Updates on activities.

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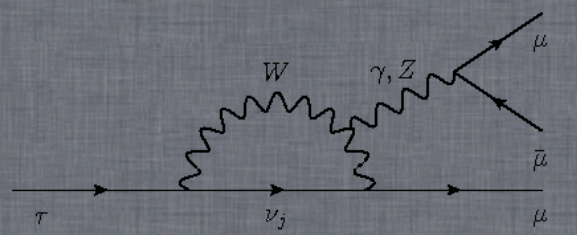
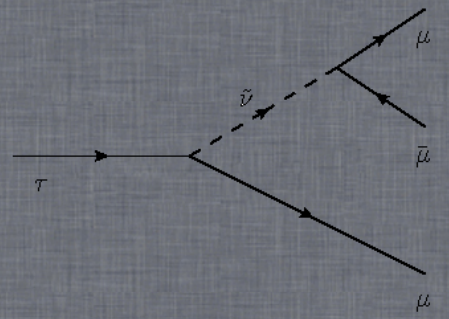
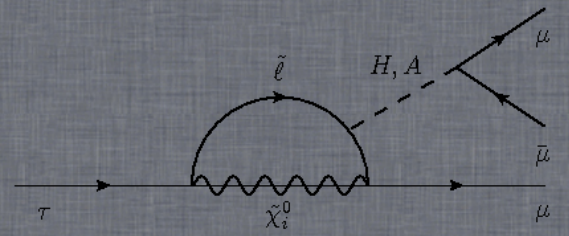
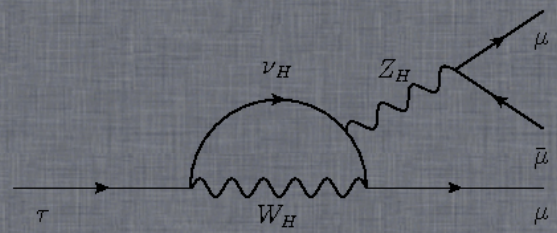
16th July 2013









Inflaton analysis

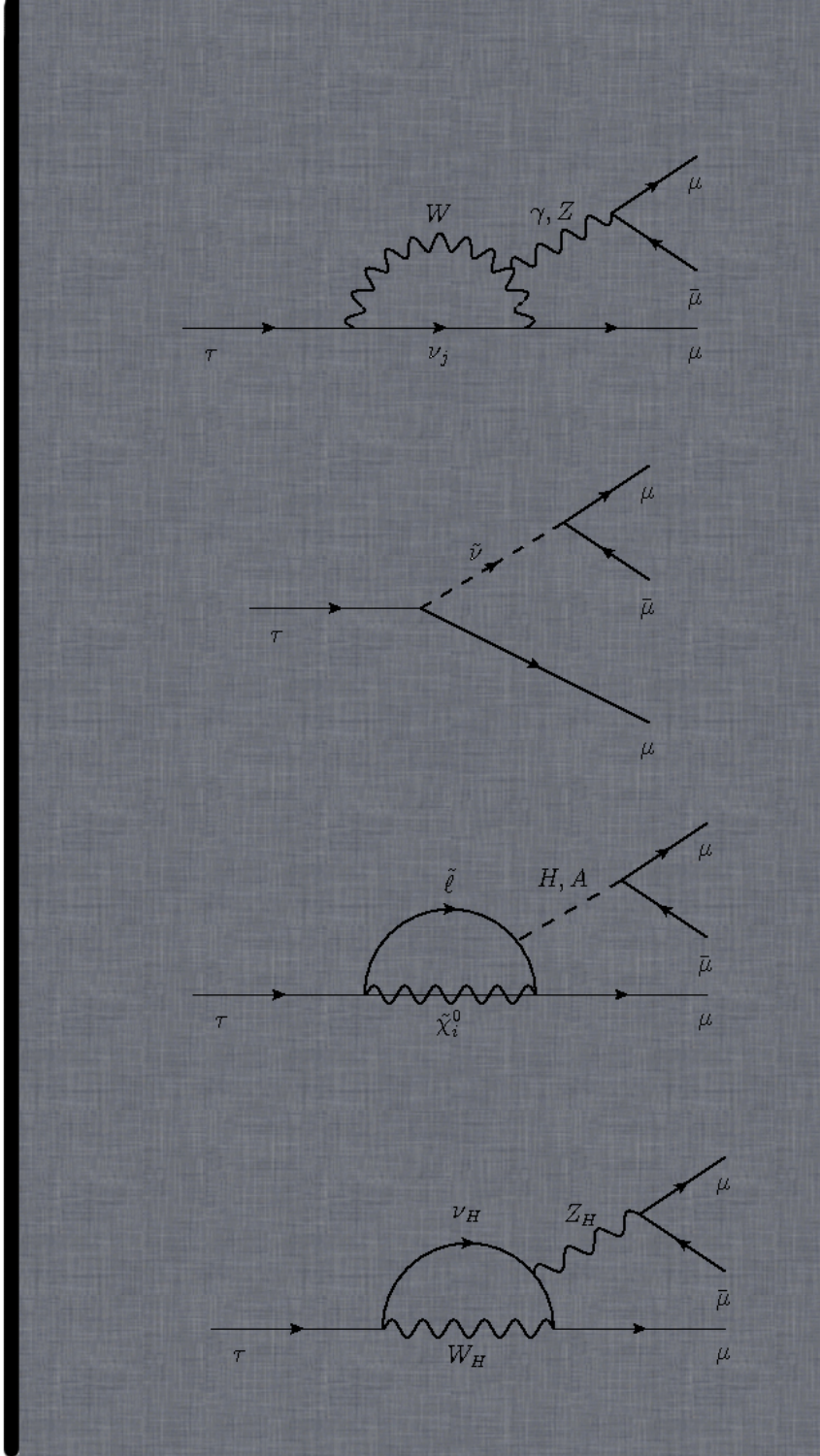
- MC samples
- Normalization Channel

$\tau \to 3\mu$

- Peaking background
- TMVA Training
- TMVA Training
- K_s FD
- Further steps

Bose-Einstein Correlations

Λ_c decays



MC Samples

To Study the behaviour of signal I am producing MC samples with different Inflaton life time:

1. $1 \times 10^{-10} s$, 1M
2. $2.5 \times 10^{-10} s$, 1M
3. $5 \times 10^{-10} s$, 1M
4. $7.5 \times 10^{-10} s$, 1.5M
5. $10 \times 10^{-10} s$, 1.5M

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MC Samples

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Sorry not everything green ☹ ☹ ☹

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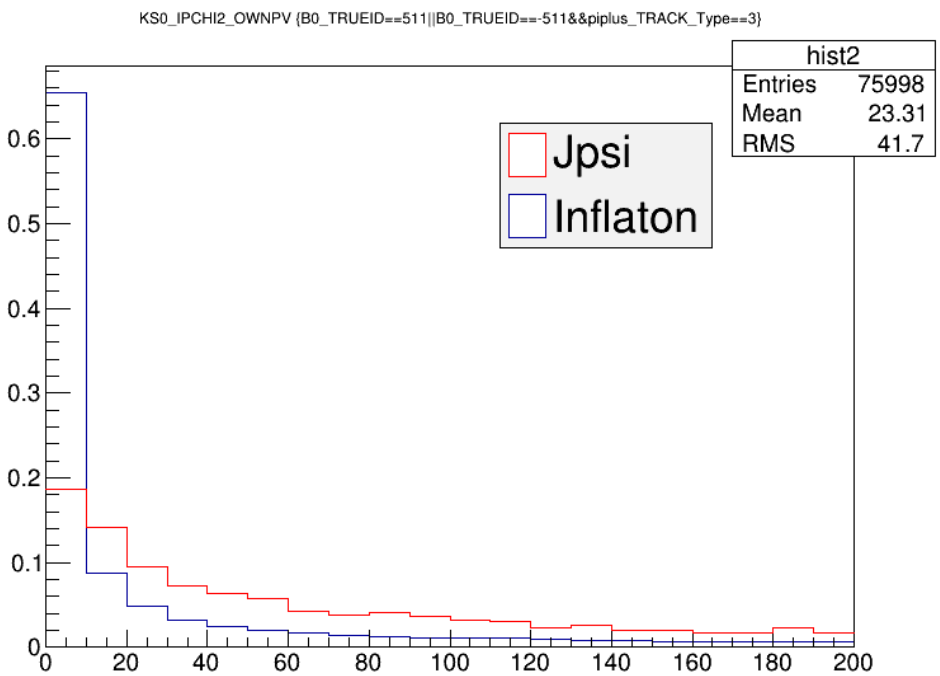
Normalization channel

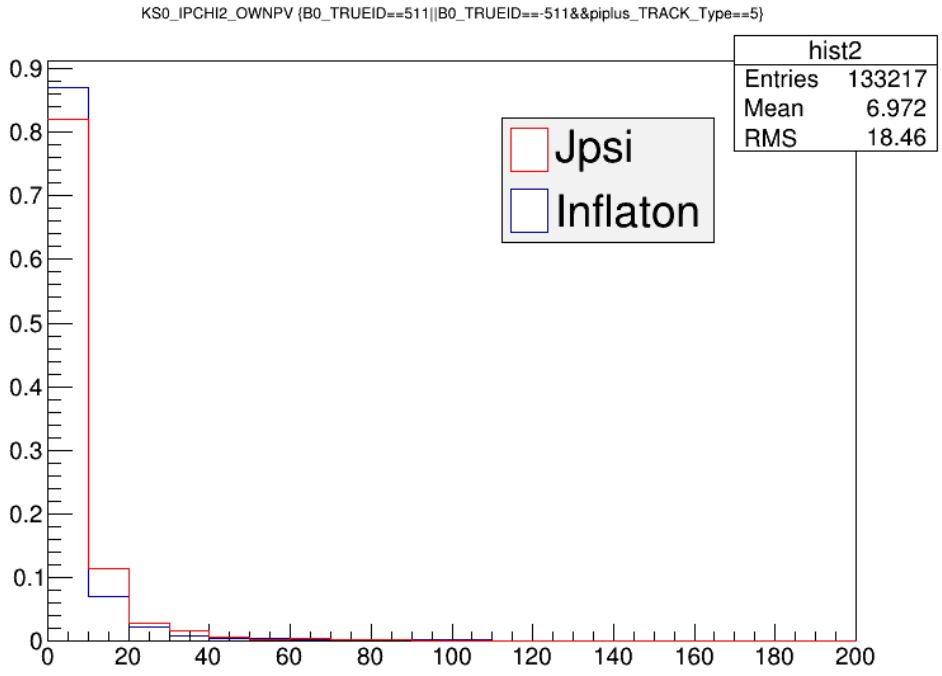
For the first idea we wanted to use $B^0 \rightarrow J/\psi K_s$. I had to compare how K_s imitates our signal inflaton on MC.:

IPCHI2

Long Tracks



DownStream



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IP

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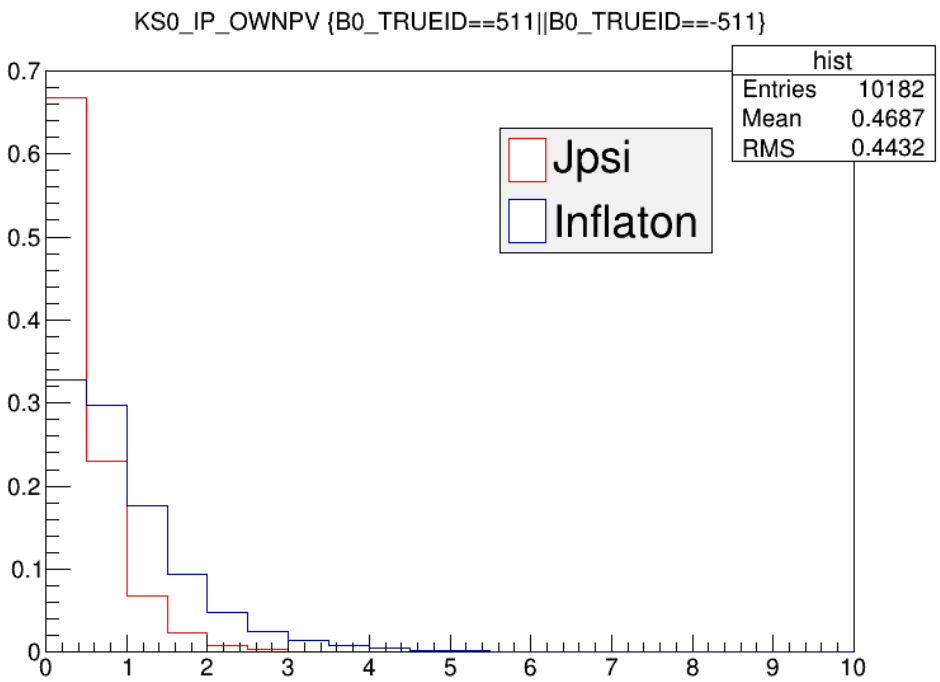

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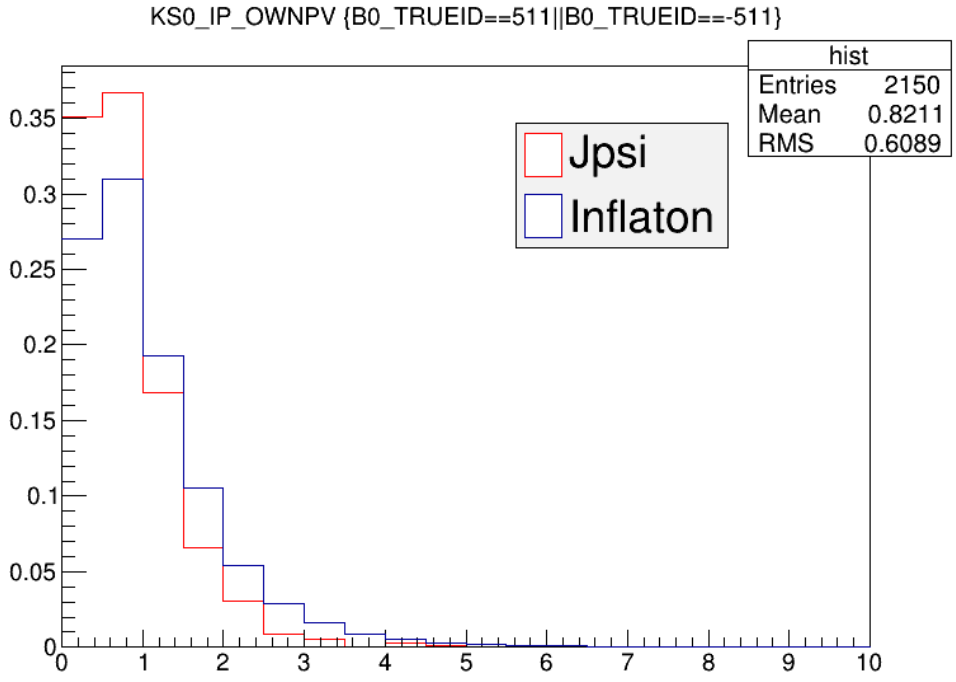

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Normalization channel

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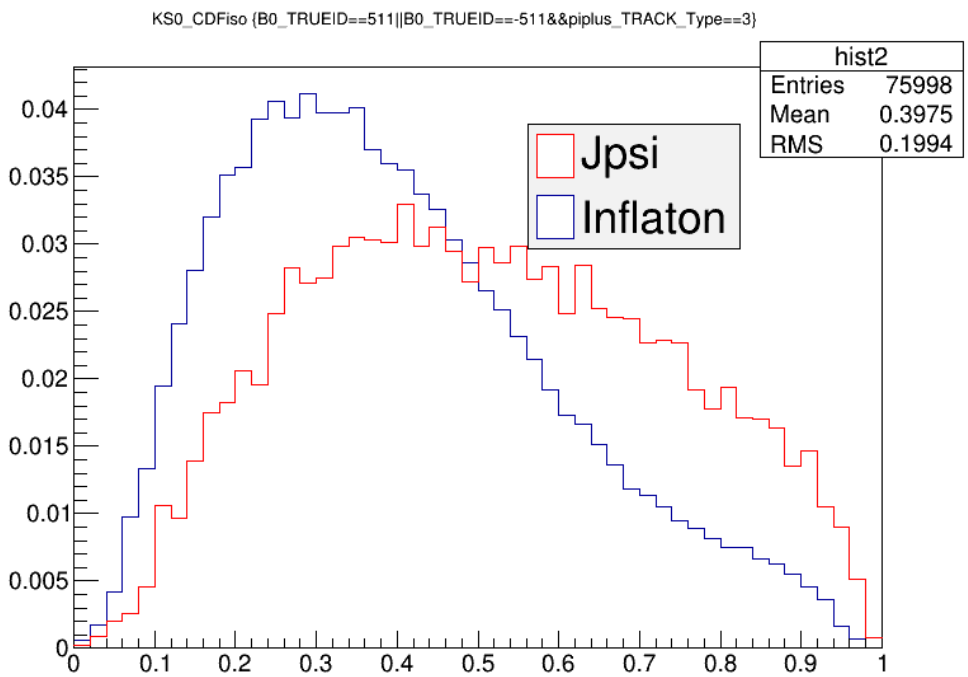
Cone isolation

Long Tracks



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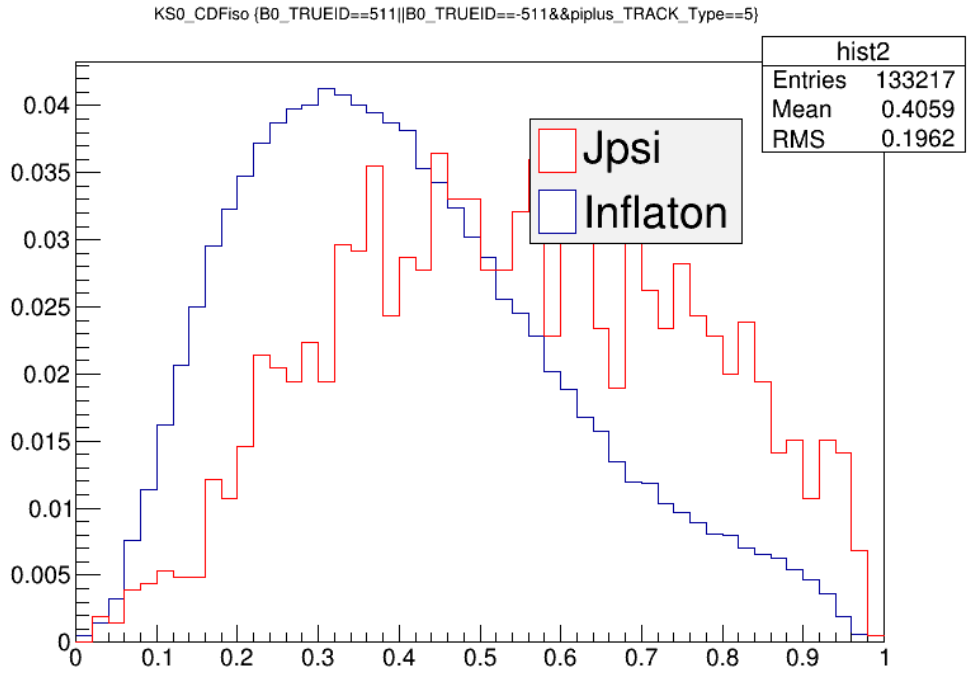

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Normalization channel

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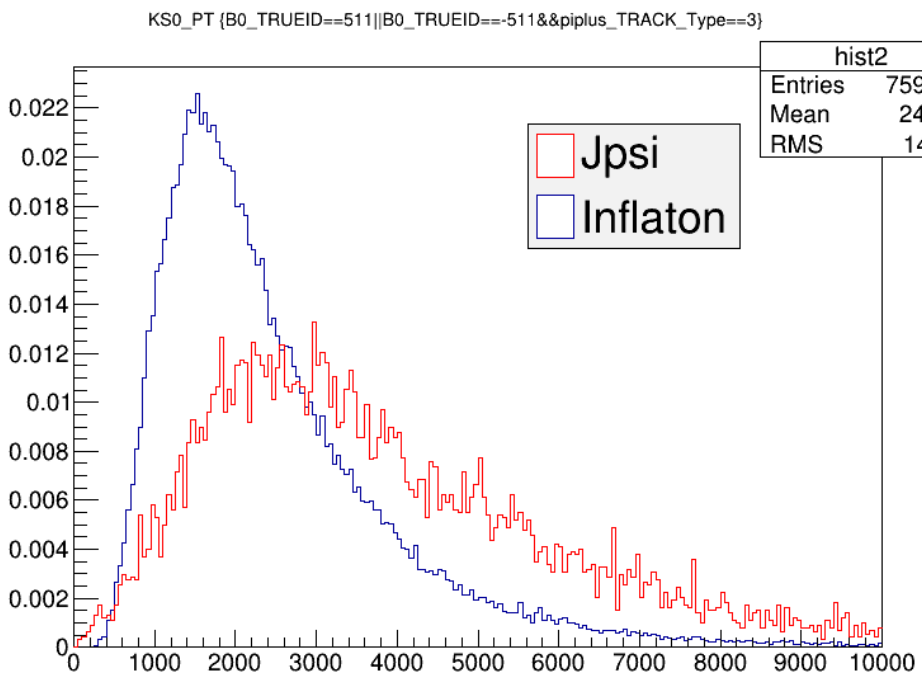
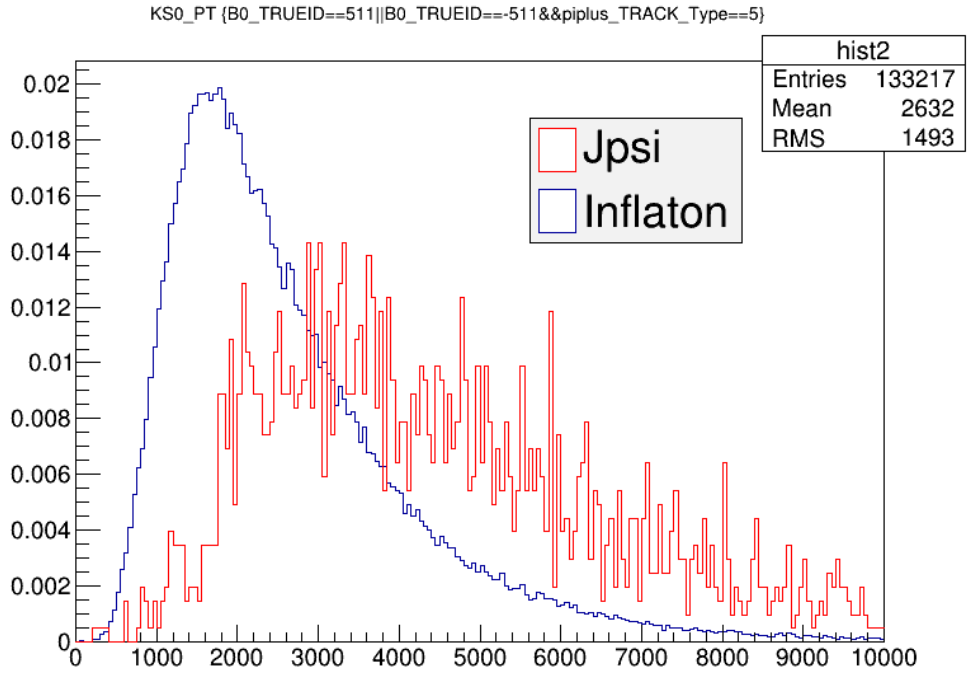
Pt

Long Tracks



DownStream



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Normalization channel

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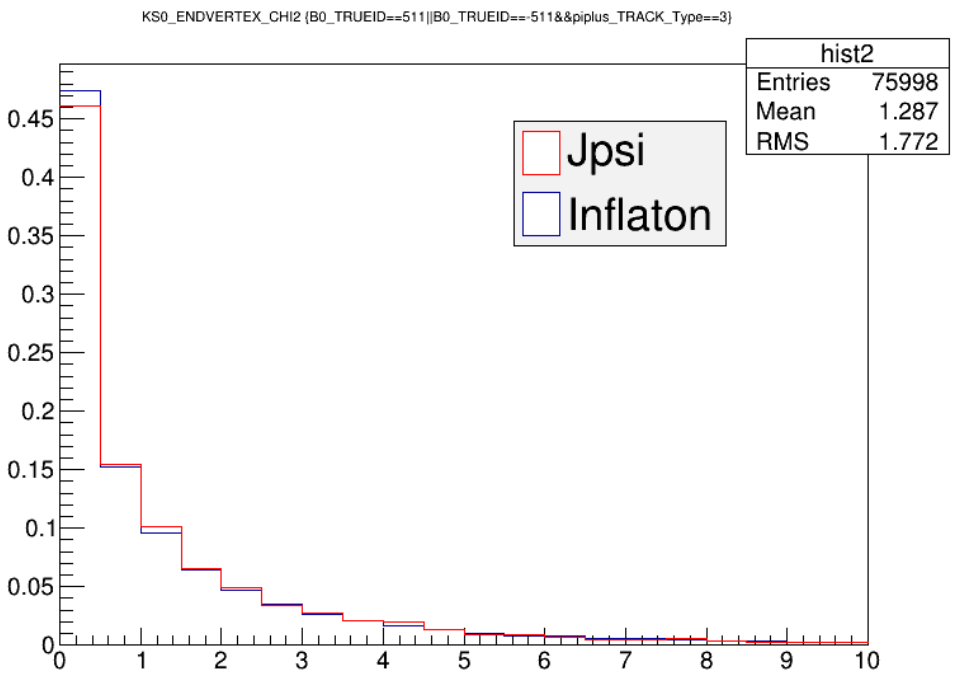
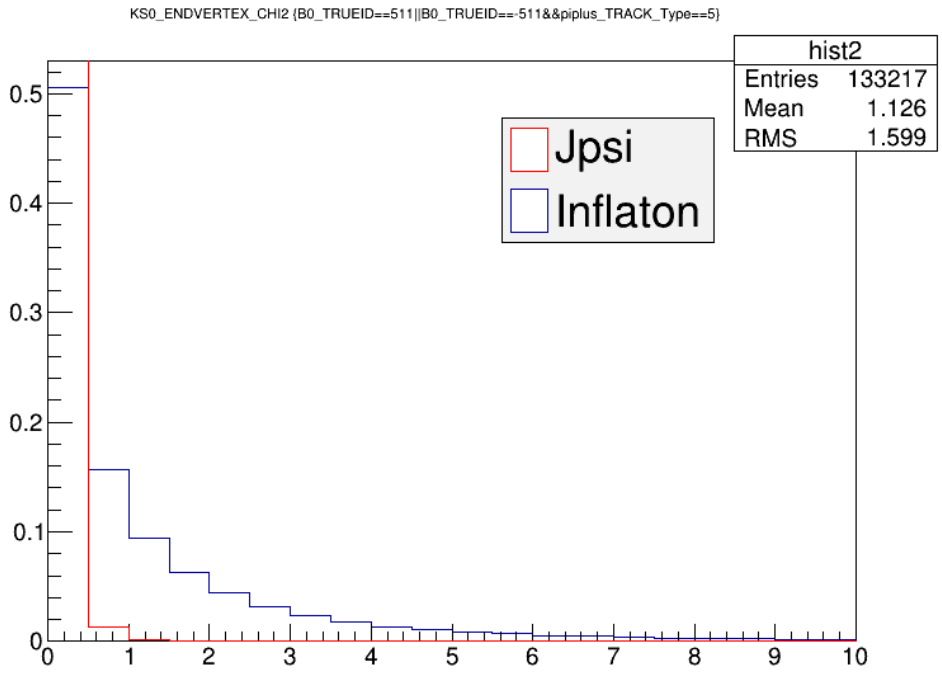
Vtx Chi2

Long Tracks



DownStream



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Summary on inflaton

1. Bid difference between control channel and signal ☹
2. Different control channel? Some Λ channel?
3. Reweigh MC?

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Making a cross check I found out that our geometry is surprisingly higher than last year:

1. MC11: 17.28%
2. Sim08a: 19.14%

Didn't believe that 2% is due to the higher CM energy.

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I run Generator Level MC to studied what has changed. Turns out this is pythia fault:

1. MC11, pythia6: 17.28%
2. Sim08a, pythia6: 17.96%
3. Sim08a, pythia6: 19.14%

To make story more funny this is true for all MC samples. With Jon Harrison we checked yesterday: $B_s \to \mu\mu$, $D_s \to \eta\mu\nu$ etc. We will let Gloria know about this. Does this change something in $B_s \to \mu\mu$?

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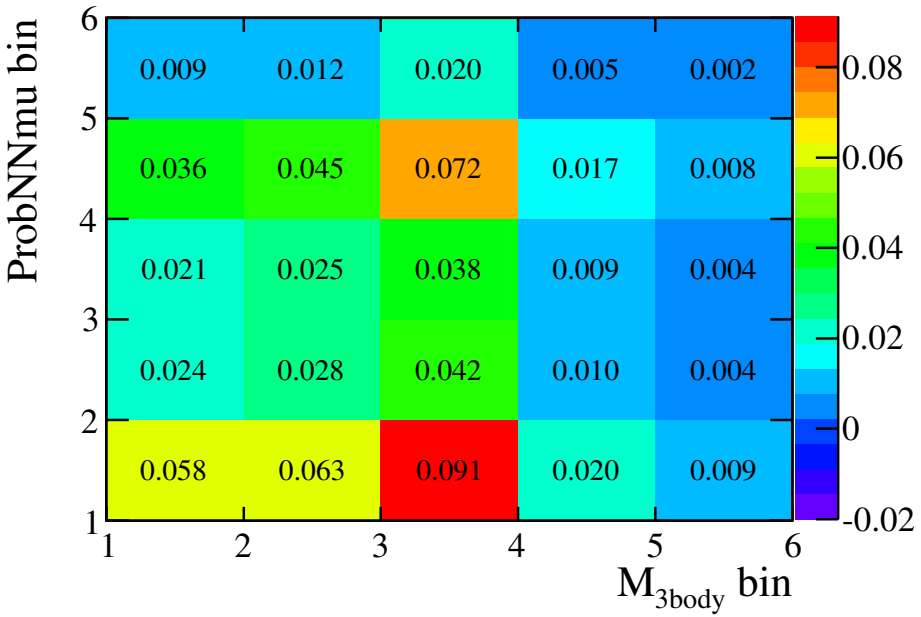
Peaking background

For $\tau \to 3\mu$ we have irreducible background: $D_s \to \eta(\mu\mu\gamma)\mu\nu$.
I performed fit to all our bins:



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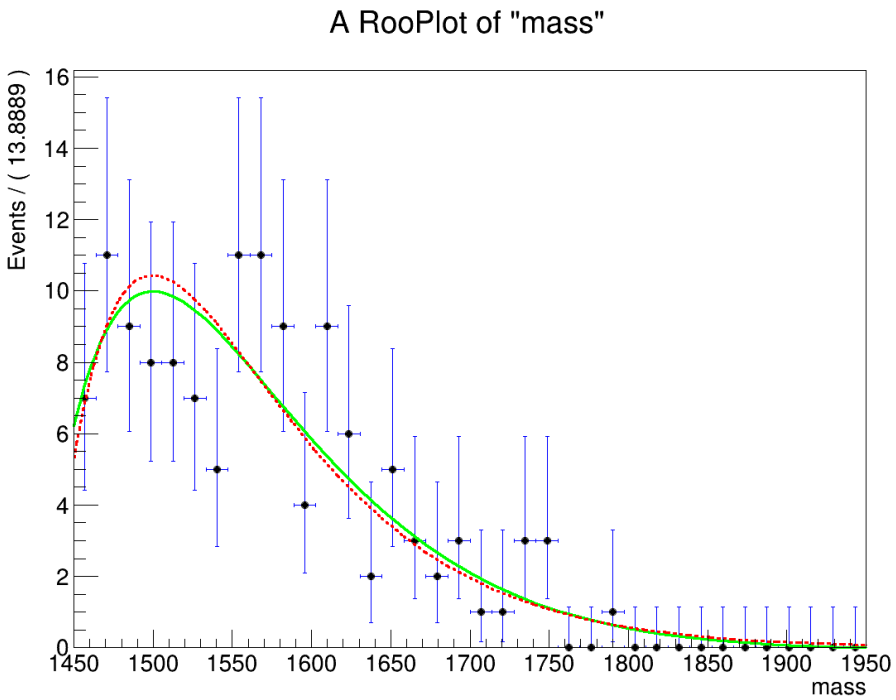
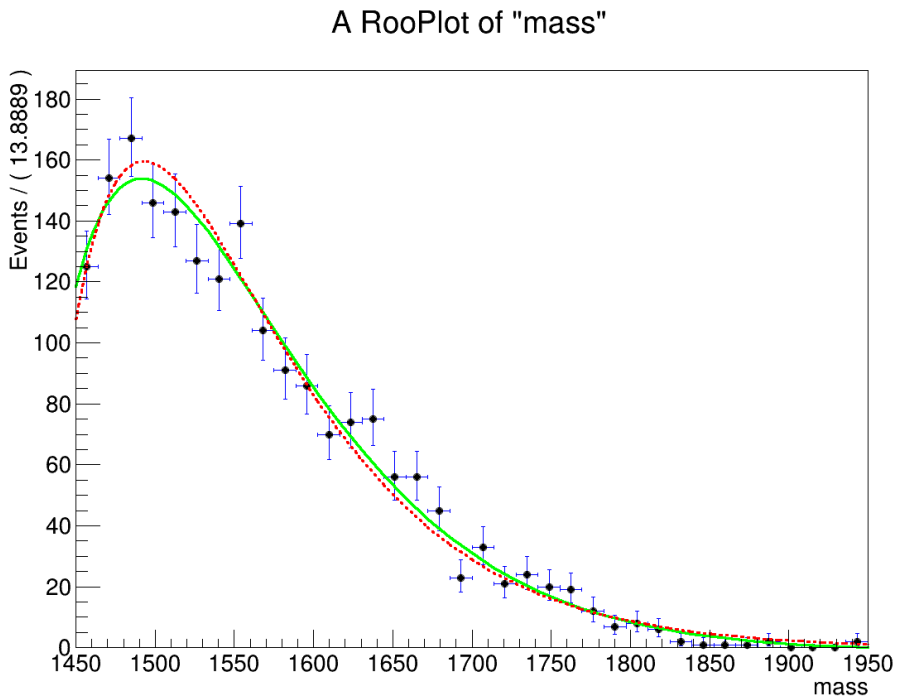
Peaking background





All fits:(user:lhcb, password: 2924)

`http://nz17-p1.ifj.edu.pl/work_public/LHCb/Tau23Mu/Eta_fits/`

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TMVA Training

Our τs come from 5 difference sources:

1. $B \to \tau$
2. $B \to D^+ \to \tau$
3. $D^+ \to \tau$
4. $B \to D_s \to \tau$
5. $D_s \to \tau$

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TMVA Training

Kaggle (leading machine learning competition platform).

If you notice how people win this competition; you'll notice that sometimes people combine two or more algorithm into ensemble and get better results.
This is called blending.
Isn't $\tau \to 3\mu$ perfect environment to play?

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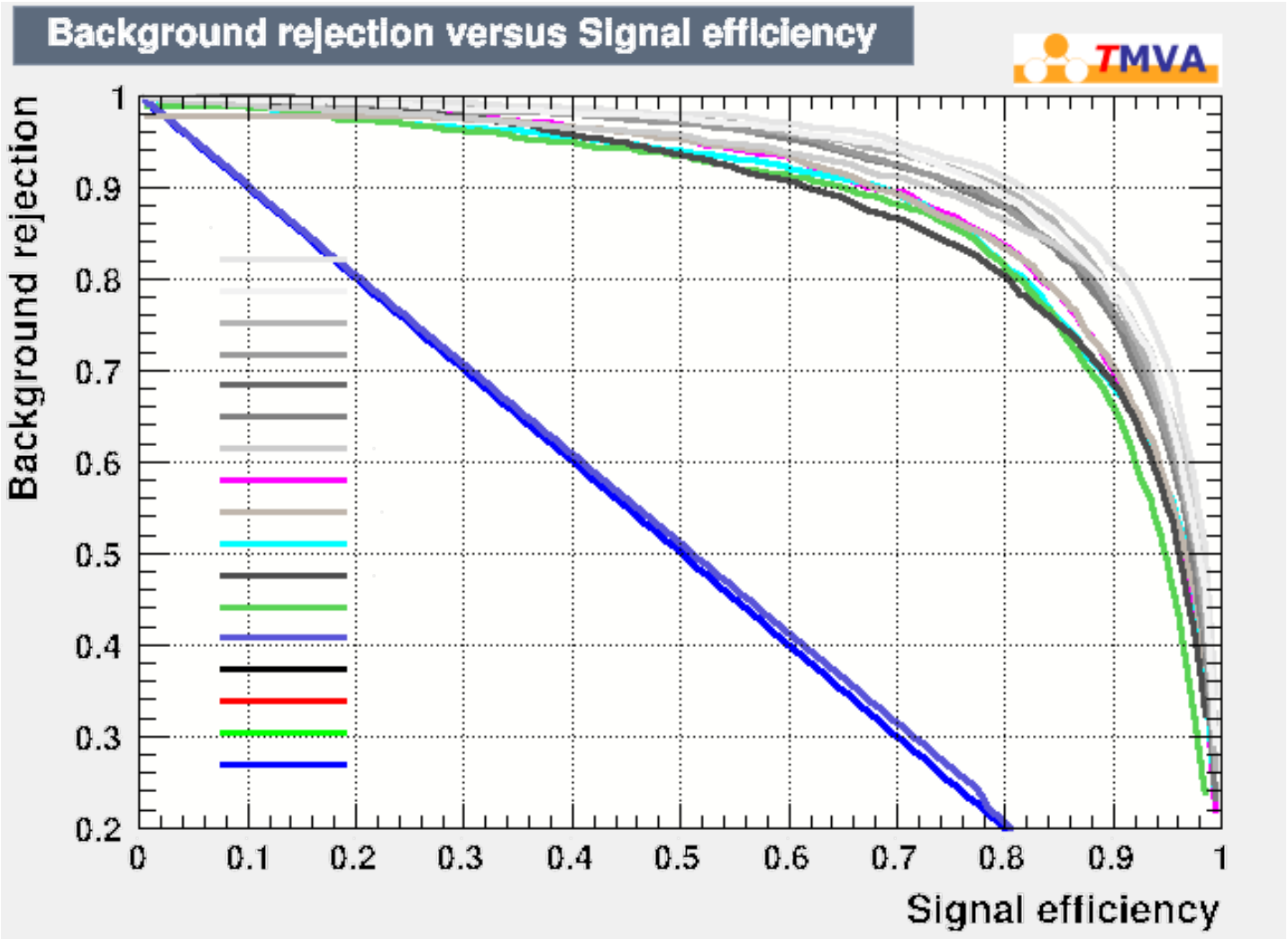
TMVA Training

Let's start with old BDT:



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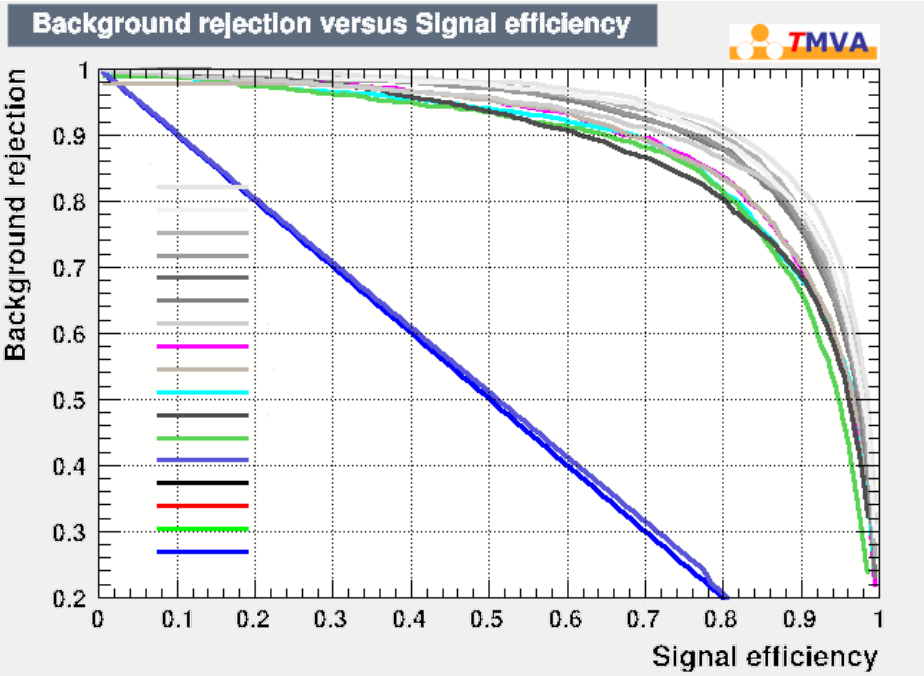
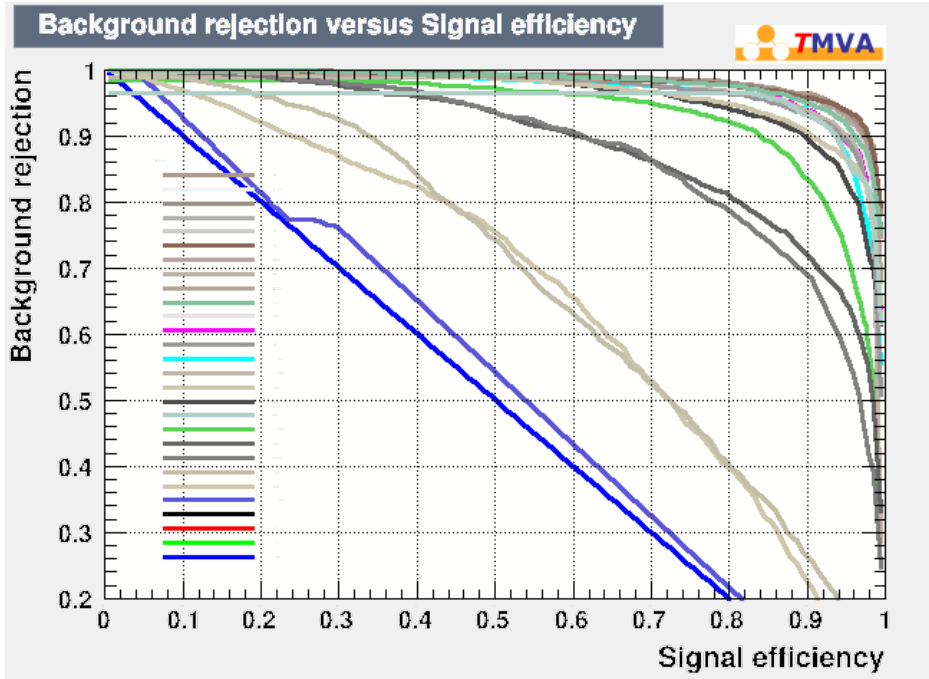
TMVA Training

End lets compare on training on individual signal types: $D_s \to \tau$





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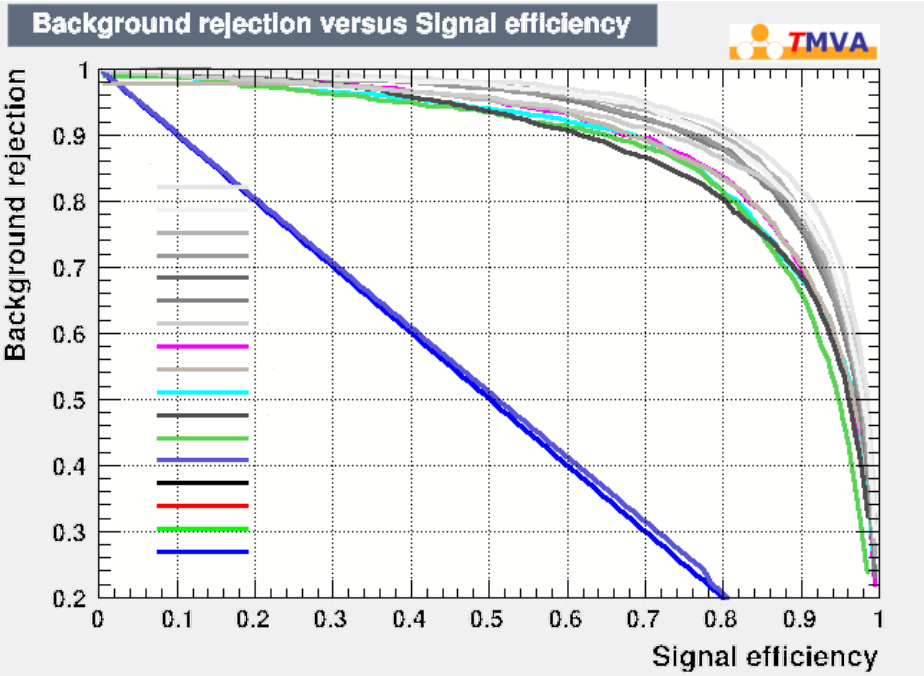
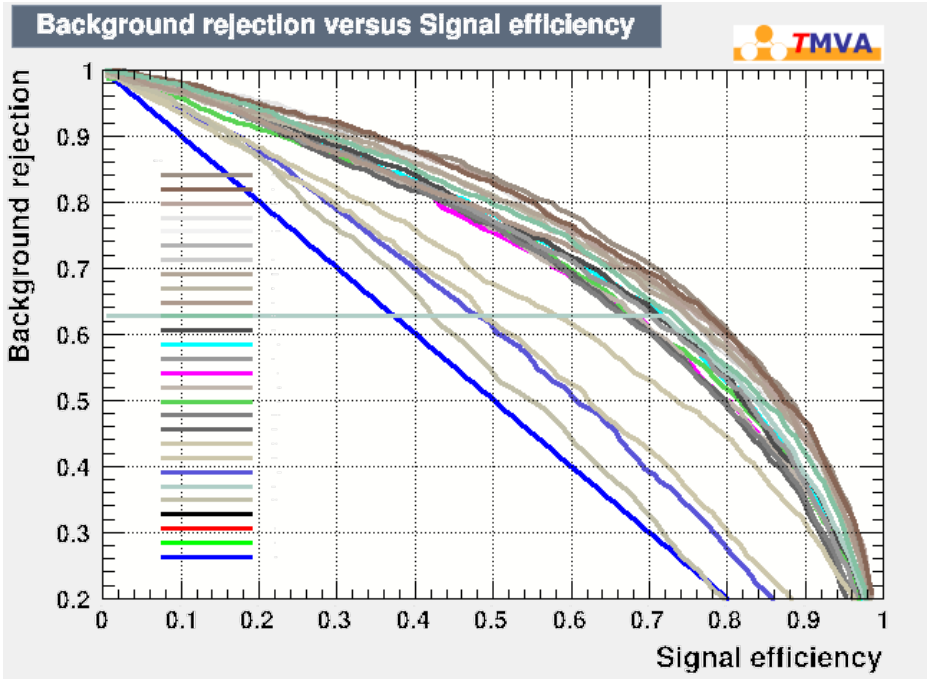
TMVA Training

End lets compare on training on individual signal types: $B \rightarrow \tau$





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Conclusions

- Ds is very promising!
- Our variables in BDT clearly not good for B channels.
- Studies are ongoing. There are thousands of combinations of different MVA i want to try combine.