

MVA selection for $\tau \rightarrow 3\mu$

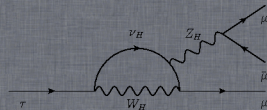
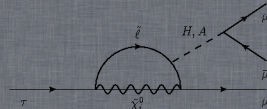
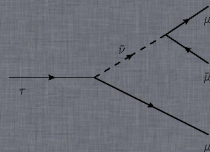
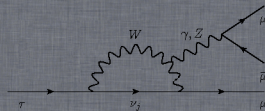
Marcin Chrzęszcz^{1,2}

¹ University of Zurich, ² Institute of Nuclear Physics, Krakow,

June 23, 2014



University of
Zurich^{UZH}

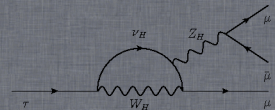
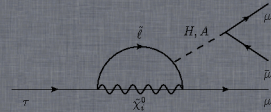
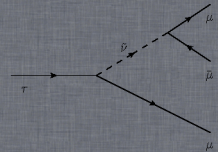
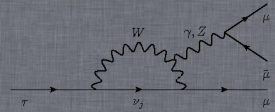


Blending - THE END

Binning optimisation

η background

Plan



Where did we end last year

- We decided to use Blending technique with MatrixNet.
- Jon updated the mixing numbers → Need to retrain everything and hope things are status quo.
- People thanks to $B_s^0 \rightarrow \mu\mu$ will ask about mass correlation → Need to check to shut them up. Big big surprise.

Status quo

- I was too lazy to retrain all TMVA stuff.
- So just compared: GeoMVA (we have it for free), MN standalone, Blending.
- Again Blending wins.

final2/ROC_2012.pr

Status quo

- I was too lazy to retrain all TMVA stuff.
- So just compared: GeoMVA (we have it for free), MN standalone, Blending.
- Again Blending wins. → I am happy.

final2/ROC_2012.pr

Status quo

- For sanity check I also have looked into 2011 data.
- Result stays the same.

final2/ROC_2011.pr

How does MN look like.

- So MN is Gradient BDT.
(name in the ntuple:
MN_BLEND)
- Applied transformation to
make flat signal
distribution. (name in the
ntuple:
MN_BLEND_FLAT).

`final2/bckmn.png`

`final2/MN.png`

`final2/MN_FLAT.png`

Mass correlation - Sit down, this is hardcore

- So lets check the correlation for my blending using MN.
- Correlation is flat and around 3.5%.
Everything seems to be ok.
- Now the scary part. I checked this for GeoMVA.

final2/corr_BLend.

Mass correlation - Sit down, this is hardcore

- I saw 30% correlation in our previous GEOMVA!
- Before I got a heart attack I had thought: Making clarifies flat has to change the correlation value. So GeoMVA was transformed to be flat, for 1:1 comparison.
- Never the less 15% in GeoMVA remains ;(

final2/corr_Geo.pr

MVA conclusions

- Blending is the best performing MVA.
- Mass correlation is reasonable low.
- GeoMVA mystery: Different RECO might have something to do with what we saw. It also could explain why GeoMVA is so efficient now(correlation might make the bck level artificially lower)
← this idea was after midnight and 3 pines of beer so I might now change my mind.

Binning

- Performed binning optimisation(with old trigger strategy and old classifier(before Jons updates)).
- All this will be updated of coz with Pauls new results + new clarifies.
- For 2012 for binning with eta veto:
PID: 0 0.10 0.42 0.75 0.81 0.86 1.00
BLEND_FLAT: 0. 0.05 0.38 0.63 0.71 0.82 1.00

`final2/cl1.png`

Binning - details

- Binning uses CLs method, not enough time to play with other FOM.
- Optimisation requires at least 8 events in the bin.
- Minimum bin size is 0.06.
- The sieve is 0.01

`final2/cl1.png`

Binning - details

- Did all the fits to η bck.
- Fits are far more stable then last year.
- Will try to make a single fit to all bins to reduce the systematics.
- All fits are here: LINK
- I was lazy and didn't want to latex thing that will change...
- The same with fits with η veto....
- MC/Data comparison doing Splot: LINK

The Plan

- 1 If we want to move with this for Moriond we would need to have a limit soon.
- 2 I would propose the attempt to have on next week a preliminary limit.
- 3 What we need:
 - $D_s \rightarrow \phi\pi$. Done for 2011 and 2012. Will appear today on my page.
 - New binning: 6 hours of computing one scenario \rightarrow tmr will have it.
 - Fits(with η veto: Wed).
 - Calibration: Paul?
 - Limit(lets aim 2011+2012). I have script from Diego with the combination for $B_s^0 \rightarrow \mu\mu$.
 - But it is never easy to run those things(2-3 days).
 - Lets try to make an effort?