

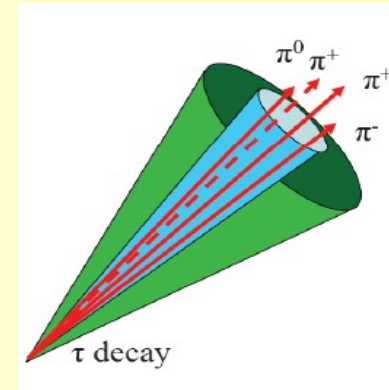
Track Quality Criteria for Taus and Photon Conversion Reconstruction

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Track Selection Procedure used in this study

- Select tracks on AOD level (no tau reconstruction)



- Find true taus ($|\eta| < 2.5$), classify them as 1 prong or 3 prongs tau decays
- For track quality criteria used in 'Calo Seed' taus :
 - count selected tracks within a cone of $DR < 0.3$ around the true tau
- For track quality criteria used in 'Track Seed' taus:
 - Find 1st quality track within a cone of $DR < 0.2$ around the true tau
 - Find 2nd quality tracks within a cone of $DR < 0.2$ around the 1st quality track

Default Quality Cuts for Track Selection

Calo Seed:

Cut	Value
pTMin	1000
IPd0Max	1.
IPz0Max	1.5
nHitBLayer	0
nHitPix	0
nHitSct	0
nHitSi	7
nHitTrt	0
$\chi^2 ndf$	99999.

Track Seed:

Cut	Tau1P	Tau3P
pTMin	6000.	1000
IPd0Max	2.	1.
IPz0Max	10.	1.5
nHitBLayer	0	1
nHitPix	0	2
nHitSct	0	0
nHitSi	7	7
nHitTrt	0	0
$\chi^2 ndf$	99999.	99999.

Track Selection Efficiency

Track Selection for 'Calo Seed':

	1 Prong tau		3 Prong taus		1P + 3P
	w/o conv.	w. conv	w/o conv.	w. conv	
Default	86.8%	64.8%	76.2%	62.9%	73.0 ± 0.4 %
Default + Conv. Tool	87.5%	76.5%	70.2%	62.8%	77.6 ± 0.4 %

↑	↑	↑
significant improvement	but degradation...	total efficiency improves!

Track Selection for 'Track Seed':

	1 Prong tau		3 Prong taus		1P + 3P
	w/o conv.	w. conv	w/o conv.	w. conv	
Default	90.6%	84.7%	72.0%	66.9%	82.6 ± 0.4 %
Default + Conv. Tool	88.1%	84.1%	67.9%	63.6%	80.5 ± 0.4 %
no Blayer+Conv. Tool	88.1%	81.3%	68.6%	63.6%	79.5 ± 0.4 %

↑	↑	↑
degradation in performance		

Track Migration

Track Selection for 'Calo Seed':

	1P→3P		3P→1P	
	w/o conv.	w/ conv.	w/o conv.	w/ conv.
Default	1.4%	8.2 %	1.3%	1.6%
Default + Conv. Tool	0.5%	3.7%	3.7%	5.1%

significant
improvement

but
degradation...

Track Selection for 'Track Seed':

	1P→3P		3P→1P	
	w/o conv.	w/ conv.	w/o conv.	w/ conv.
Default	0.4%	1.6%	2.5%	2.1%
Default + Conv. Tool	0.3%	1.0%	4.0%	3.2%
No BLayer+Conv. Tool	0.3%	1.6%	3.8%	3.1%

No improvement with conv. tool

Conclusion

“Calo Seed” quality tracks:

- The photon conversion tagging tool:
 - significantly improves the 1P tau selection efficiency and migration
 - degrades performance for 3P tau selection;
 - but similar comparison on performance using reconstructed taus indicates no degradation (see previous talk)

“Track Seed” quality tracks:

- No improvement on performance by neither including the photon conv. tagging tool nor replacing the nHitBLayer cut by the photon conv. tagging tool

Would be interesting to repeat this study including pile-up effects