Interest in b-Tagged Di-Jet Resonances

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Exotic b-Tagged Dijet Meeting
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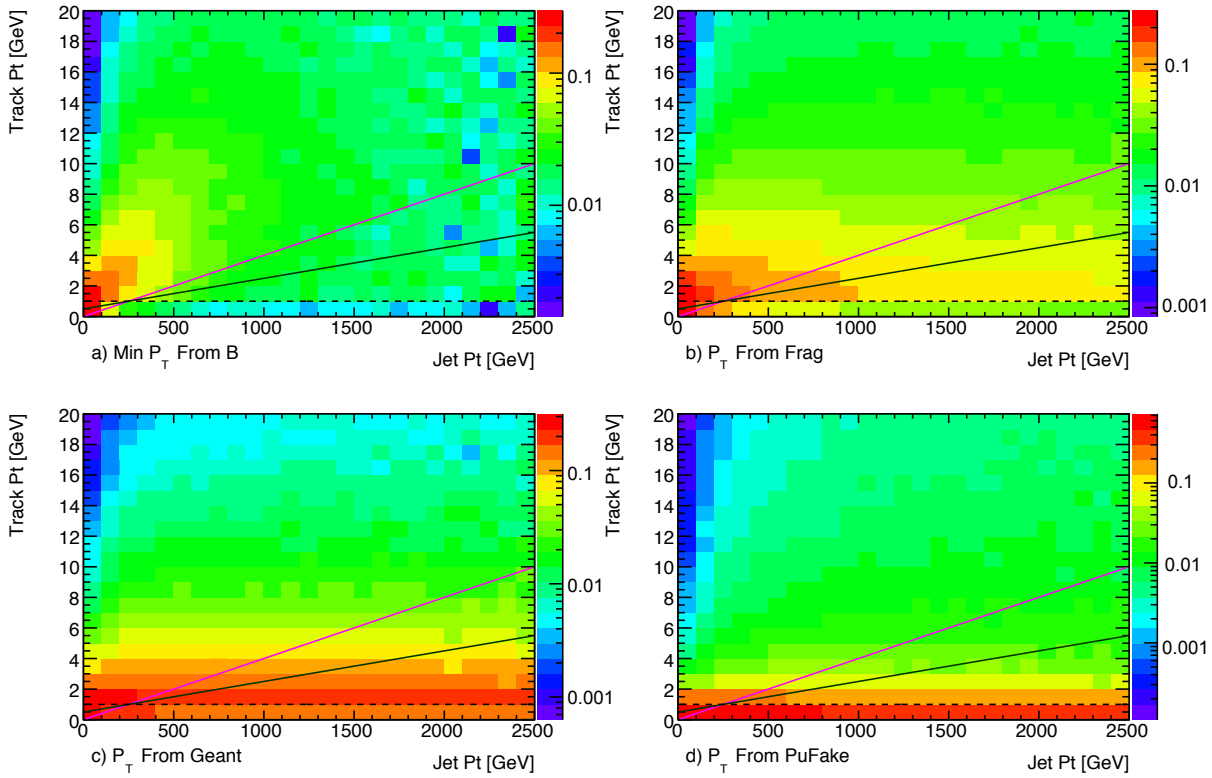
Interest in b-Tagged Di-Jet Resonances

- Interest in this analysis since Run 1. (Contributed to di-jet resonances.)

- Most important ingredient is understanding and improving high-pt b-tagging.
  - Optimise track selection.
  - Optimised algorithm performance.
  - Understand efficiency profile (sculpting).

- UCL Group - Laurie and Andreas.
  - Integrated with b-Tagging group at UCL.
  - Tim (b-Tagging convener), Katherine (b-jet Trigger Conv.), Andy et. al.

Track Optimisation for High-P_T b-Tagging



Z' bb sample

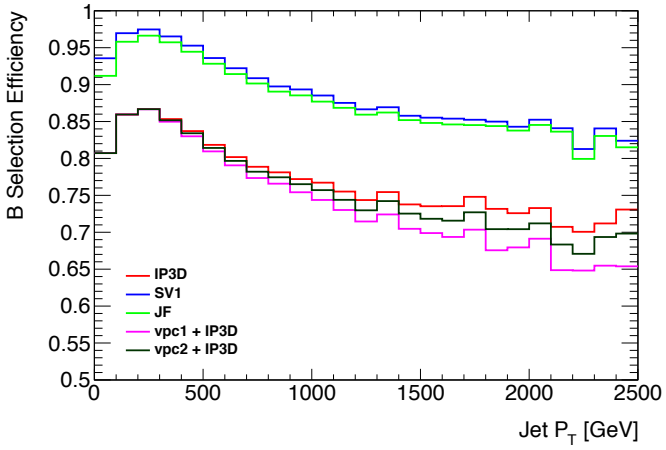
- We have studied the distribution of track-P_T against increasing jet-P_T.

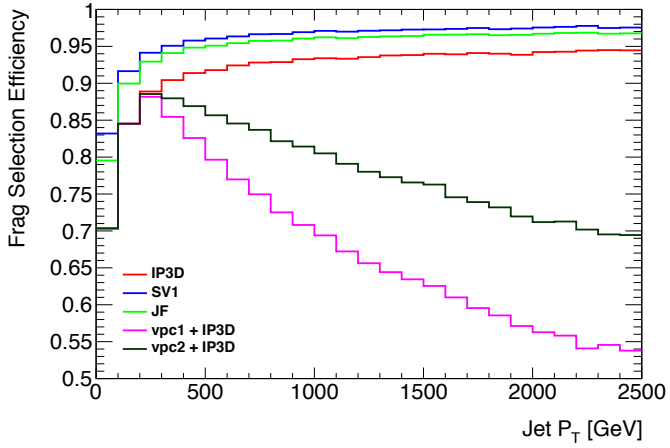
- Identified that tracks from B are more dependant than tracks from other origins.

- Implemented two jet-P_T dependant cuts on track-P_T.

- These cuts can be seen on the left by the magenta and dark green lines.

- These cuts show much promise





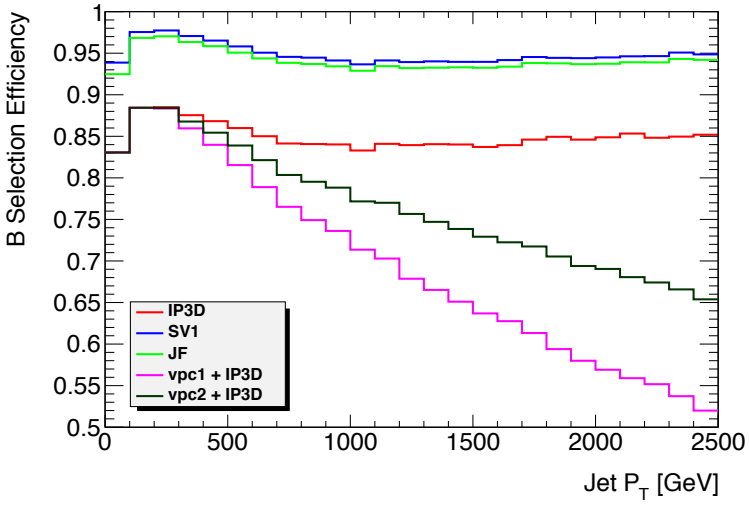
- Little effect on track selection efficiency of tracks from B.

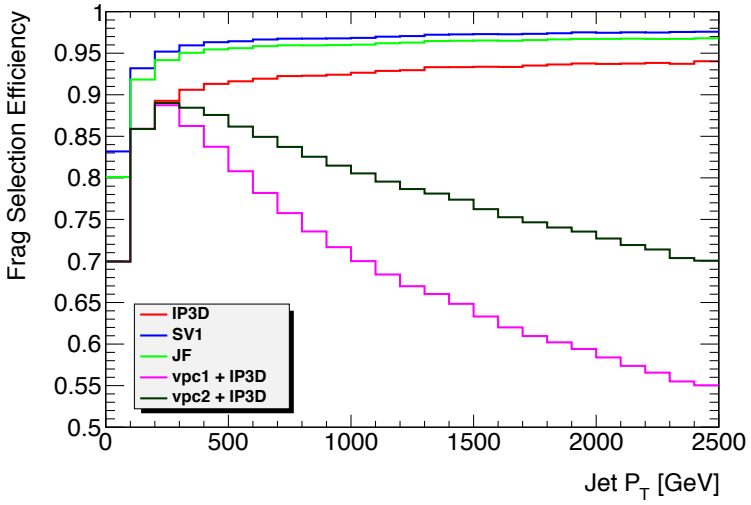
- Larger effect on tracks from other sources (particularly fragmentation) which should reduce fake rates.

See Full Talk: https://indico.cern.ch/event/393645/contribution/13/material/slides/0.pdf

Further Optimisation Studies

QCD Sample





- Applying the same cuts to a QCD sample shows larger cut on tracks from B.
- This is consistent with the removal of some B-tracks that correspond to gluon splitting
- Reduces QCD background for exotic resonances.

Future Aims

• Examine other track selection cuts, such as d0 and z0, to see if there are any optimisations that can be done for high-P_T.
- Study is underway and first results will be very soon.

• Produce ROC curves to demonstrate how the jet-P_T dependant cuts effect b-Tagging performance.
- This should be done soon.

• Next; investigate, understand and optimise the b-tagging algorithms themselves.
• Integrate b-Tagging findings into di-jet framework.