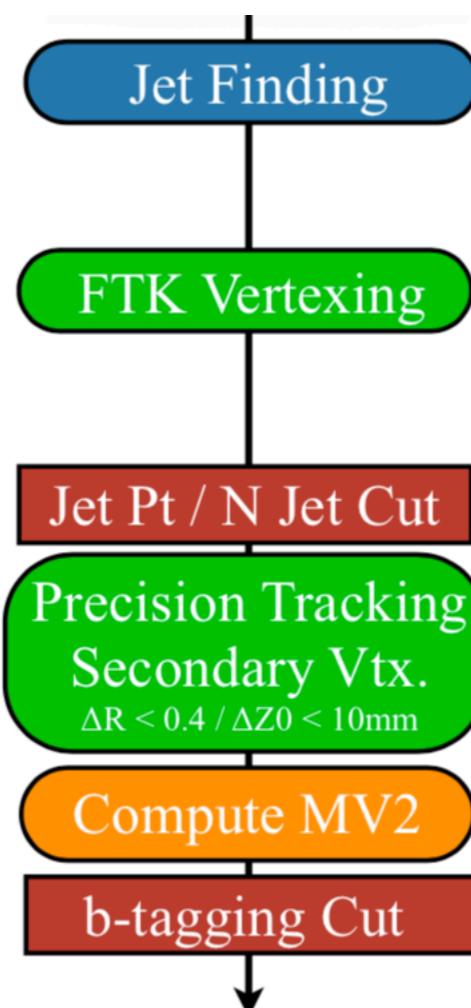
- FTK b-jet chains come in three different flavours, according to where/how it is used:
 - **FTK, FTKVtx and FTKRefit**

Current b-jet chain

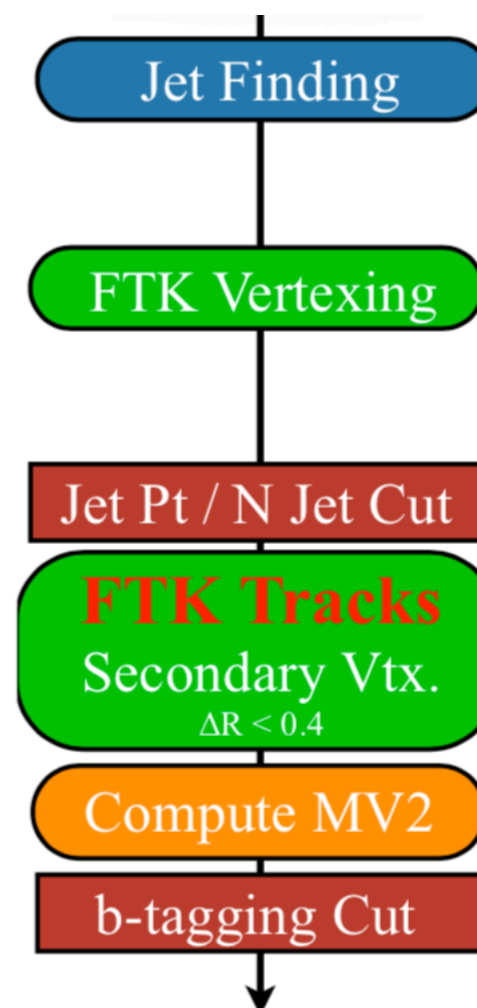


J. Alison

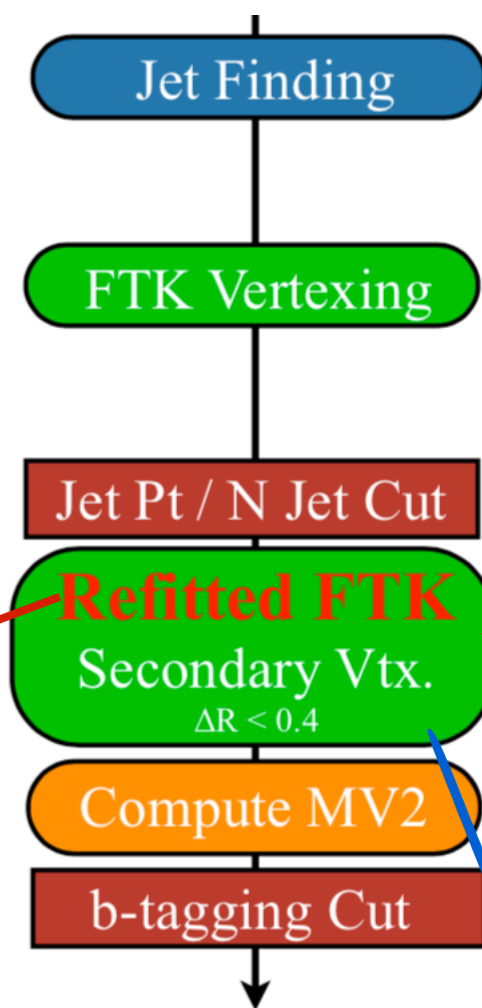
FTKVtx



FTK



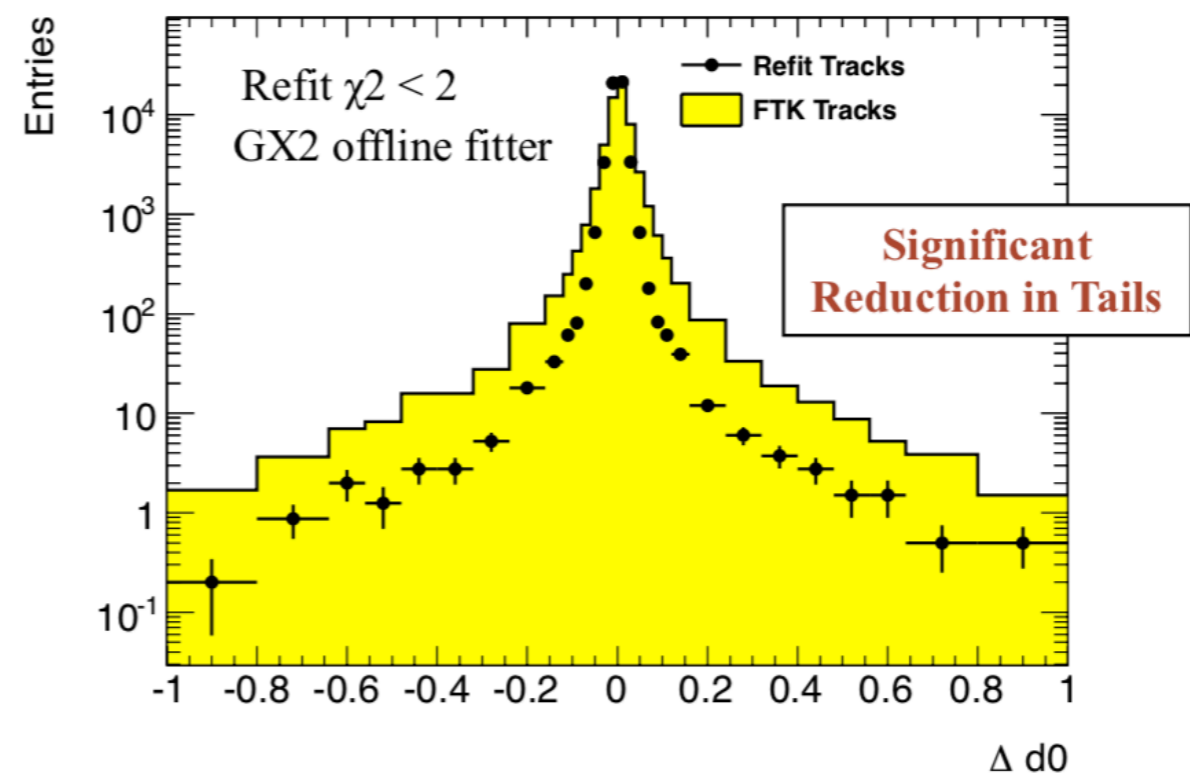
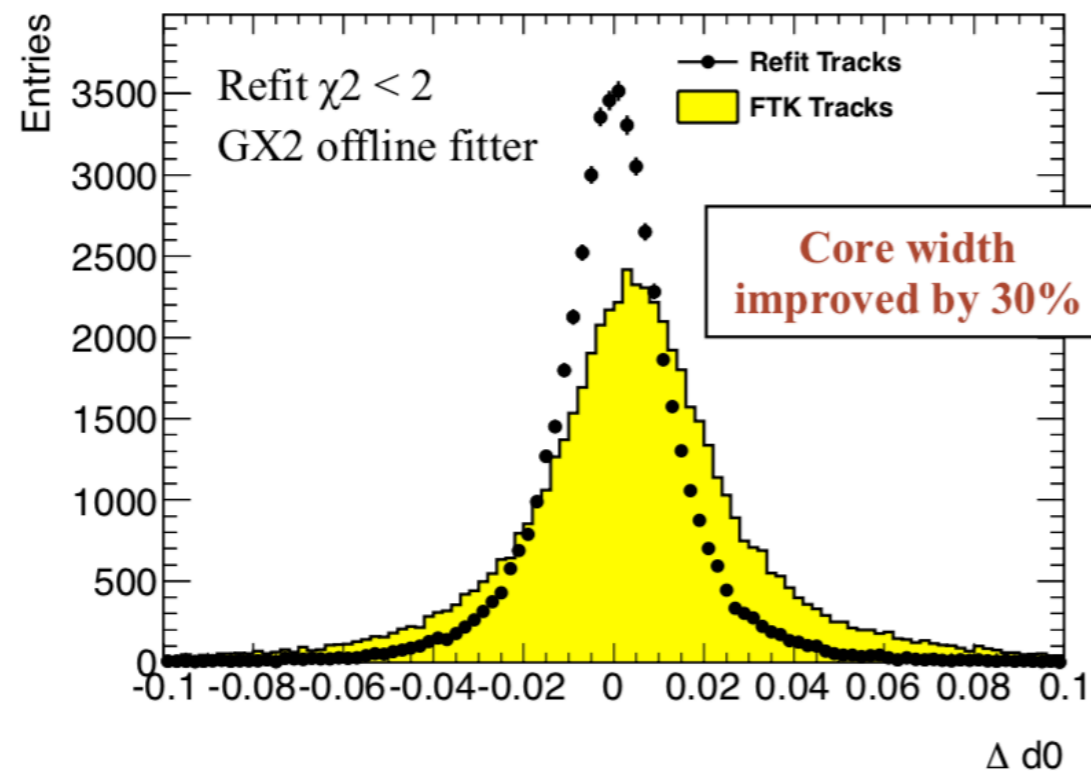
FTKRefit



Refit w/ offline-like
track fitter

b-jet Triggers w/ FTK

- FTK b-jet chains come in three different flavours, according to where/how it is used:
 - **FTK, FTKVtx and FTKRefit**
- Performance studies being (and to be) conducted
 - Need to understand pro and cons of each flavour
- b-tagging with FTK tracks requires new tuning (under-way) for optimal signal/background discrimination



ATLAS Phase-2 Upgrade : Hardware Track Trigger (HTT)

- **Vertices and tracks crucial for PU suppression (especially for hadronic signatures):**
 - HTT fast regional tracking (rHTT):
 - for single/double leptons: provides tracks to EF ($p_T > 2\text{GeV}$) in LO-Rols @1MHz
 - HTT global precise tracking (gHTT):
 - for b-jets/soft jets/MET/PU suppression: provides all tracks with $p_T > 1\text{GeV}$, @100kHz
- Need to assess performances, such as the effects on the impact parameters
- New possible ideas ?
 - Make a fast vertex reconstruction with HTT and use it in order to apply JVF cut before HLT jet reconstruction
 - Use HTT tracks for building track jets and impose matching with Calo jets
 - Use HTT tracks for building track jet and use tagging
- **For Timeline see Francesca Pastore's talk :**
 - <https://indico.cern.ch/event/753196/contributions/3119996/attachments/1712305/2760934/20180907-L1TT-PPES.pdf>