Updates on activities.

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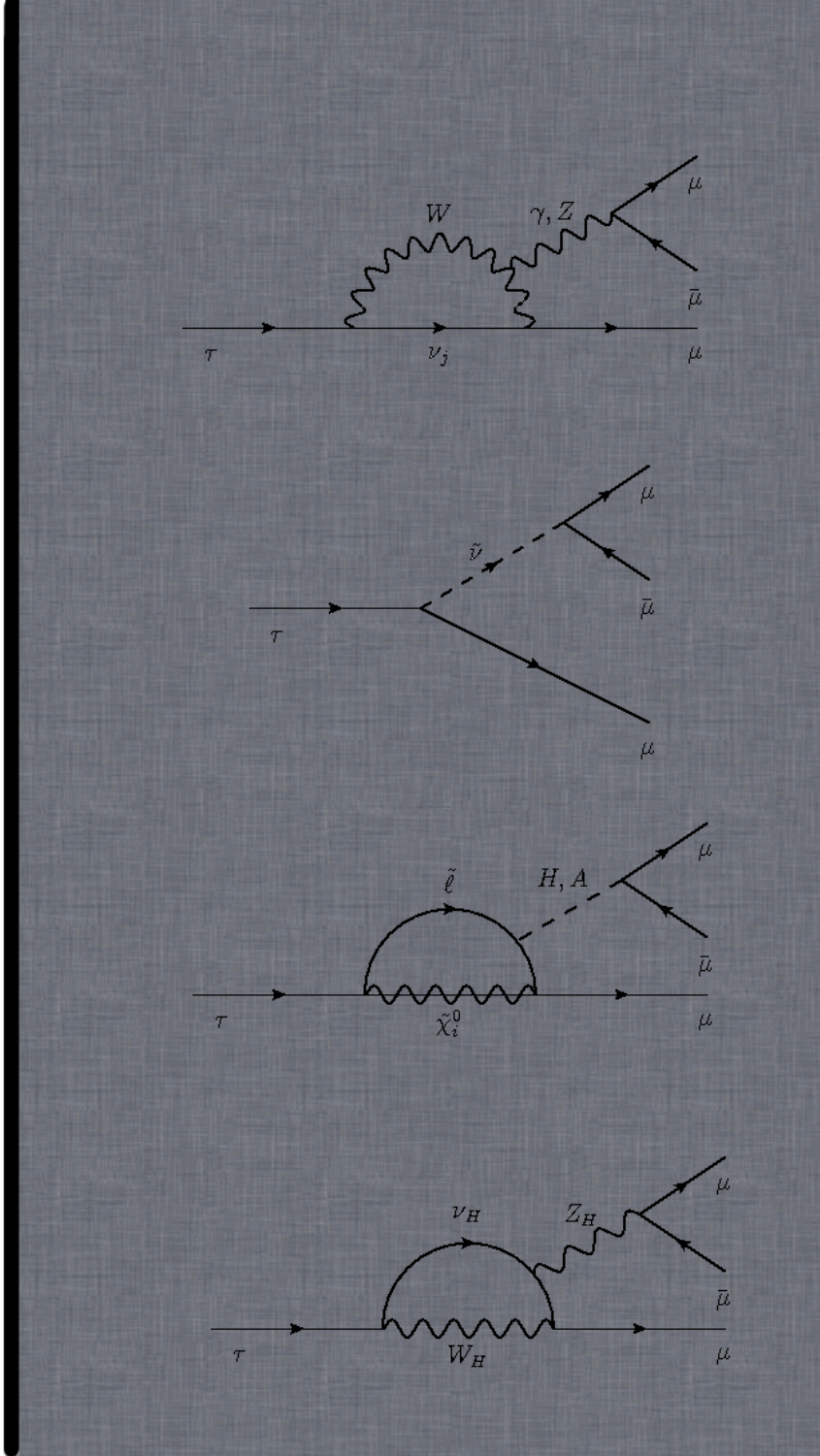
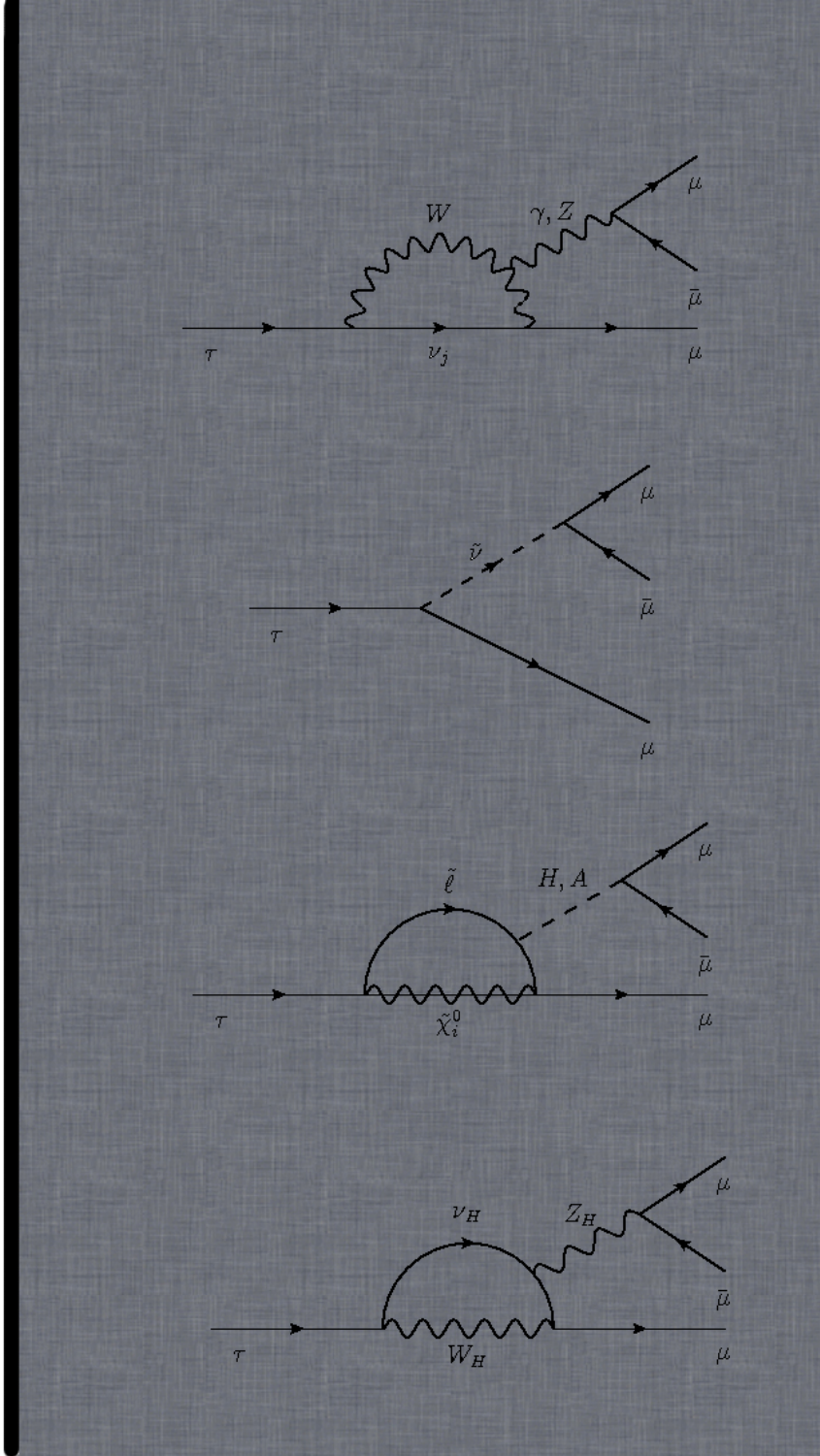


Inflatlon

Inflaton

$K^*\mu\mu$

Isolation optimisation



Reminder

1. We wanted to use $B^0 \to J\psi K_s$ as a normalization channel to $B^0 \to K^* X$.
2. We saw some discrepancy between MC of the two channel.
3. suspicion was it's becouse of mass and lifetime.
4. Idea, compare MC giving the inflaton attributes of K_s.

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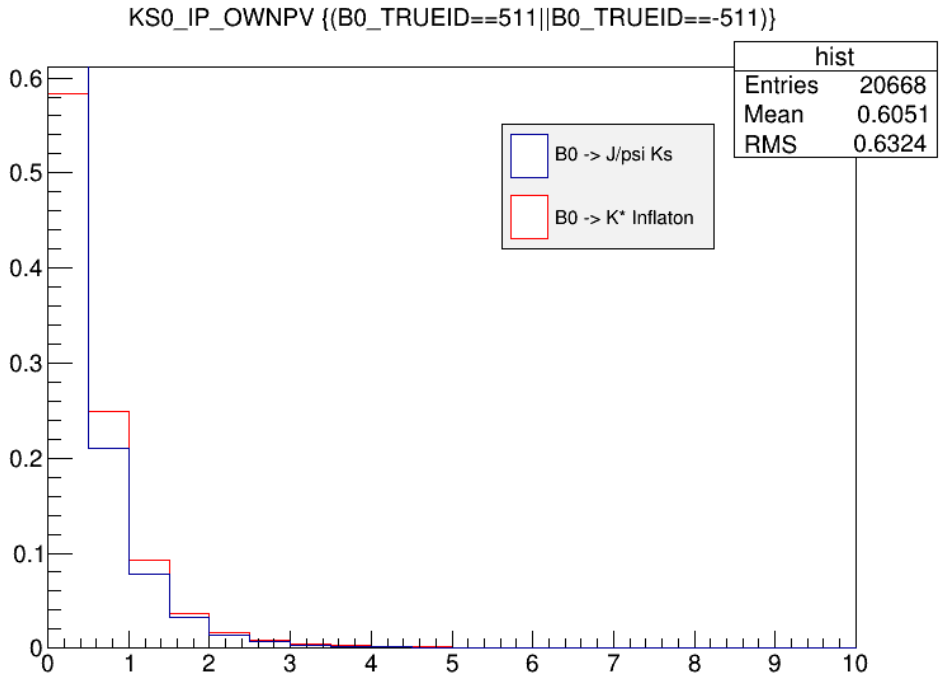
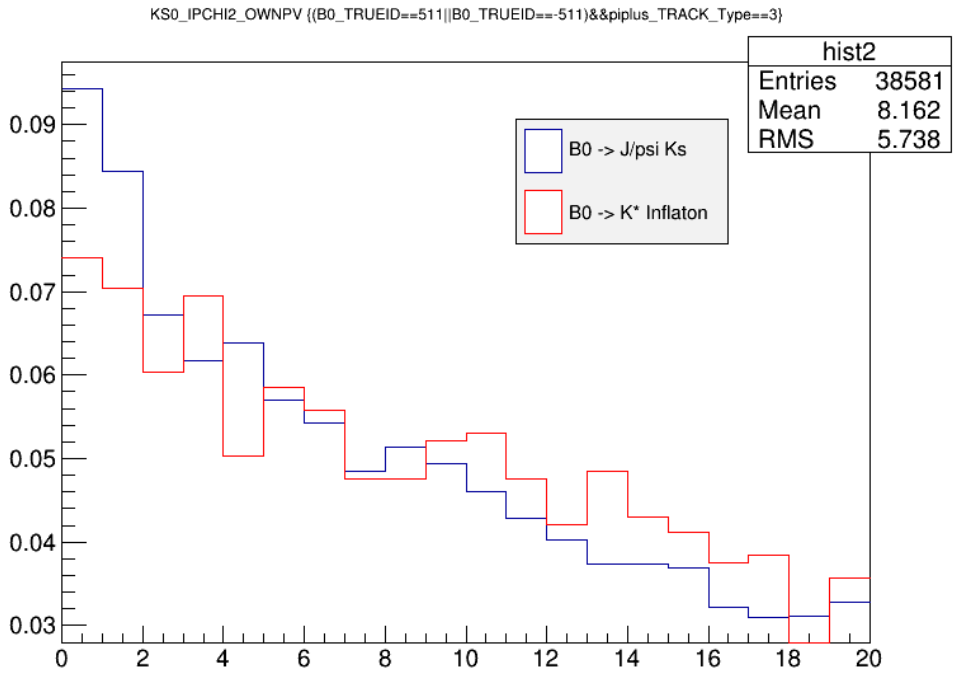
Reminder

IP



IPCHI2



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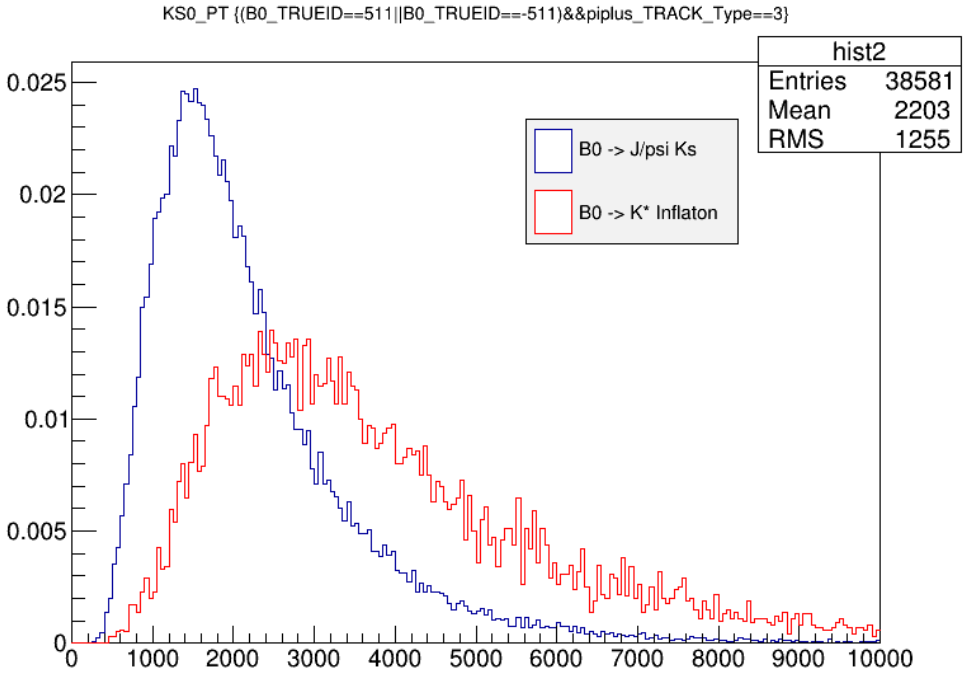
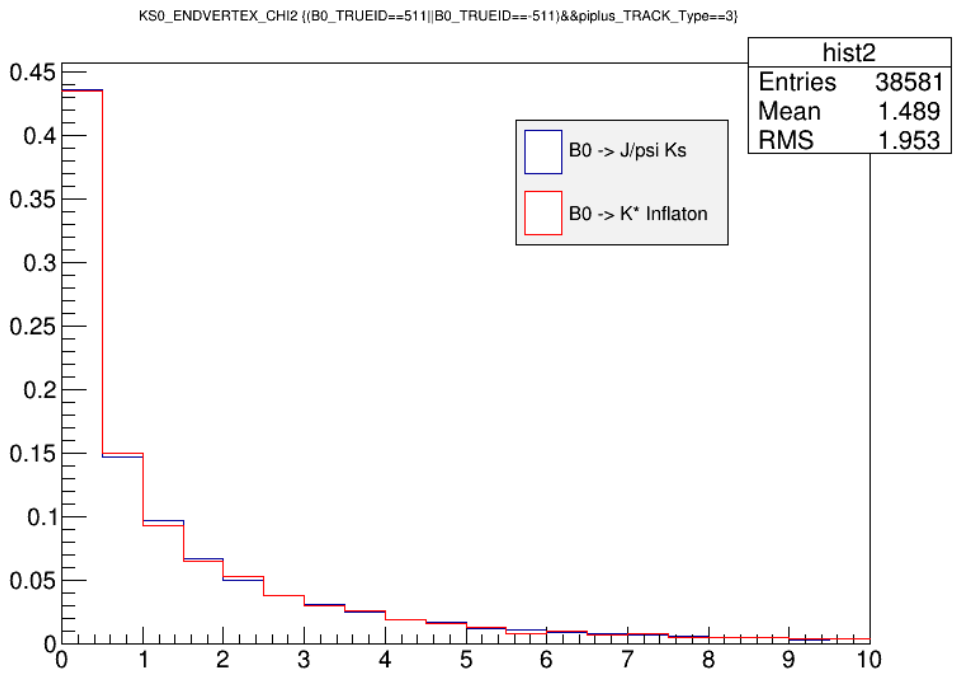
Reminder

PT



VRTCHI2



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Reminder

1. I am starting to sleep better at night :)
2. Need to check the downstream....

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Iso optimisation

Till now every analysis that used track isolation parameter used the ones develeloped and optimised for $B_s \to \mu\mu$. This is based on an abstract definitons of isolating and non-isolating tracks:

- Non-isolating track to a given track(μ from $B_s \to \mu\mu$ for example) will be atrack that has the same primary mother as muon.
- Isolating is the negation of non-isolating.

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Iso optimisation

This definition has potentially dangerous implications.

- Why very long living particles (Λ, K_s) have to be considered non-isolating?
- Imagine a long chain of decays. Every of this decay is non-isolating.
- When we do our analysis we are operating on basis of signal and bck hypothesis.
- There isnt a 1:1 correspondence between isolating and bck etc.

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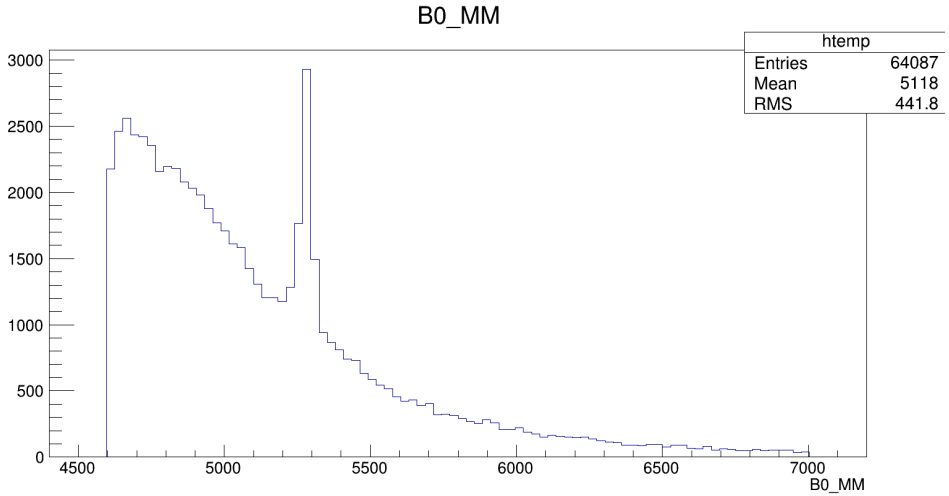
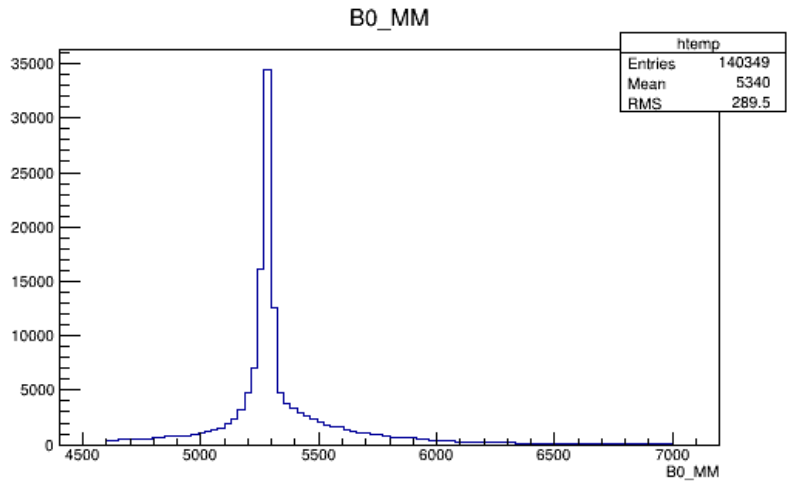
How to train?

Let's go back to the origin. We have our MC sample for signal and bck.

Background sample



Signal sample



VERY BIG BCK MC!

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How to train?

1. The main point of isolation variable is to fight again combinatorial bck.(example two decays trees are close and one picks something from the other).
2. We build our bck sample taking from MC truth the candidates that are combinatorial bck.

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How to train?

Now I will loose you all :P

1. We need to swap our signal and bck sample.
2. Why? Our signal sample contains: signal candidate(4 tracks)+ tracks surrounding this candidate. Our selection should be optimised in a way that we should end up with our single signal candidate without any tracks nearby.
3. Thats why our signal sample is our background sample.

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How to train?

1. Special module for TupleMaker was written.(need a psichiatras after this)
2. We define the training variables as Giampi did:+tckchi2+IP.
3. We put everything inside tmva.
4. The output of the tmva is then put again in new module of TupleMaker(at this point no psichiatras will be able to help...).
5. Then we scan the BDT response space and write how many tracks survive the cut.

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How to train?

1. In practice what we do is to scan BDT form 0. to 0.5 and count the tracks for each of the BDT value.
2. Then our new ntuple will have like 100 isolation parameters.
3. How to choose the best one?
4. Well isolation parameter on its own is usless. It has to be combined with other variables in TMVA. Than you can choose the best cut on the BDT.

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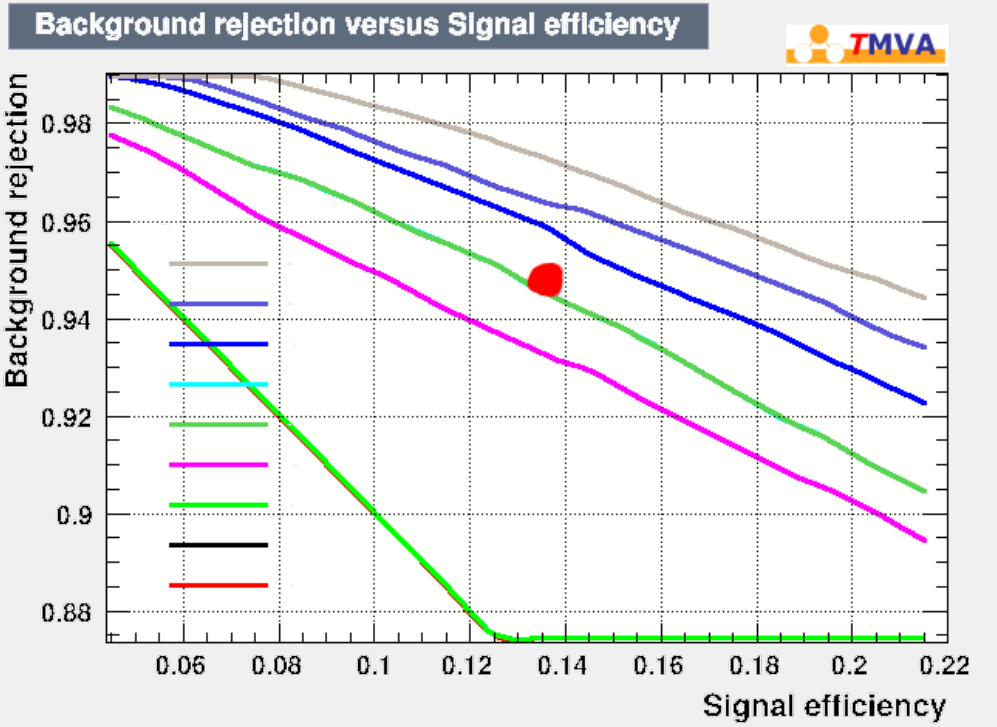
How to train?

Let's try judge from ROC curve:



this is not definitive! But looks promising.
Funny situation. My 20M bck events takes 4 hours to reproduce, but 1M on is stuck on grid on GRID for 12 hours?!?!

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$\tau \to 3\mu$

$\tau \to 3\mu$ is doing a new approach of isolation paramentr that is the same as giampi did but instead of cuts they use BDT.
With Nico we have a strong opinion it's not the best way to do it. That why I did similar studie for tau23mu as for $K^*\mu\mu$. In this case we are going one step further. I am training 5 different isolation parameters for 5 different τ sources:

- $D \to \tau$
- $Ds \to \tau$
- $B \to D \to \tau$
- $B \to Ds \to \tau$
- $B \to \tau$

$\tau \to 3\mu$

1. Does it make any sense to make my life so complicated?
2. YES!
3. Example: $B \to \tau$ is in 99% $B \to D\tau X$.
4. This means we if you have D and tau close to each other track from D can go to τ etc.
5. In their aproch this truck would be considered non-isolating which is nonsense because it forms a bck candidate!

$\tau \to 3\mu$

1. Again I did all the studies. and i am stuck with ganga to have final ntuples...
2. A bulet proof example that the signal on which you train matters: