Status of the Level 3 IP B-tagger

What can we do with p12?

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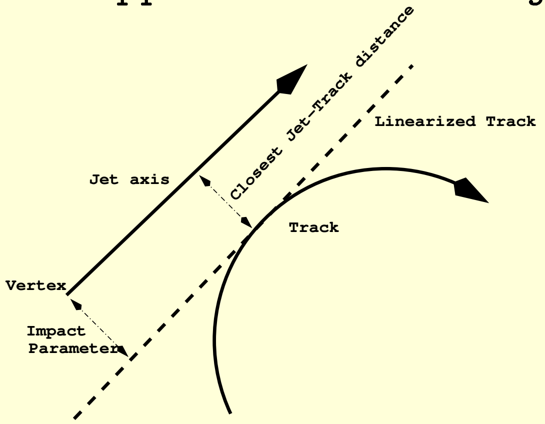
L3 Algorithms meeting

- MC Performance
- Timing
- What can we do with data?
- Beamspot
- First data-MC comparisons
- Summary

*L3Package:*l3fbtag_ip

2 dimensional (R-ϕ) Impact Parameter btag for a start. Use reconstructed tracks, jets and primary vertex from other L3 tools.

- Select well reconstructed L3 global tracks tracks
- Associate each track to the closest reconstructed calorimeter jet
- Find the point of closest approach track to jet



- Linearize the track
- Calculate the signed IP and significance
- Construct a track probability, based on a non-B resolution-function
- Combine the individual track probabilities to a jet probability
- Construct an event tag based on the 3 leading jets.....

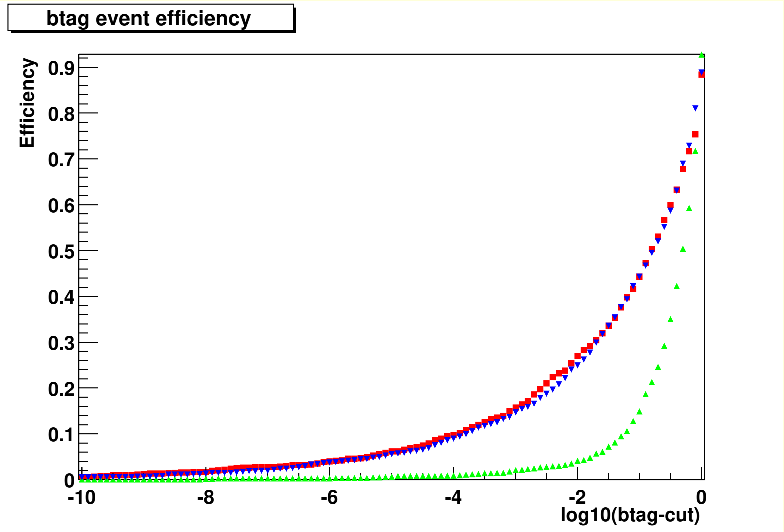
Tested with MC and ready for p12

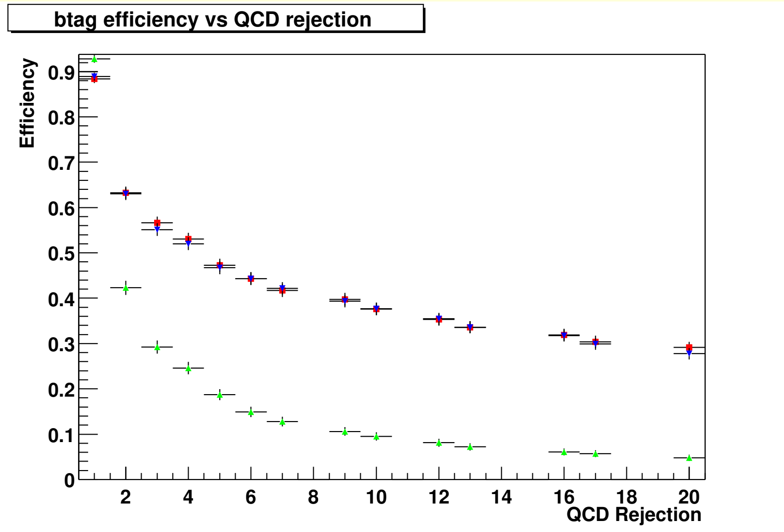
MC performance

red $= Z \to b\bar{b}$ + 2.5 min bias

blue $= t\bar{t}$ + 2.5 min bias

green = QCD $pt > 20$ GeV +2.5 min bias



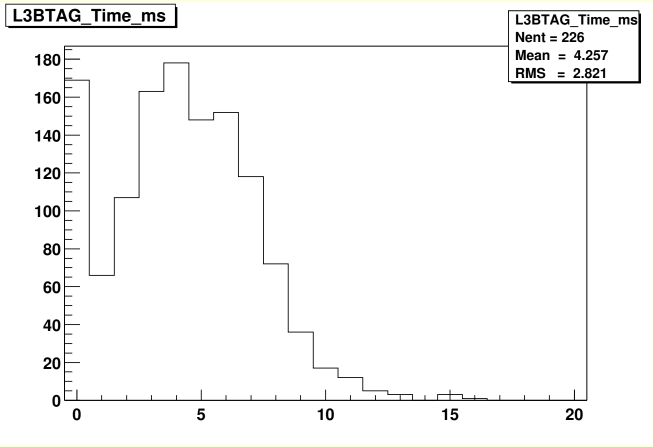


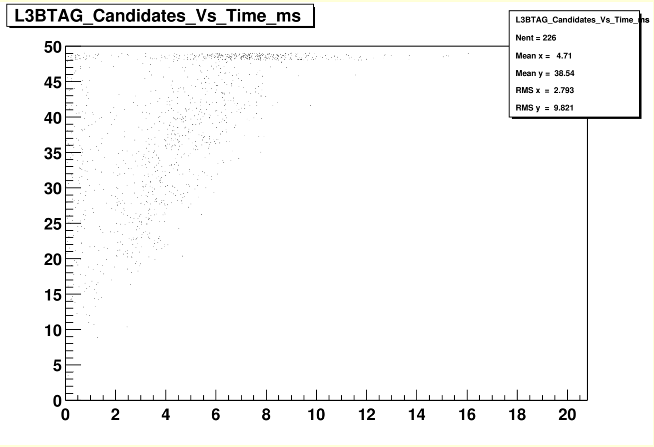
Conclusion:

Possible to obtain high b efficiency and at the same time fair rejection of background

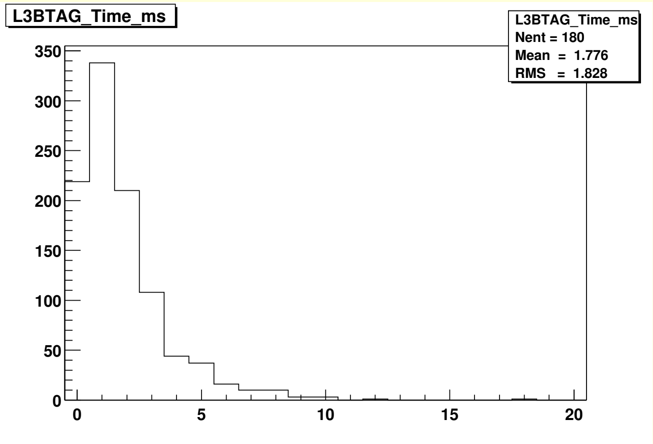
MC performance

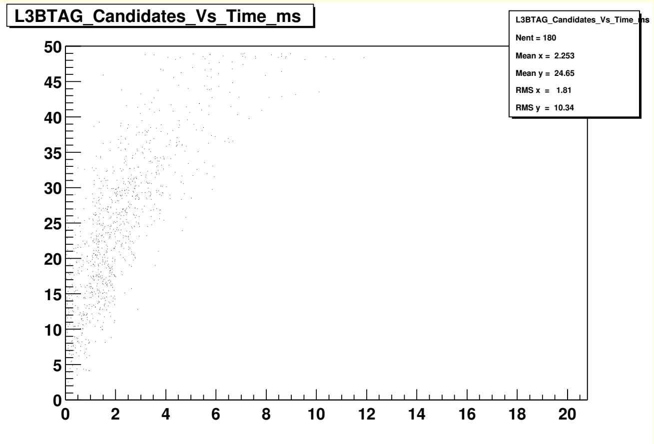
Timing (d0mino non-opt) for $t\bar{t}$ + 2.5 min bias





and for QCD $pt > 20$ GeV +2.5 min bias

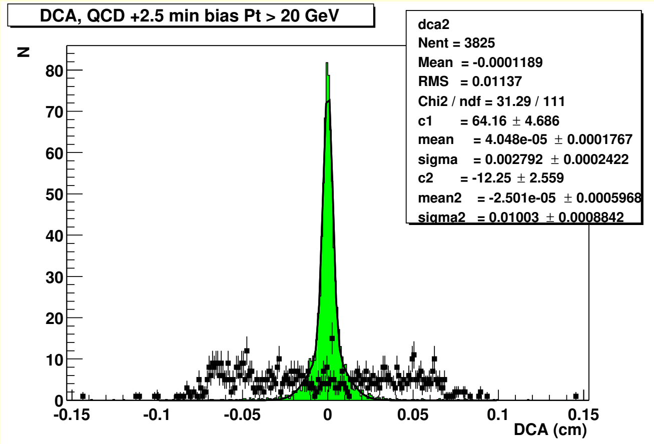




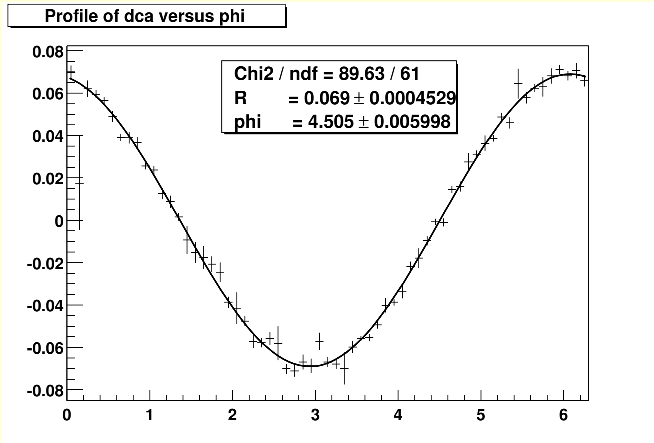
Mean time less than 5 ms, scales with number of tracks.

What can we do with real data then?

DCA (wrt 0,0) from run 152415, all triggers, processed with ScriptRunner offline (p11.08). Latest geometry, mapping and thresholds.



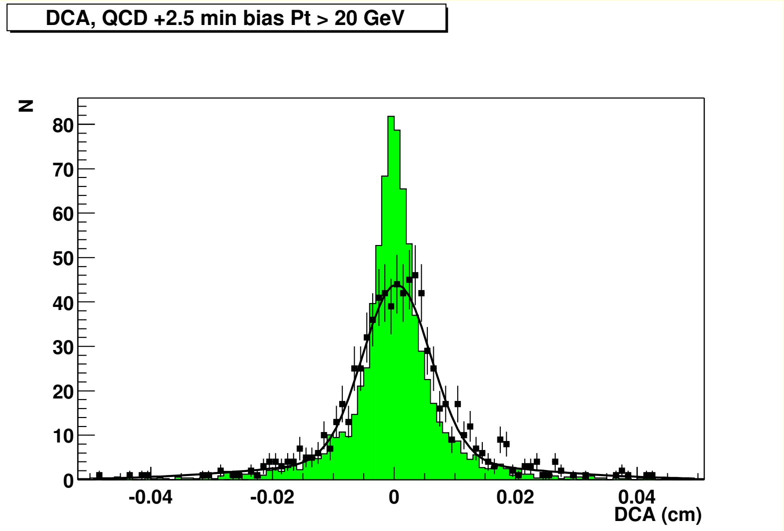
No L3 primary vertex tool...so what can we do?
Fit dca vs ϕ for 1400 events (1 min of recorded data)

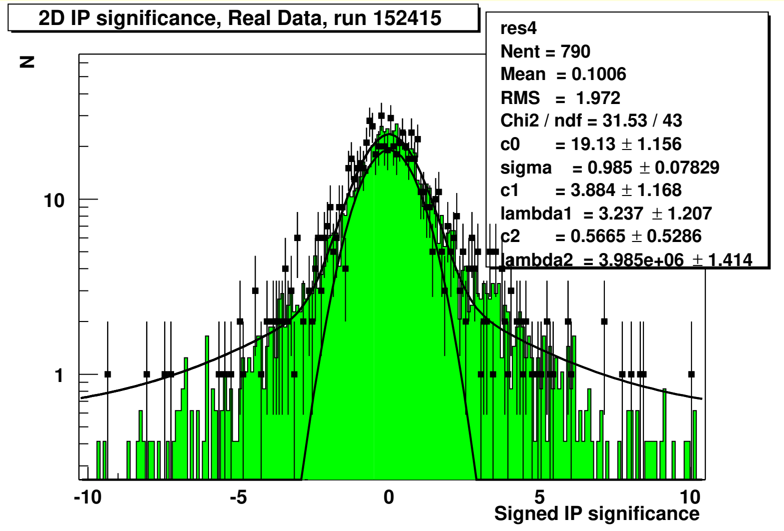


Assume possibility to obtain beamspot position from online examiner

What can we do with real data?

- Recalculate the track-parameters with respect to beamspot position
- Add the size of the beamspot (30 microns) to the dca error



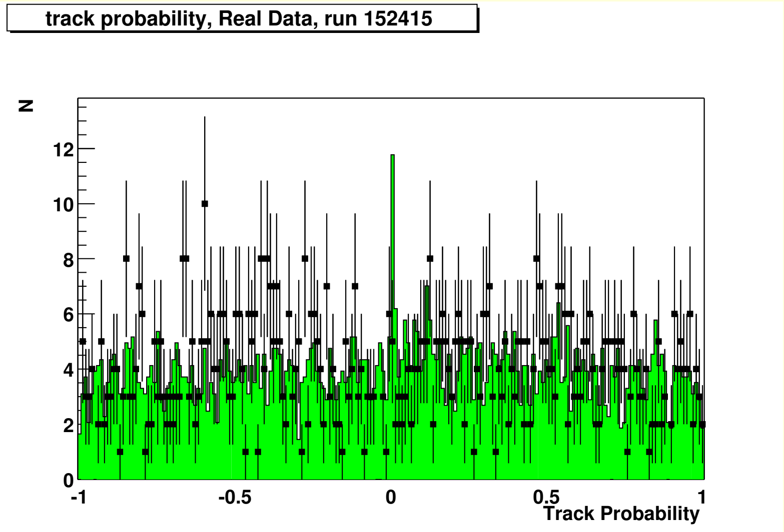


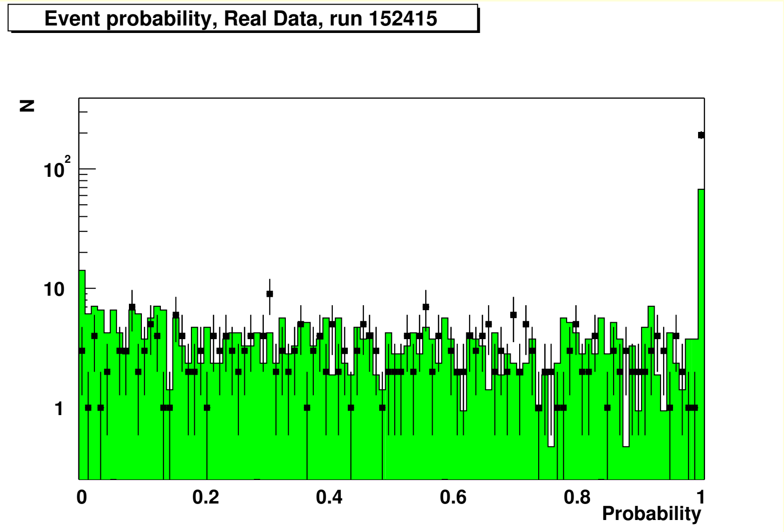
- wider dca profile (sigma of 60 microns) than QCD MC, but...
- comparable signed impact parameter significance

Not bad at all!

Probabilities

Use resolution function (gaussian + 2 exponentials) obtained from MC studies to calculate track and event probabilities
zero = high b-tag
one = compatible with primary vertex





- flat track probability
- less events with high b-tag (prob=0)
- more events with no selected tracks (prob=1)
- of course: need more statistics + studies of event selection

Not bad at all! Remember: high pt QCD is maybe not the best comparison... my event selection is simply: "at least one jet with Et greater than 10 GeV with at least one track assigned to it".

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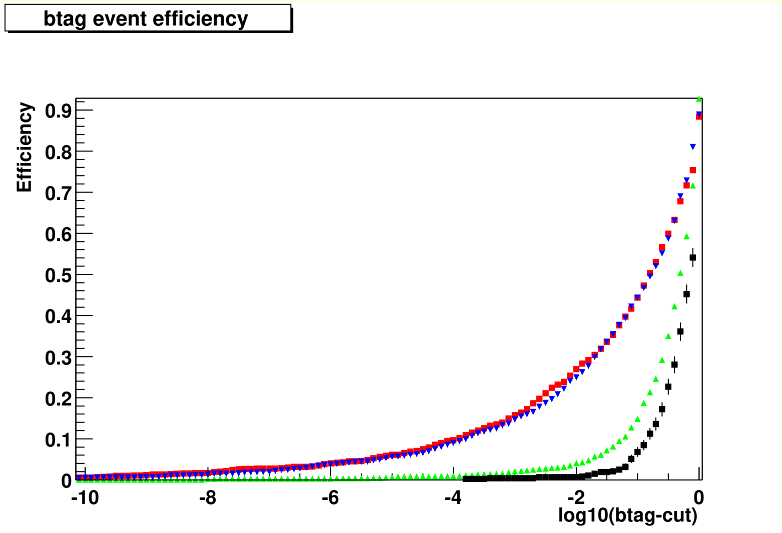
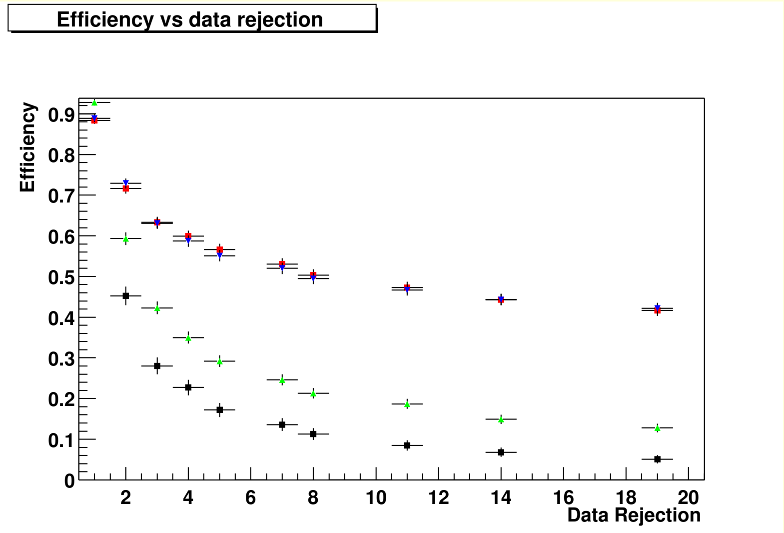
Efficiencies and Rejection revisited





Summary:

- `l3fbtag_ip` **v00-01-10 ready to handle non-zero beam positions**
- **requires beamspot coordinates from external source (online exminer)**
- **first data-MC comparisons of dca and impact parameters seem reasonable**

Next Step:

- **studies of efficiencies and further MC-L3-offline comparisons**
- **looking forward to p12!**