

Calo/Jet Update

Muon Collider Discussion

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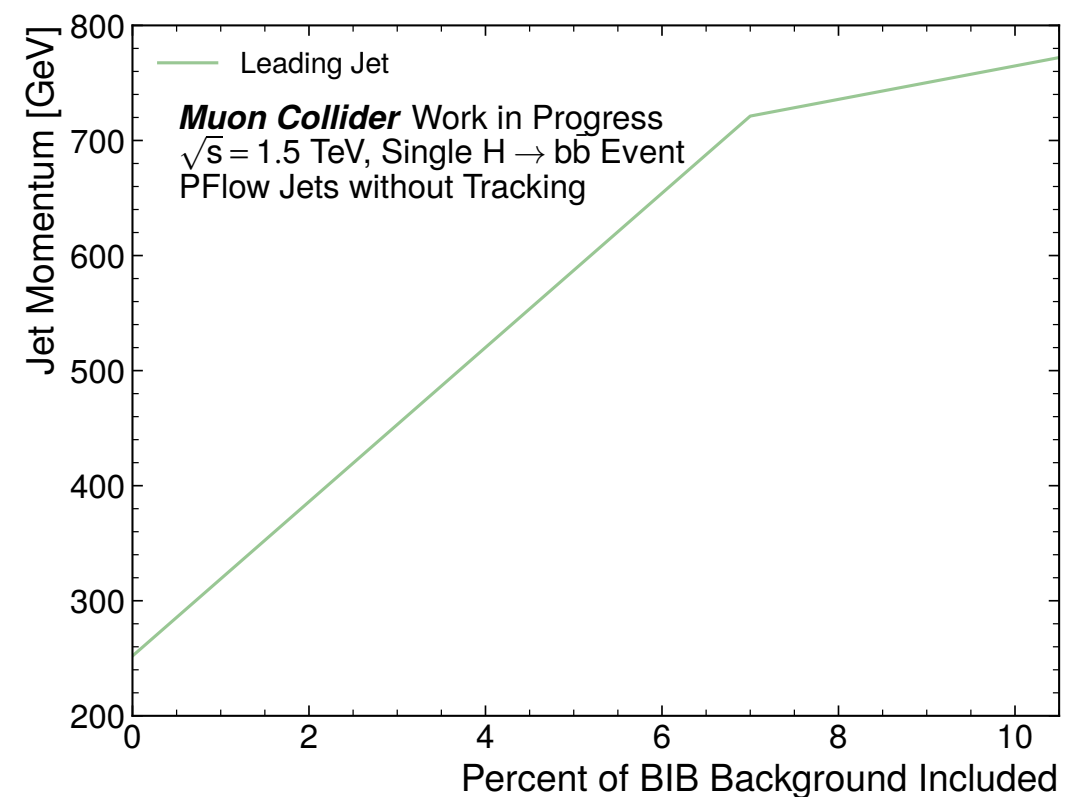
TRIUMF



Previously...



- As of a few weeks ago, had plots like this
- Running reconstruction without tracking to get to higher BIB fractions
- Lorenzo indicated the leading jet is often caused by BIB! Need matching to 'original' jets



Jet Matching



- To determine the ‘true’ hard scatter jet, need to create a matching scheme
- Using something very simple for now
- When running with $BIB \neq 0$...
 - Compare to jets from the $BIB=0$ reconstruction
 - Match jets from $BIB \neq 0$ samples, to $BIB=0$ samples
 - The smallest ΔR is considered a ‘match’
 - These are the ‘true’ jets: everything else is BIB-induced

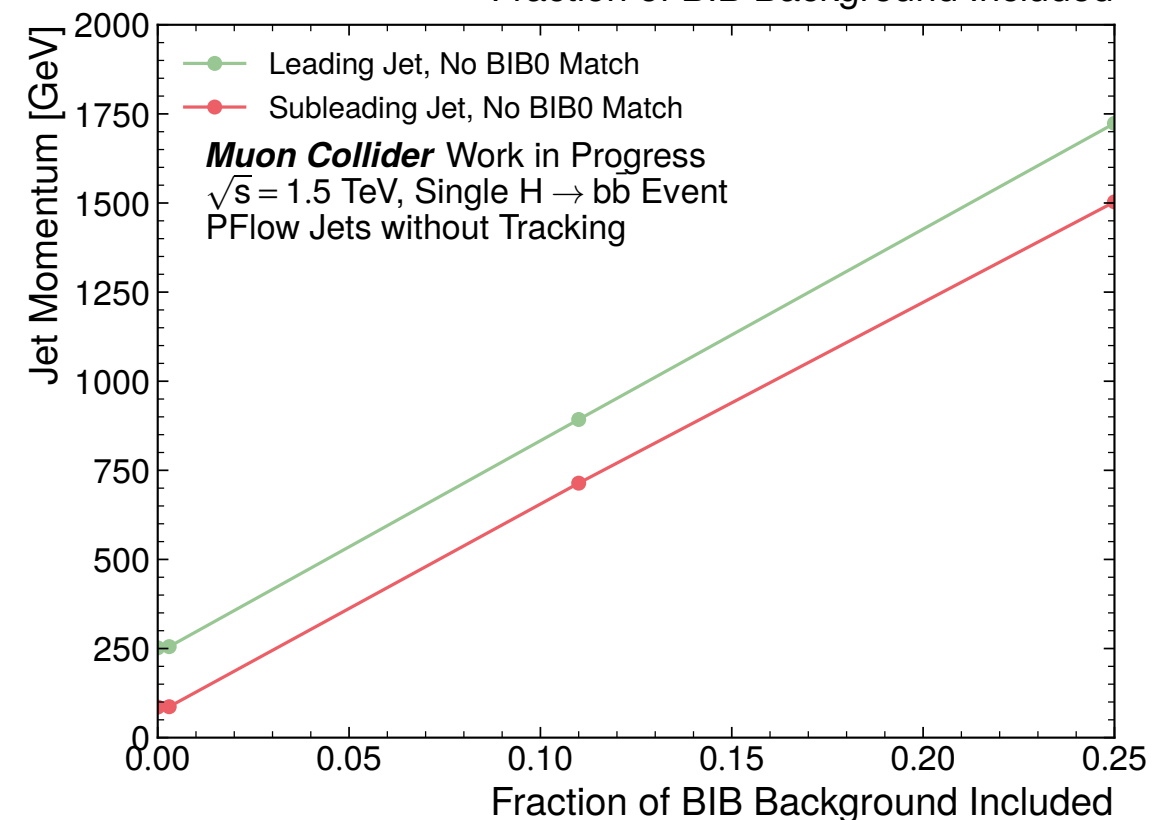
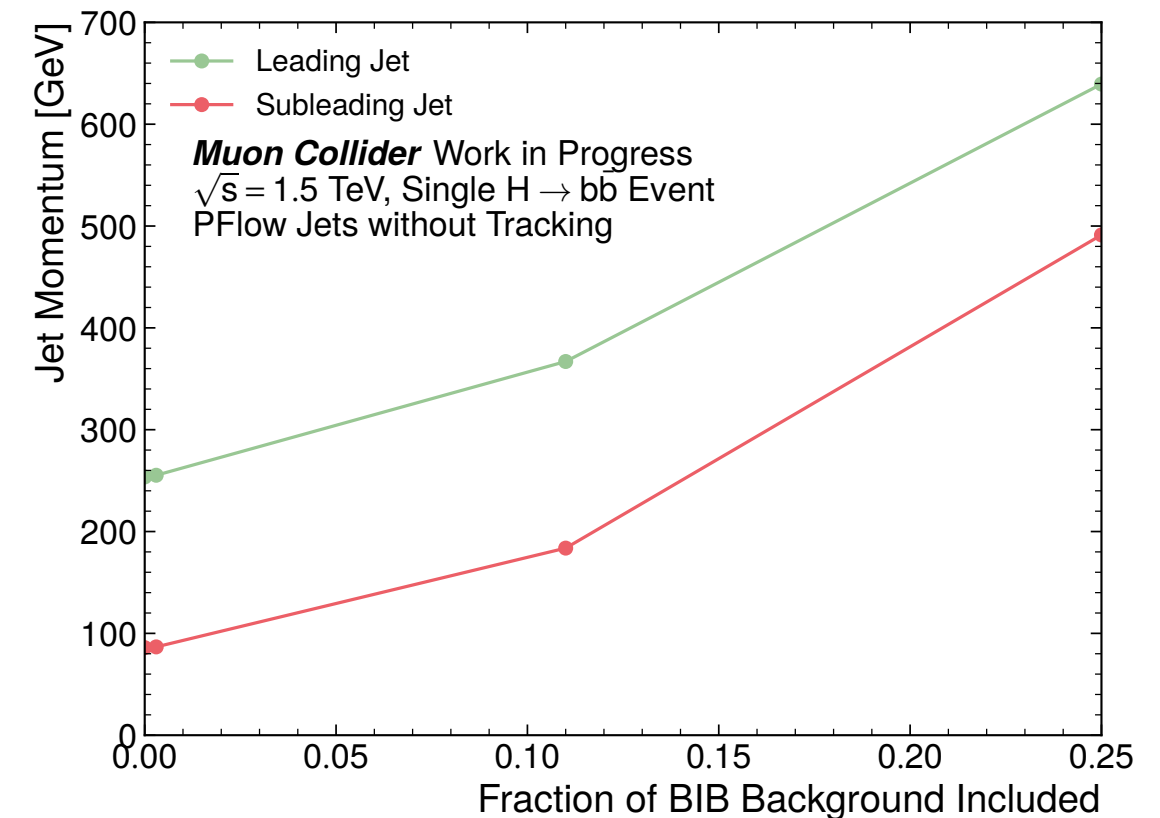


- Still studying only a single Hbb event at 1.5 TeV, overlaying some fraction of BIB background
 - With more reconstruction turned off and MC particles removed (thanks Larry), can get up to 25% of nominal BIB reliably
 - Ran at 0%, 0.003%, 10%, 25%
 - 50% of BIB took 5 days before I cancelled the job...
- Easy to generate more hard scatter events, but given the strong BIB component, we definitely need more BIB events to start overlaying...
 - Can 'hack' this by using different sub-fractions, since I can only get up to 25% anyway...

Jet Momenta



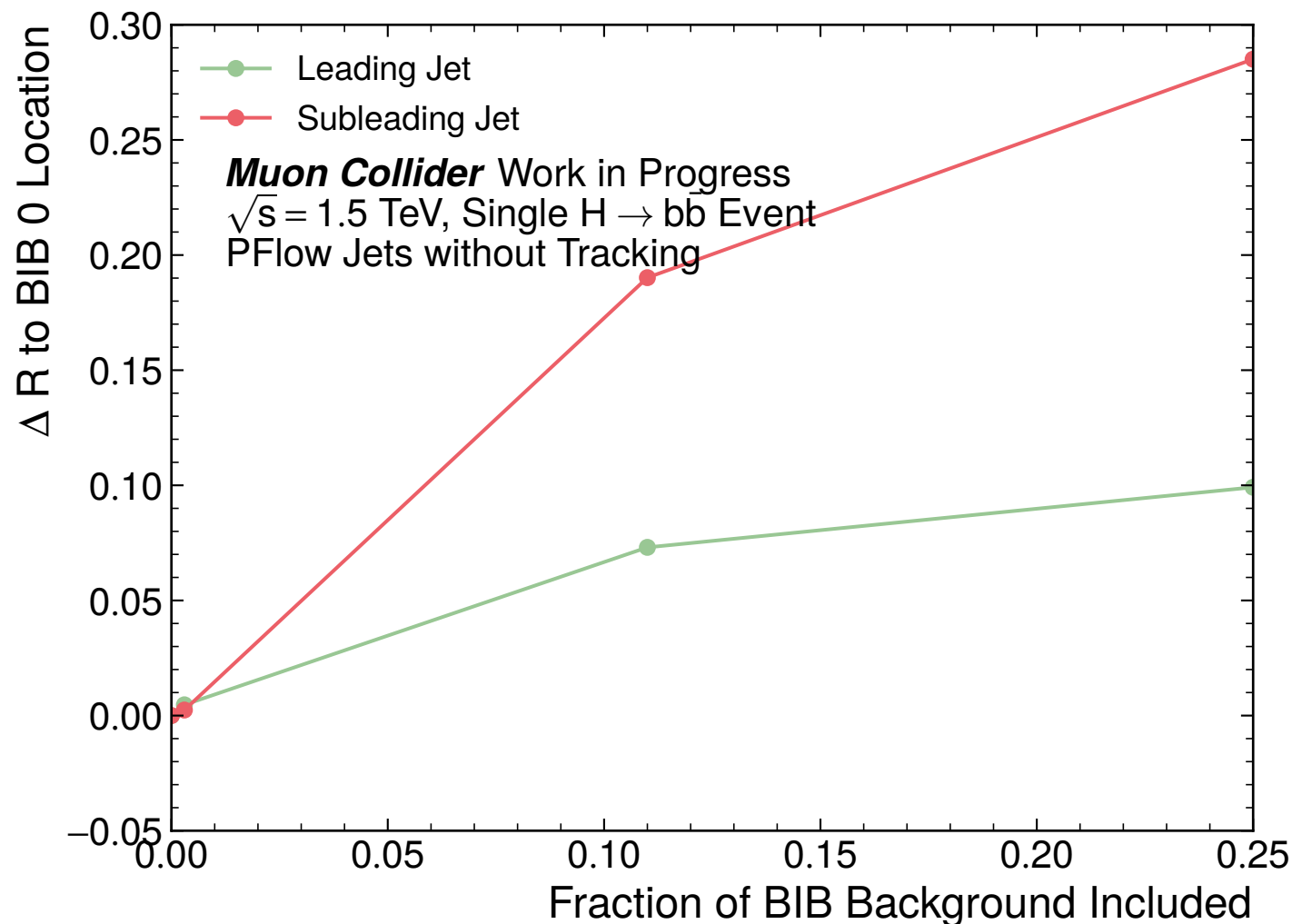
- When matching is introduced, see substantially lower energies!
- Top plot has matching to BIB=0, bottom does not
- But, still see a ~250 GeV jet become ~650 GeV
- BIB causes:
 - Huge fake jet component
 - Huge contamination to true jets



How Good is Matching?



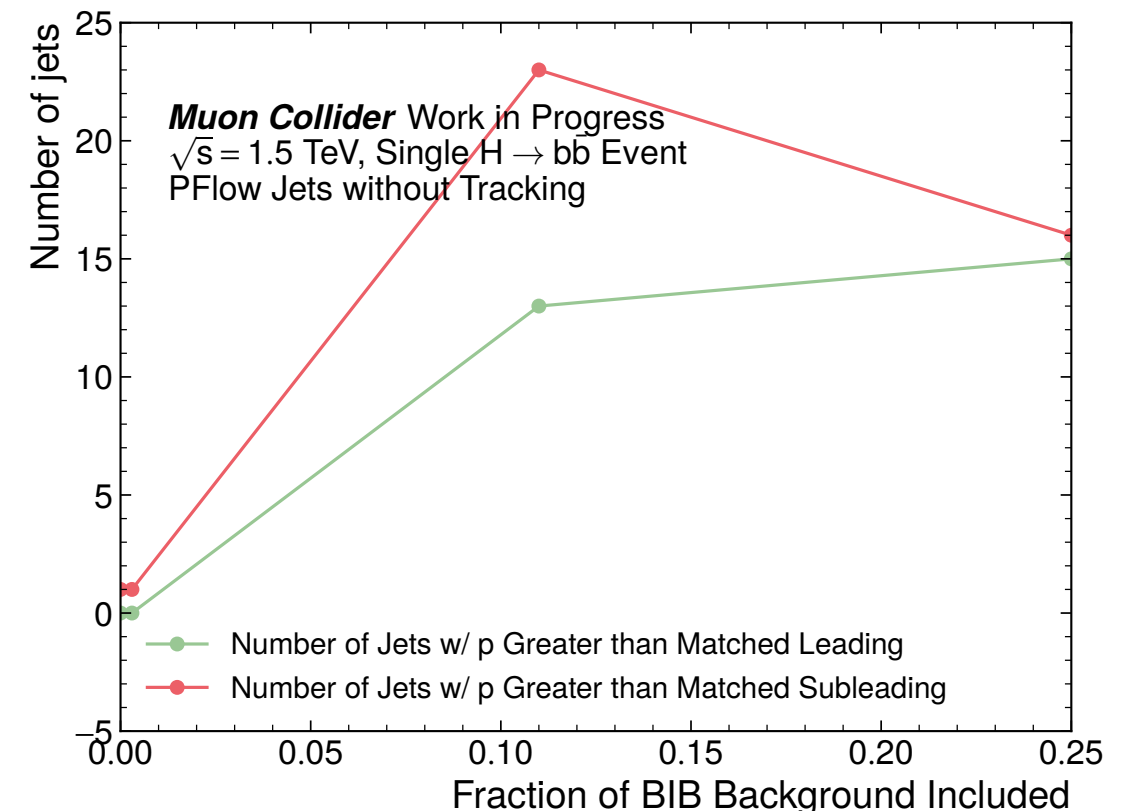
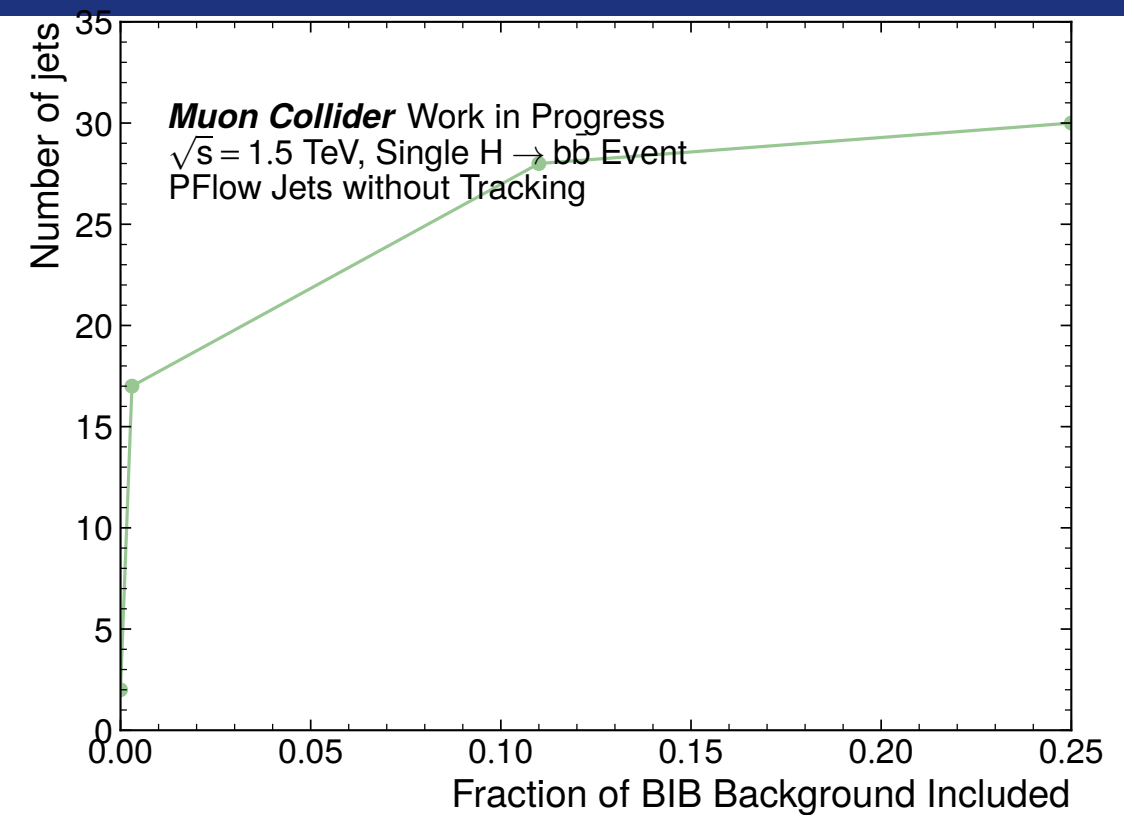
- At least for the leading jet, the location really doesn't seem to change much
- $\Delta R < .1$ to BIB=0 jet even with 25% BIB
- Seems to be consistently related to the original jet
- Subleading jet gets 'moved' further: contamination dominating even more?



Number of Jets



- Number of jets looks interesting: jumps up rapidly but stabilizes
 - Full detector occupancy?
 - NB: ~no threshold on jet momenta in this plot
- Number of jets 'above' the leading jet also interesting
 - ~Half of the 'fake' jets have higher momenta than the true leading jet!



Next Steps



- Start exploring clustering algorithm: make it less ‘greedy’?
- Marco to explore MHT: already has plots with low BIB, adding more