中国科学院高能物理研究所
Institute of High Energy Physics Chinese Academy of Sciences

2022年第四季度考核

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Content

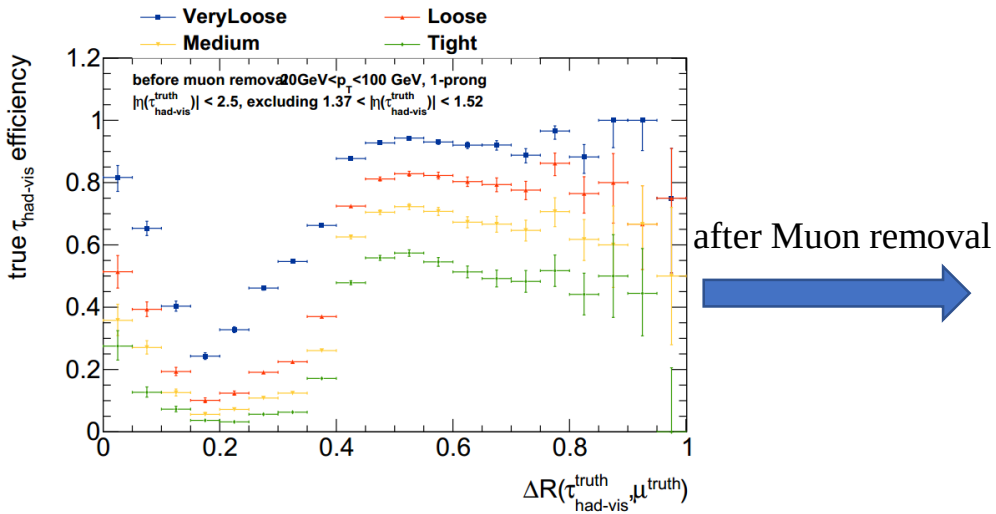
- H→2a→4tau merged analysis:
  - New derivation TAUP6 production is done
  - Signal yields and efficiency look good
- Qualification task: HGTD module automation assembly
  - QT note finished
  - Final report was given in the HGTD week
  - QT was approved
- MOST2 vertex test beam at DESY
  - Services and shifts work

$H \to 2a \to 4\tau$ Merged Analysis

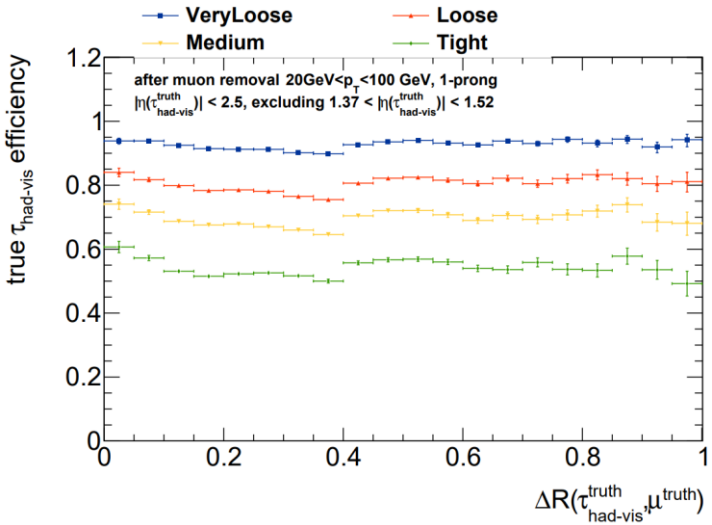
- The muon removal code was merged into the official repository
- The new derivation TAUP6 production is done
  - Run 2 data
  - Signal and background MC samples

- data15: https://prodtask-dev.cern.ch/prodtask/inputlist_with_request/45790/ - done
- data16: https://prodtask-dev.cern.ch/prodtask/inputlist_with_request/45791/ - done
- data17: https://prodtask-dev.cern.ch/prodtask/inputlist_with_request/45792/ - done
- data18: https://prodtask-dev.cern.ch/prodtask/inputlist_with_request/45793/ - done

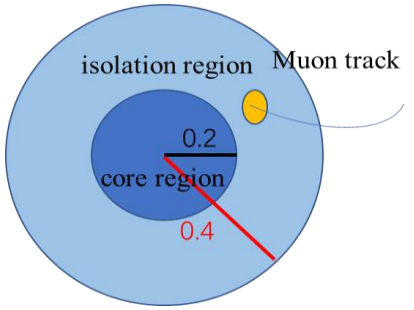
total	done	finished	broken
367	365	1	1



after Muon removal

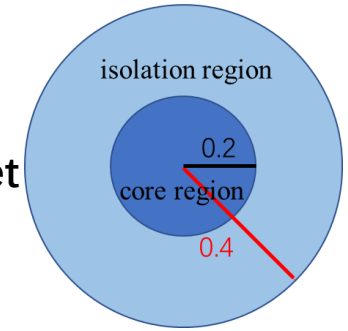


TauJet



Muon removal

MuRmTauJet



$H \rightarrow 2a \rightarrow 4\tau$ Merged Analysis

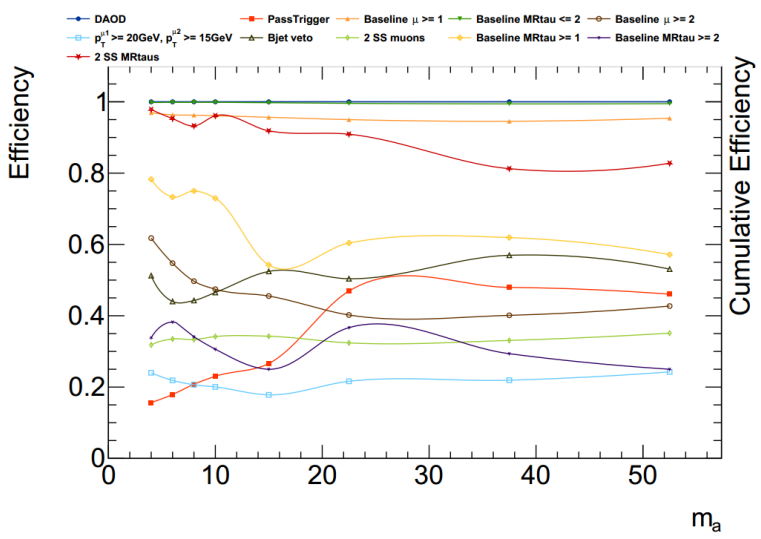
- Signal cutflow yields:
  - Keep the similar cutflow as the resolved 4τ analysis
  - More signal yields in the merged regime than the resolved regime
  - The final cumulative efficiency is more or less the same for both the merged regime and resolved regime.
  - All the background except the fakes are estimated from MC and they are all under control

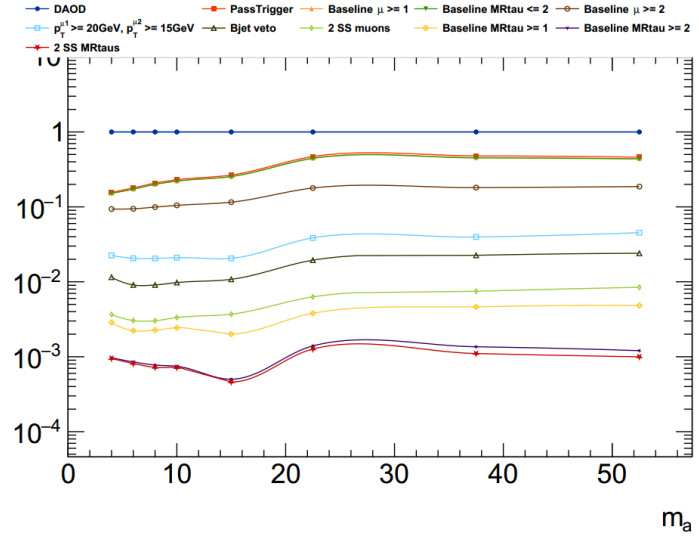
signal

cut name	4 GeV	6 GeV	8 GeV	10 GeV	15 GeV	22.5 GeV	37.5 GeV	52.5 GeV
DAOD	34328	18607	15205	13859	12606	4337	4597	7295
PassTrigger	5376	3334	3163	3191	3353	2036	2204	3359
Baseline $\mu \geq 1$	5213	3212	3044	3067	3208	1934	2084	3205
Baseline $MRtau \leq 2$	5202	3207	3039	3062	3200	1925	2072	3188
Baseline $\mu \geq 2$	3213	1755	1510	1453	1457	774	831	1362
$p_T^{leadmu} \geq 20GeV$, $p_T^{subleadmu} \geq 15GeV$	772	384	312	291	260	167	182	330
Bjet veto	396	169	138	136	136	84	104	175
2 SS muons	126	57	46	46	47	27	34	62
Baseline $MRtau \geq 1$	98	41	35	34	25	16	21	35
Baseline $MRtau \geq 2$	33	16	12	10	6.3	6.0	6.2	8.8
2 SS MRtaus	33	15	11	9.9	5.8	5.5	5.1	7.3

background

cut name	ttbar	Tribosons	WZ	ggZZ	qqZZ	ttW	ttbarZ
DAOD	2.0e+06	229	60035	364	14643	9791	2701
PassTrigger	1.5e+06	177	39810	297	10029	5801	2179
Baseline $\mu \geq 1$	1.4e+06	174	39129	294	9905	5310	2038
Baseline $MRtau \leq 2$	1.4e+06	174	39120	293	9899	5307	2034
Baseline $\mu \geq 2$	512319	134	20715	229	7667	1829	1395
$p_T^{leadmu} \geq 20GeV$, $p_T^{subleadmu} \geq 15GeV$	325296	106	14374	180	5386	893	1076
Bjet veto	29153	90	12851	155	4801	76	87
2 SS muons	1734	1.5	773	1.3	49	22	3.3
Baseline $MRtau \geq 1$	262	0.39	94	0.25	6.3	2.8	0.83
Baseline $MRtau \geq 2$	13	0.04	3.4	0.02	0.35	0.16	0.06
2 SS MRtaus	7.5	0.03	1.4	0.01	0.25	0.06	0.03





Qualification task: HGTD module automation assembly

- The qt note draft has been finished
  - Summarized almost all HGTD module assembly work at IHEP
  - Hardware and software of the gantry system
  - Module assembly details
  - Preliminary metrology results
- The qualification was approved after the qt final report at HGTD week (link)

Contents

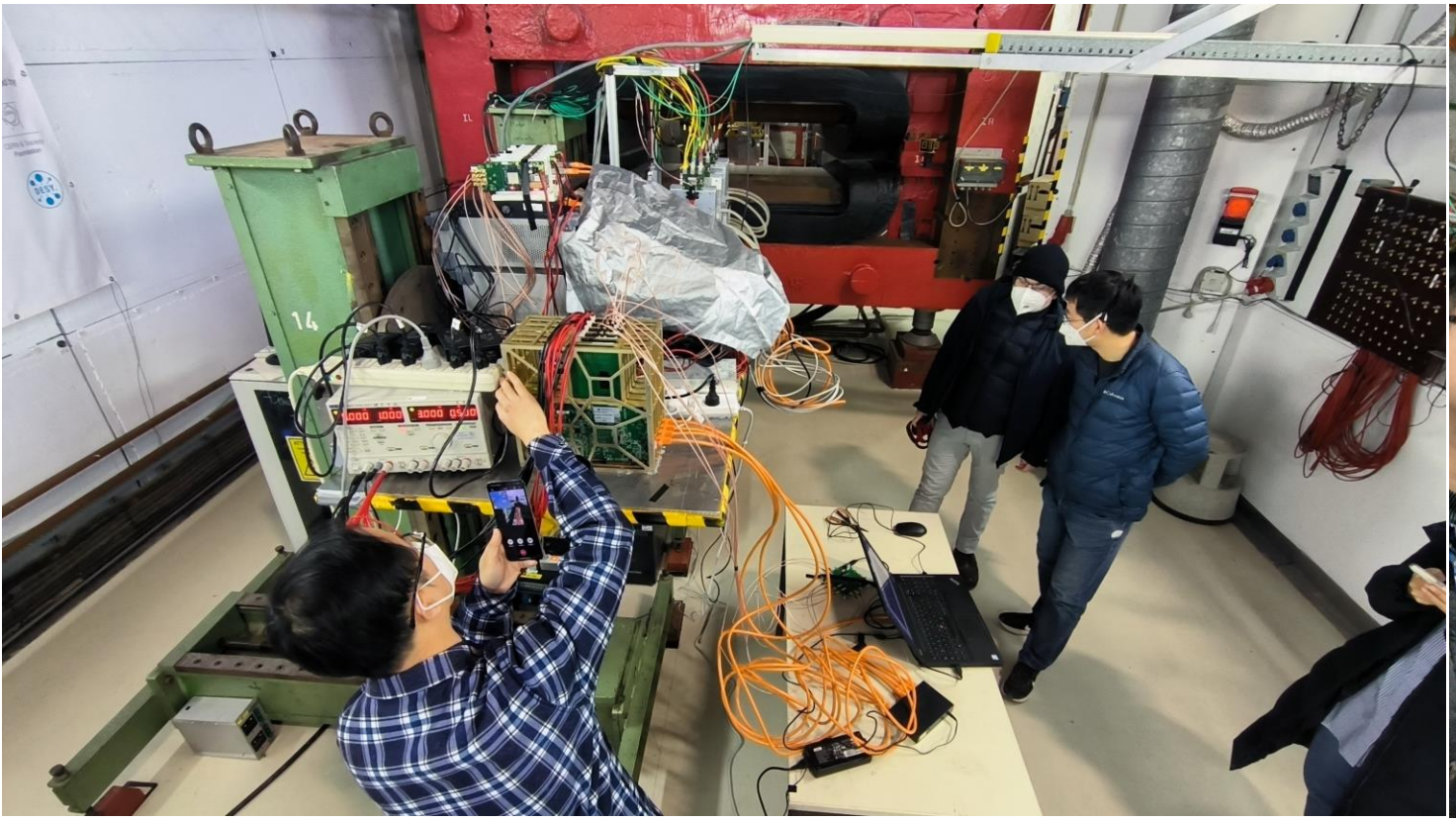
Summary

Qualification status:

Qualification Progress	2021-07-01	2022-09-22
	100%	
Qualification Period	2022-09-22	N/A
	105%	

MOST2 vertex test beam at DESY

- Dec 10 – Dec 22
- Services and shifts work
- Learnt a lot things of test beam



Summary & next

- H→2a→4tau merged analysis:
  - New derivation TAUP6 production is done
  - Signal yields and efficiency look good
  - All the background except the fakes are estimated from MC and they are all under control
  - Next:
    - Fake estimation, uncertainty study, etc.
- Qualification task: HGTD module automation assembly
  - QT was approved finally
- MOST2 vertex test beam at DESY
  - Services and shifts work
  - Next:
    - April test beam (full mechanical structure)? Offline analysis