

b-ID Status

- **Conveners**

- Herb retired from b-ID last month, after 2 years of hard work
- Still helping out with b-ID significantly!
- Management is trying to find a new b-ID convener...

- **CAFe interface**

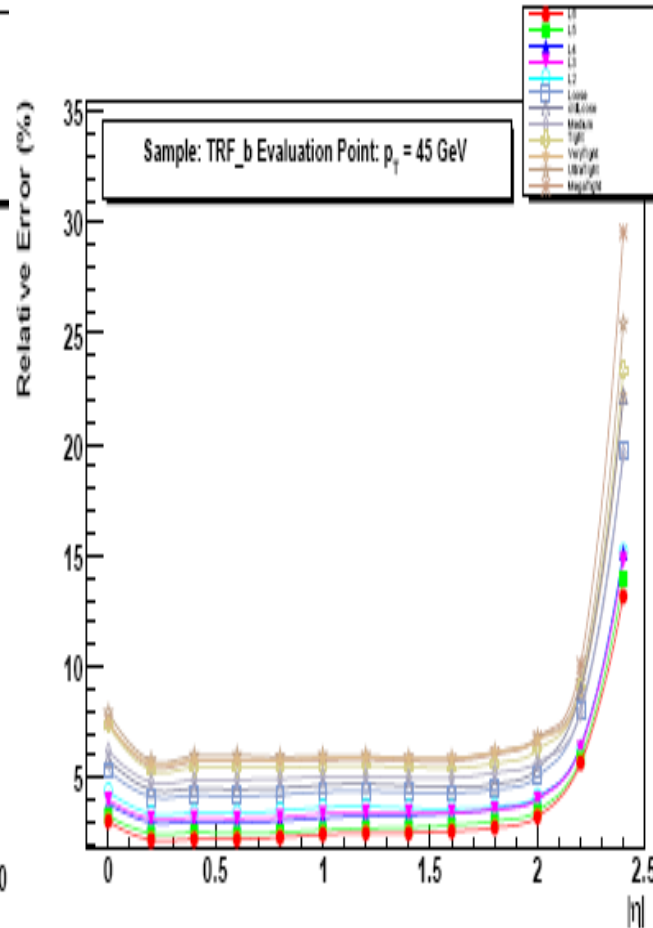
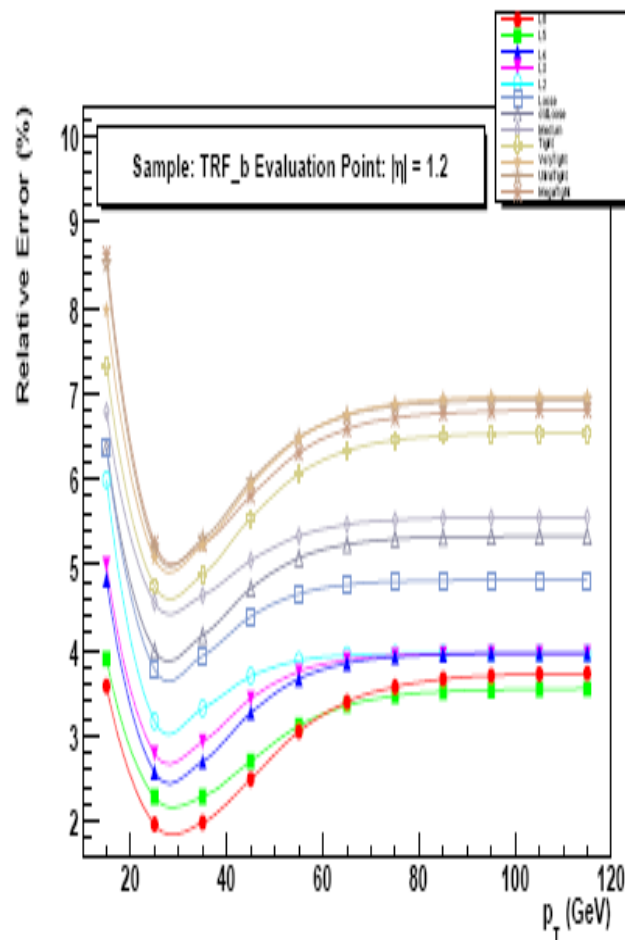
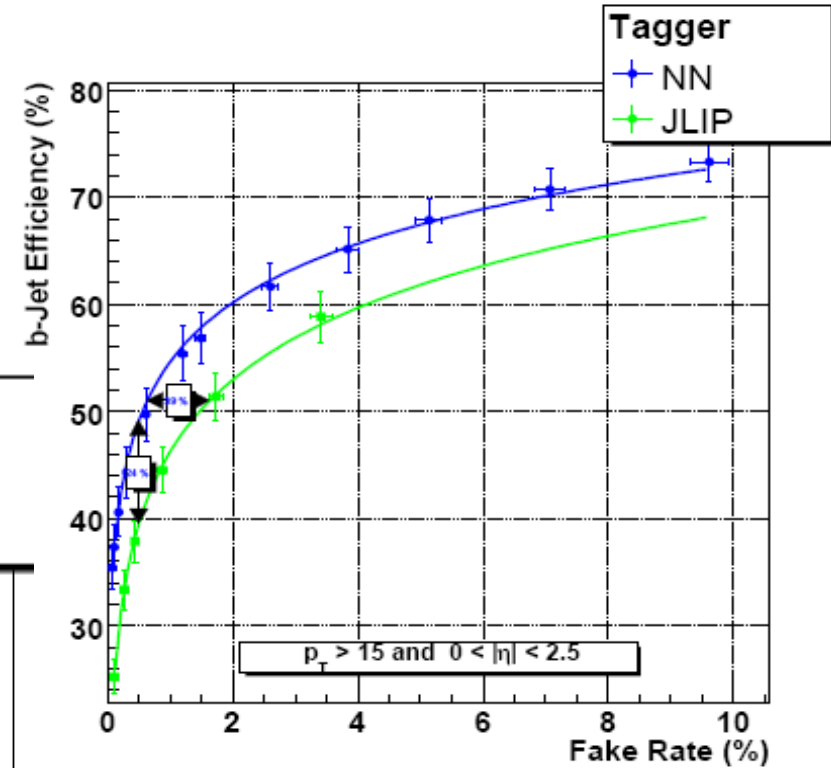
- Now working stably :)
- Extra features added lately:
 - taggability parameterizations are applied during tagging - Gordon
 - combined systematics of taggability+TRF uncertainties (*BUG FIXED!!!!*)
 - BTagJetSelector, Permuter (with systematics)...
 - Documentation: <https://plone4.fnal.gov/P1/D0Wiki/bid/Documentation/>

- **p17 NN – v1.1 (Tim, Miruna, Stephen)**

- Preliminary certification note is now in CB review
 - Frank has asked that the review be completed as quickly as possible, hopefully by the end of the month
 - http://www-d0.fnal.gov/phys_id/bid/d0_private/certification/cert_p17/
- Many analyses in the Higgs and Top groups are using p17 NN v1.1 tagging
 - Good data/MC agreement after tagging is being seen in many analyses
 - See the following talk from this morning's convener's meeting...

b-ID Status

- Performance of p17 NN v1.1
 - Up to 1/3 the fake-rate for same b-efficiency
 - Smaller systematic uncertainties
 - Wider range of operating points



Region	L6	L5	L4	L3	L2	Loose
CC	6.44%	6.98%	7.73%	8.5%	9.55%	11%
ICR	5.65%	6.06%	6.78%	7.49%	8.57%	10.1%
EC	4.7%	5.19%	5.71%	6.2%	6.83%	7.96%

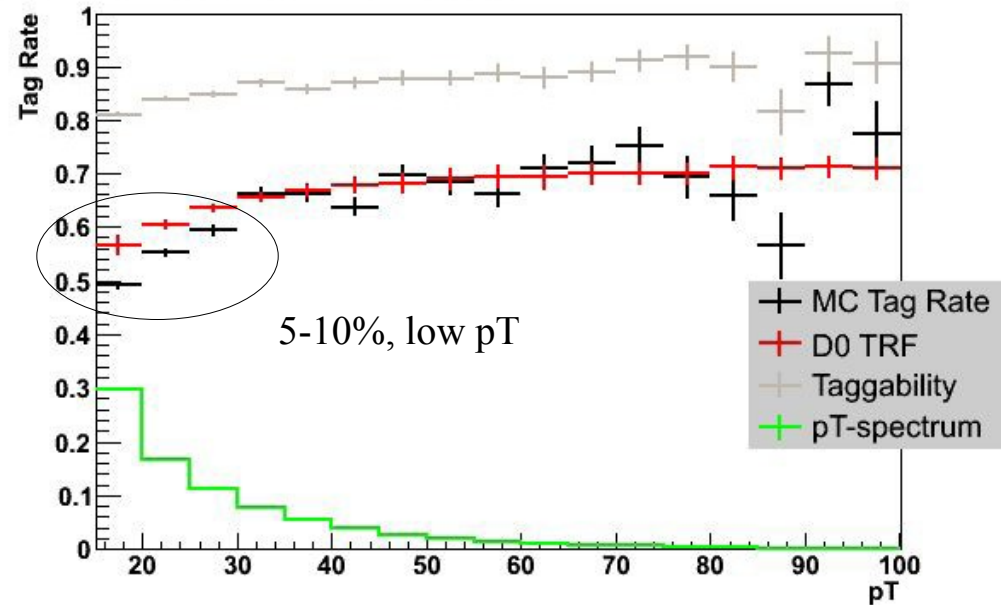
Region	oldLoose	Medium	Tight	VeryTight	UltraTight	MegaTight
CC	11.6%	13.6%	15.5%	16.5%	17.5%	18.6%
ICR	10.8%	12.8%	15%	16.8%	18.2%	19.2%
EC	8.28%	9.6%	11.2%	13.2%	14.8%	15.2%

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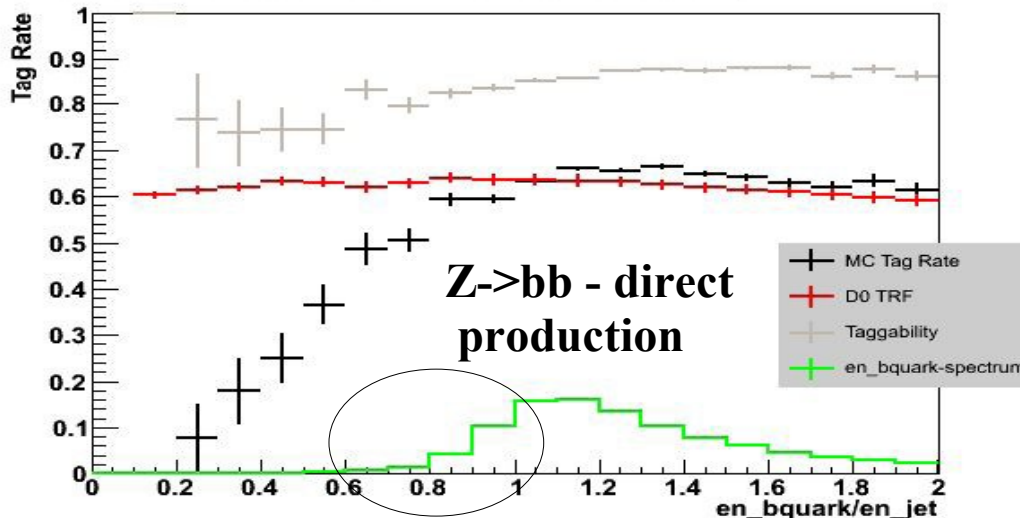
- TRF discrepancies (Jan Steggemann)**

- studied TRFs for *gluon-splitting* samples, like Wbb , Zbb
- Observes a 5-10% *overestimate* of the TRF, compared to actual tagging in MC
- Finds that it is due to lower b-quark momentum (as a fraction of the jet momentum) in these samples
- **Need further studies and a fix for this..** simply use *direct tagging + scale factor* for these samples?

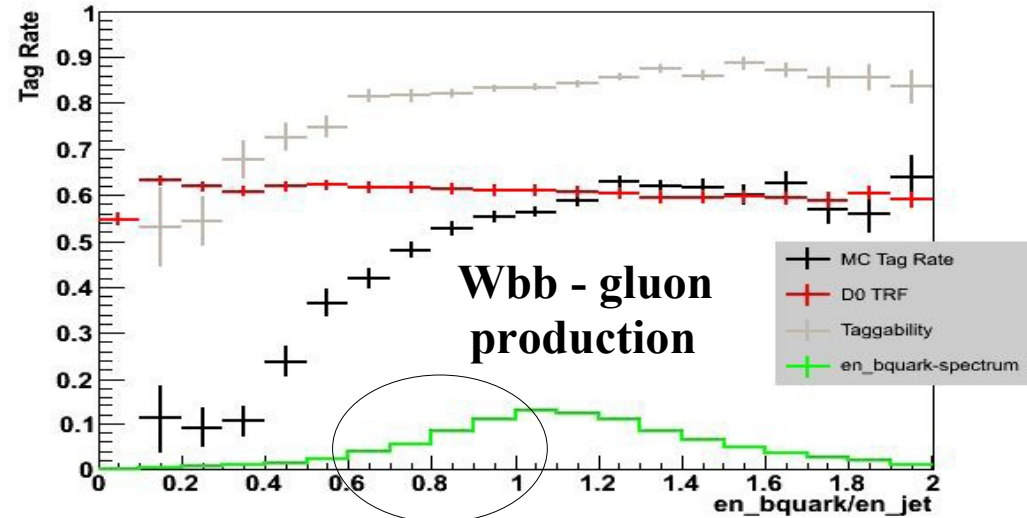
Tag Rate vs p_T , Wbb_excl ($0 < |\eta| < 2.4$)



Tag Rate vs en_bquark , $Z \rightarrow bb$ ($0 < |\eta| < 2.4$) ($15 < p_T < 40$)



Tag Rate vs en_bquark , Wbb_excl ($0 < |\eta| < 2.4$) ($15 < p_T < 40$)



b-ID Status

- **Taggability**

- Timour finished the taggability parameterizer processor
 - Needs to be tested / improved
- loana has released a fantastic D0Note (5240) on her taggability studies:
 - We are *underestimating* the taggability for high CPF jets at low pT by 5-10%
 - Add a systematic uncertainty to the low pT jet taggability of 5-10%?
 - We should correct for this instead!

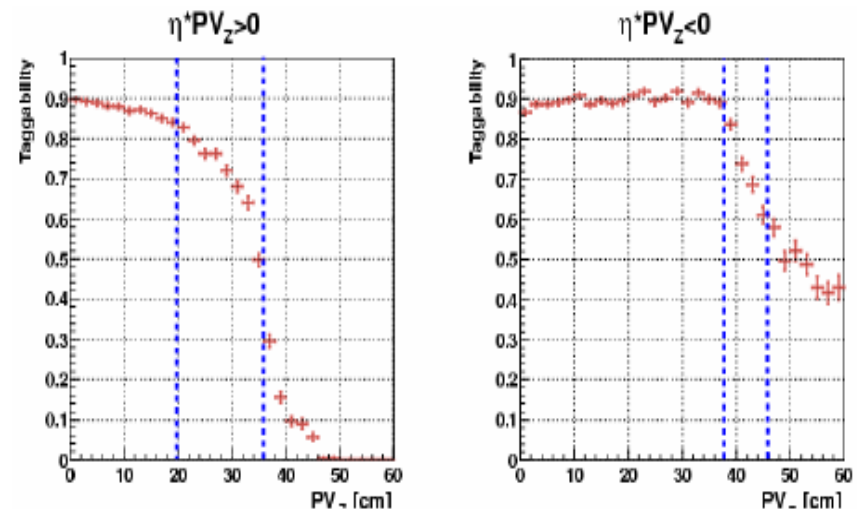
- **SVT Optimization** (Yvonne)

- Random grid search of taggability and secondary-vertexing parameters
- Fix old feature of re-using tracks on vertices
- Revive the 2-pass vertexing algorithm

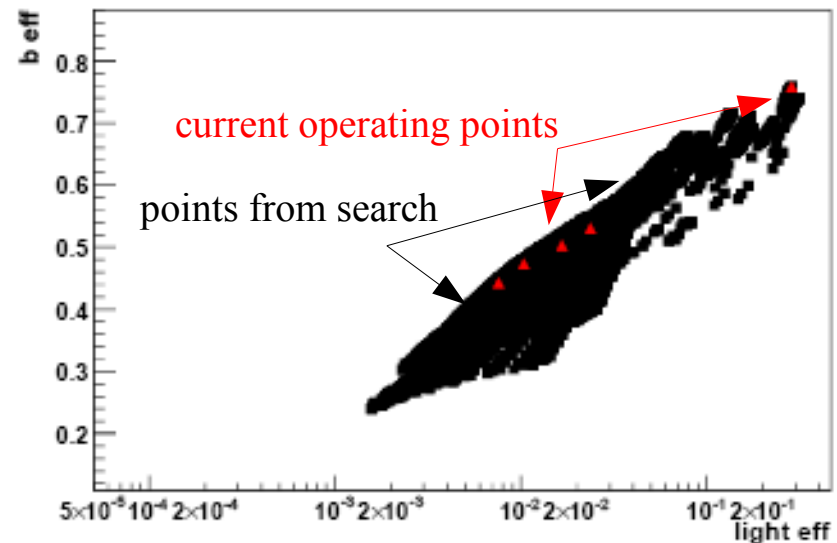
- **muon NN tagger for p17?** (Hwidong)

- Adds ~5% efficiency to b-ID / negligible extra fake rate
- We need to focus on a schedule for bringing this to completion

Taggability now done vs. PV_Z, pT, eta



b eff vs. light eff



b-ID Status

- **CVS package: nn_cert**

- Worked to turn certification macros from the p17 NN into a repeatable procedure
- Steps to certification:
 1. Use nn_cert framework package (based on d0root_example) to make “nn_ntuples” from b-ID, QCD, and emQCD data skims and all MC samples
 - In the future, these nn_ntuples could be made from CAF...
 2. Merge samples using btag_info_macros
 3. Train NN / run system 8 certification / make plots, using nn_cert_macros
- Some documentation has been written (in nn_cert/doc)

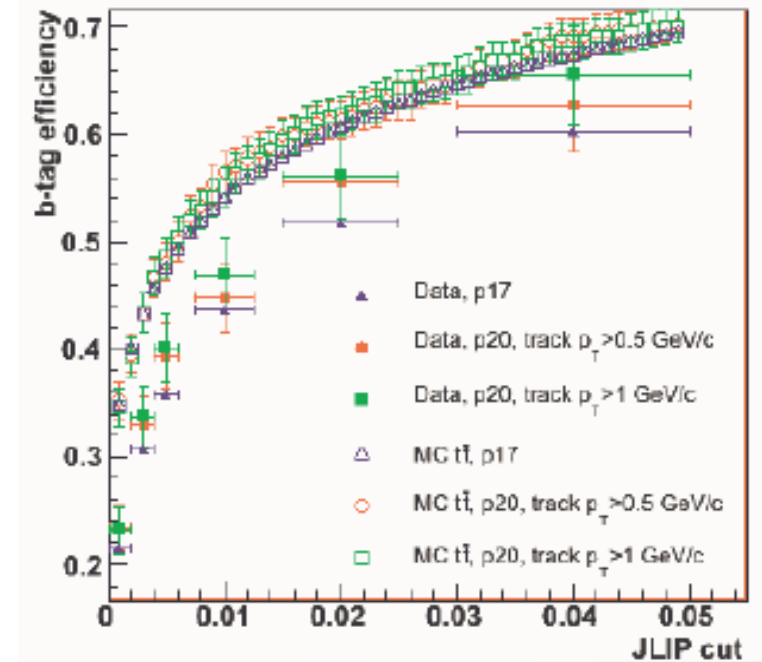
- **p17 NN – v2.0** (Sarah Schlobohm + Who???)

- Final JES, I am told there will be significant differences at low pT
- nn_cert improvements:
 - Better parameterizations (PV_z)
 - Include new inclusive b samples in Beta error
 - Tau TRFs?
 - Light-quark data/MC scale factor?
- Optimized SVT/taggability parameters
- A “tight SVT” for comparison (also coming for v1.1) – from Justace/Pieter
- New systematic: b->mu/b->incl. data/MC ratio?

b-ID Status

- **p20 – it's here!**

- Benoit has re-tuned JLIP resolution functions, extended track categories for Layer 0
- Test MC samples are being produced
 - Z->bb,cc,qq at various luminosities (0,150,300 e30)
 - We need a volunteer to look at this MC and measure eff. / fake rates, try to optimize, compare to p17, study Layer 0, etc.
- Basic p20 NN certification (Sarah + Who???)
- What major additions are foreseen for p20?
 - whatever improvements planned for p17 that did not make p17, we'll try to get into p20 :)
 - train NN against charm as well as light?
 - train NN against g->cc/bb, as well as light?



b-ID Status : Conclusions

- We've made a lot of progress in the past ~year:
 - CAFe interface for tagging, taggability, selection, and systematics
 - A working NN tagger for p17 data, excellent performance, nearly certified
 - An automated CAFe taggability parameterizer
 - nn_cert: a semi-automated NN certification package
 - Optimized SVT parameters, and algorithm improvements
- Things still aren't perfect, but progress has been made understanding some issues:
 - *Overestimated* tag-rate at low-pT in gluon-splitting samples (5-10% effect)
 - *Underestimated* taggability at low pT for high CPF jets (5-10% effect)
 - Finite cone size for b-hadron matching in MC / system 8 (2% effect) ...
- Lots still to do: ***
 - **Fix the above problems...**
 - **Get the muon-NN working,** finish certifying SVT for p17
 - Basic certification of NN p17 v2.0 **and make additional improvements:** (PV_Z, tau TRFs, new systematics, **light-jet data/MC SF's, etc...**)
 - **Basic certification of taggers for p20** **and make improvements:** (charm-jet separation, g->bb rejection, etc...)

*** will probably get done
may get done with current personnel
probably won't get done without new people