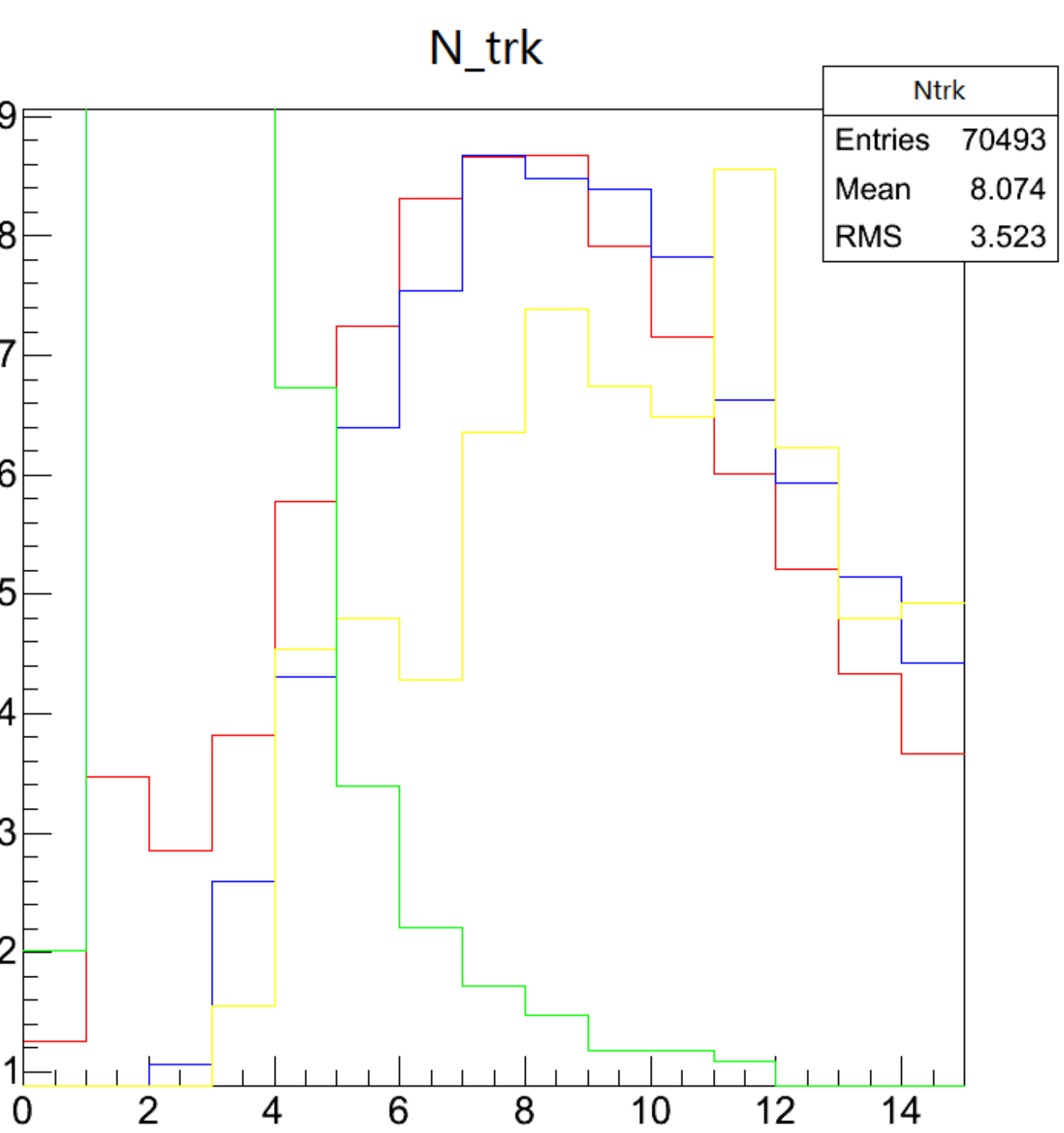
Final presentation

The very beginning

- **Varibles**:

- Nuber of tracks: ghost associated with the jet associated to the primary vertex with transverse momentum greater than 500 MeV.
- Width: the transverse energy weighted width of the energy deposits in the calorimeter that make up the jet.
- Emfrac: the fraction of the energy in the electromagnetic calorimeter.
- SumTrkPt/pt: the ratio of the sum of the transverse momentum of tracks with transverse momentum greater than 500 MeV associated with the primary vertex normalised to the jet's transverse momentum as measured using the calorimeter.
- EME3+EMB3/EME2+EMB2:
- EME3 is the energy deposited in the 3rd layer of the electromagnetic calorimeter.
- EME2 is the energy deposited in the 2nd layer of the electromagnetic calorimeter.



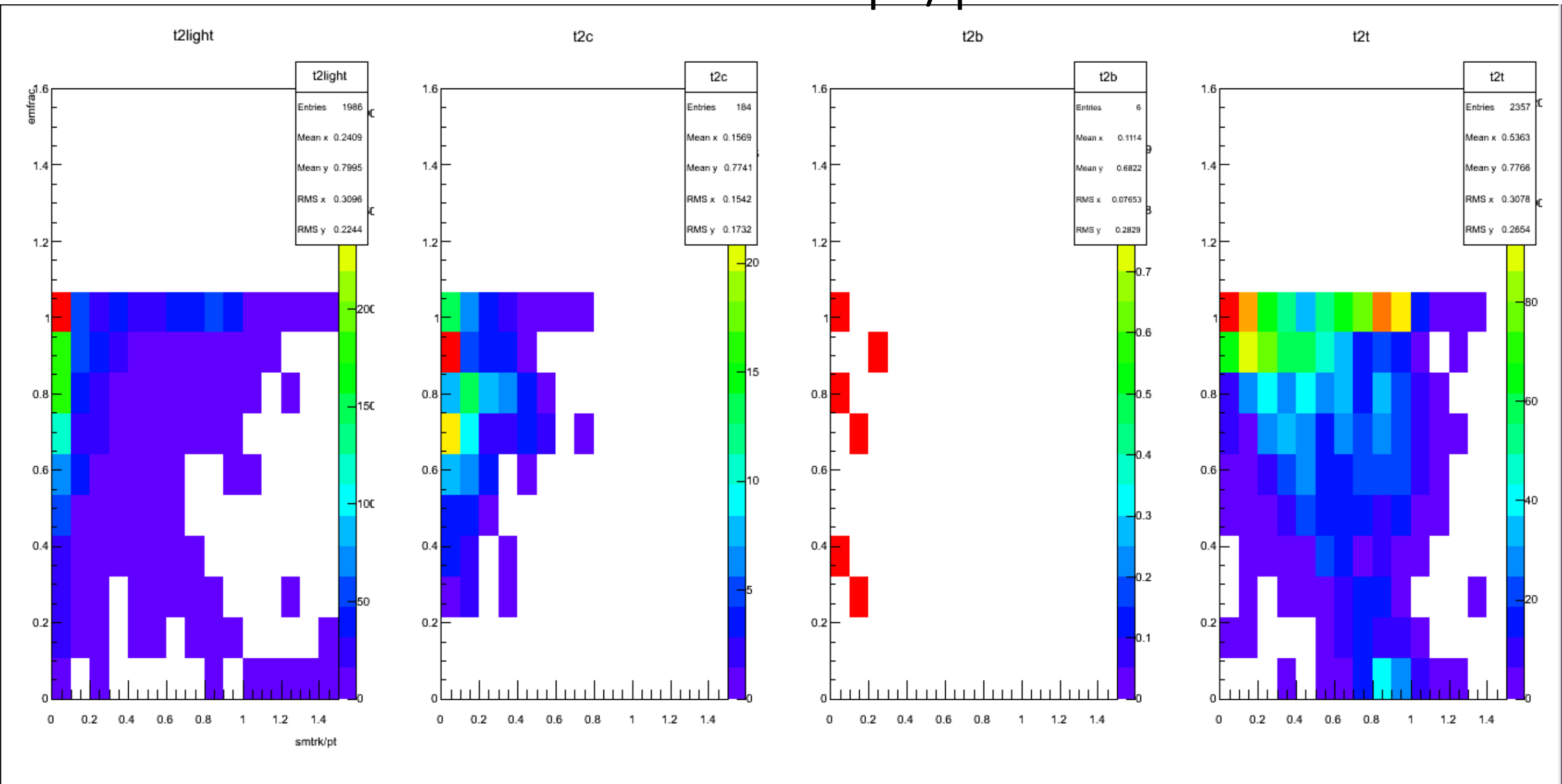
Red ----------light jets

Blue----------charm jets

Yellow----------b jets

Green ----------tau

Emfrac vs sumtrkpt/pt



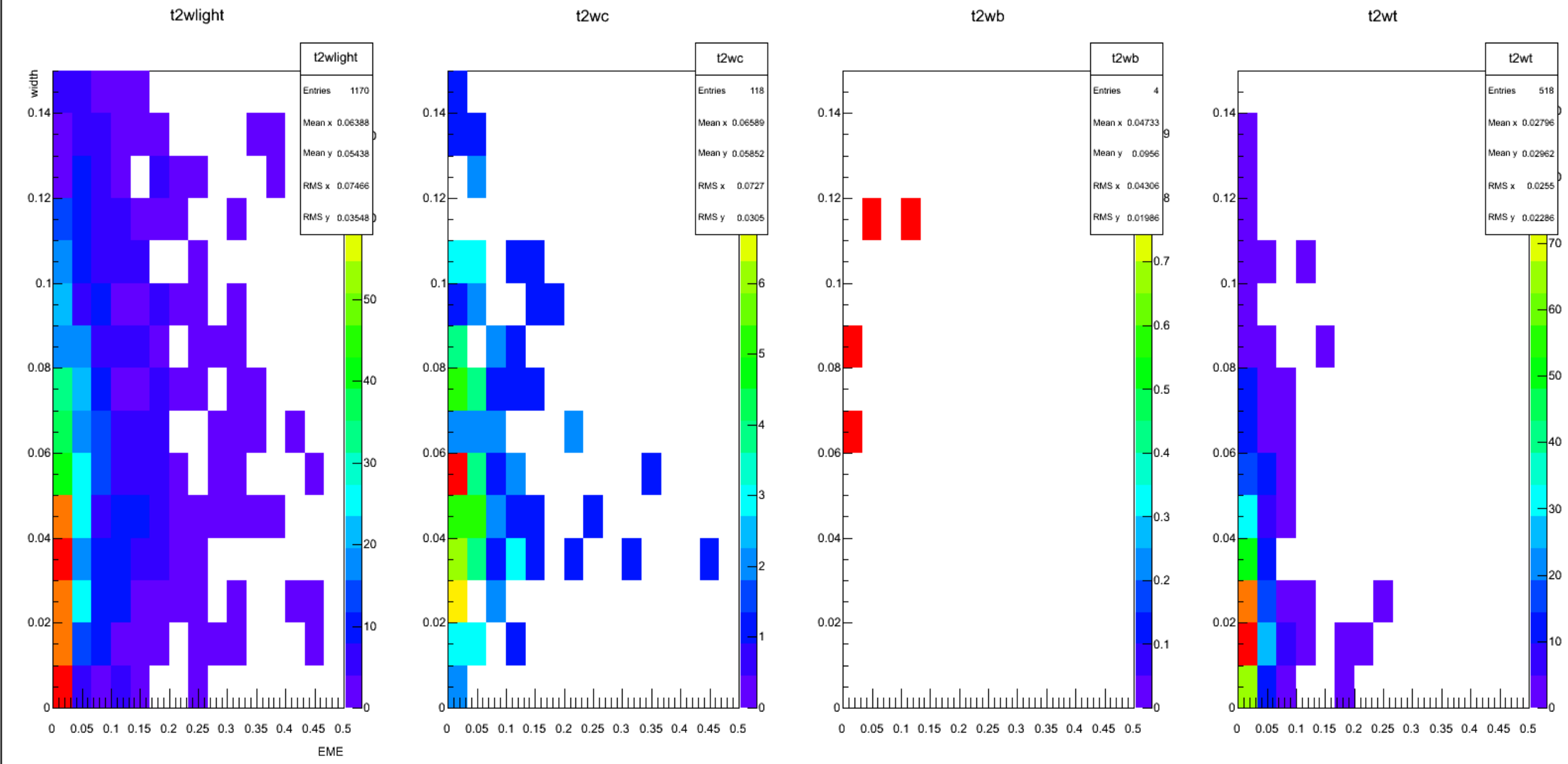
The Cut

Emfrac >0.55

&&

SumTrkpt/pt <0.1

Width vs (EME3+EMB3)/(EME2+EMB2)



Cut Efficiency

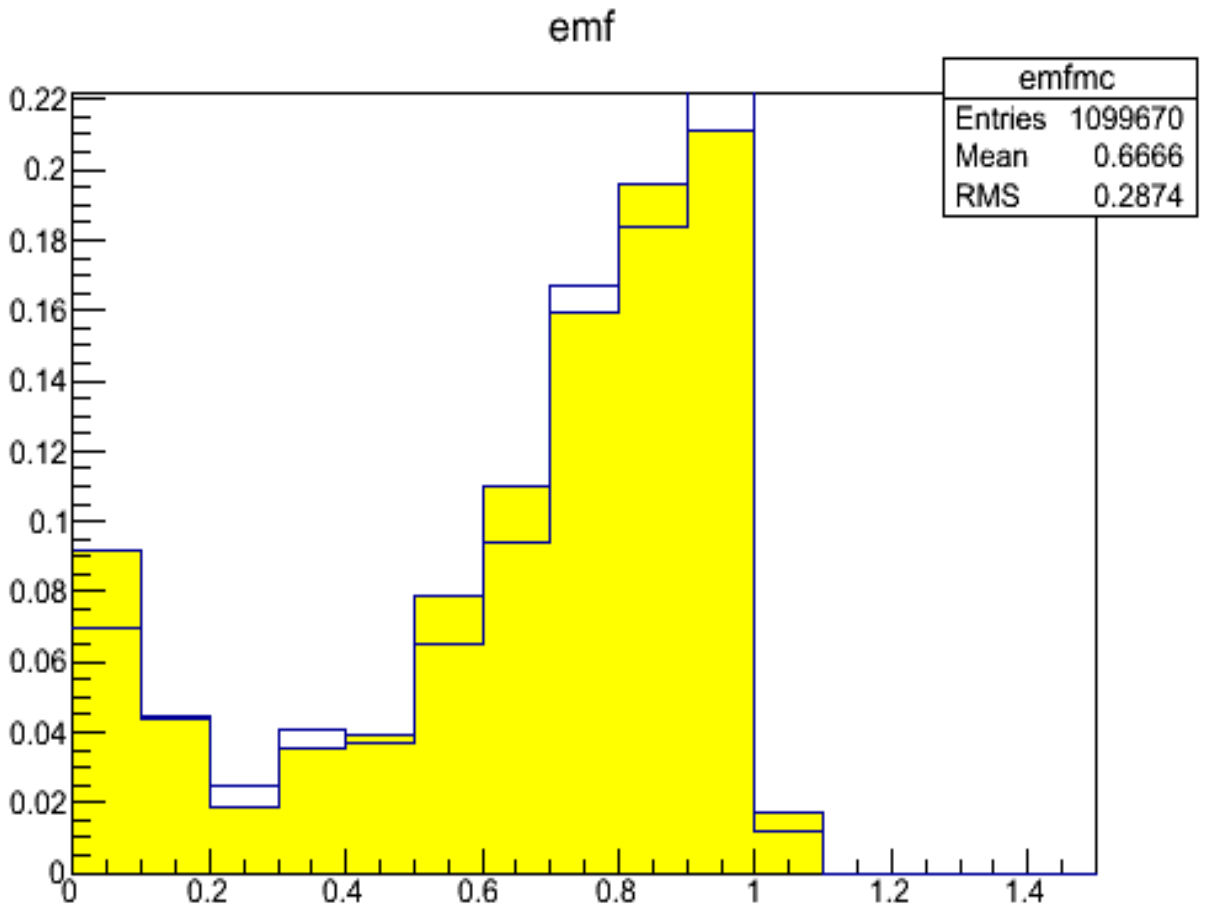
- By the tight cut
- We loose 0.6% (1189/190132)light jets
- while kill 34%(2135/6214) taus

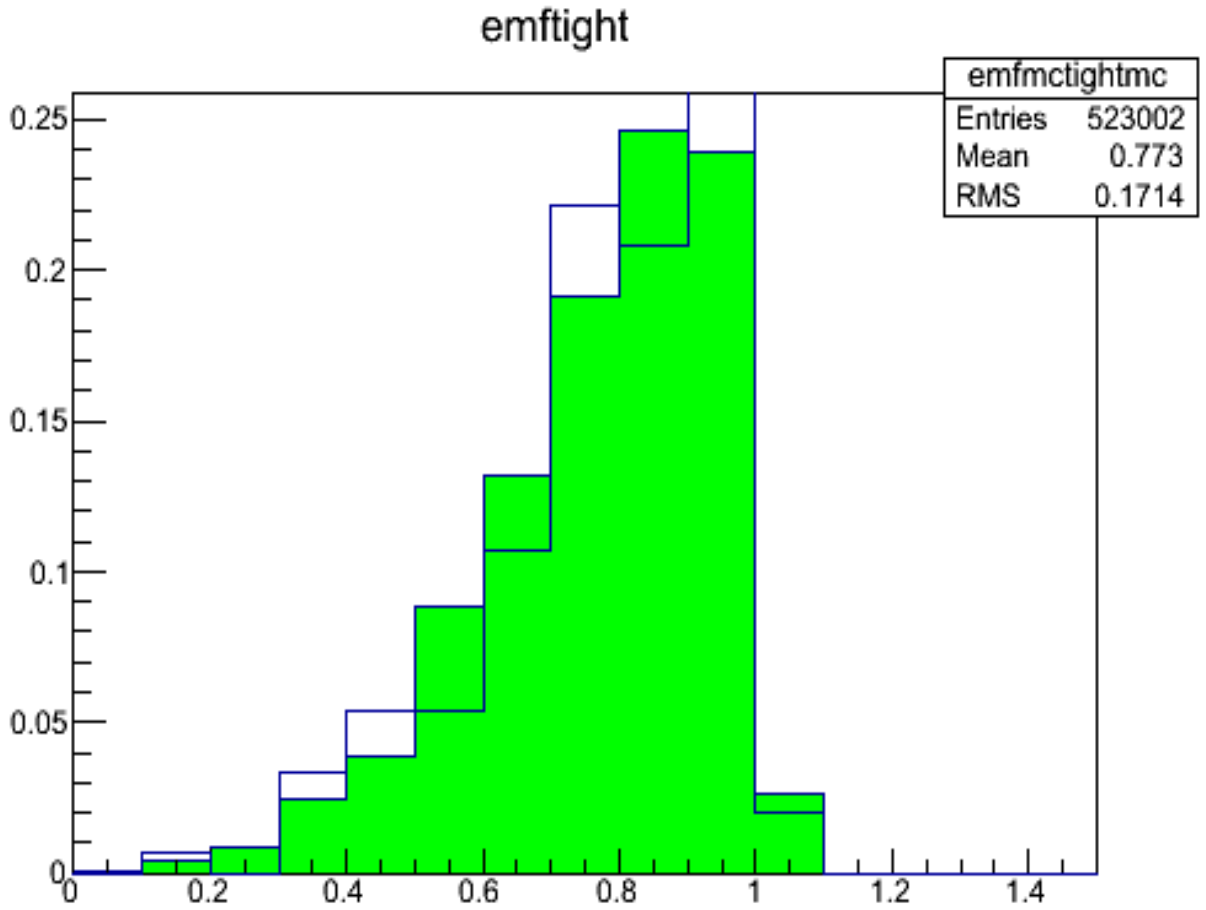
- Compared with if we though away all the events of one track
- We loose 1%(1986/190132) light jets
- While kill 38% (2357/6215)taus

Test on SM samples

Z ->μμ Event type	Exactly 2 muons + Exactly 1 jet
Z ->ττ Event type	Exactly 1 muons + Exactly 1 jet
Muons selection	Iso SUSY muon by SUSY Tool
Electron rejection	pt>10&&mediumPP=1&&ΔR<0.2
Jet selection	Pt>50&& -2.8<η<2.8 && no electrons
Muon Overlap	ΔR<0.4
mass widow for for Z ->μ μ	80-100GeV
mass widow for Z ->ττ	70-95GeV

Emfrac frbefore and om the Z ->μμ process after the cut





Cut efficiency

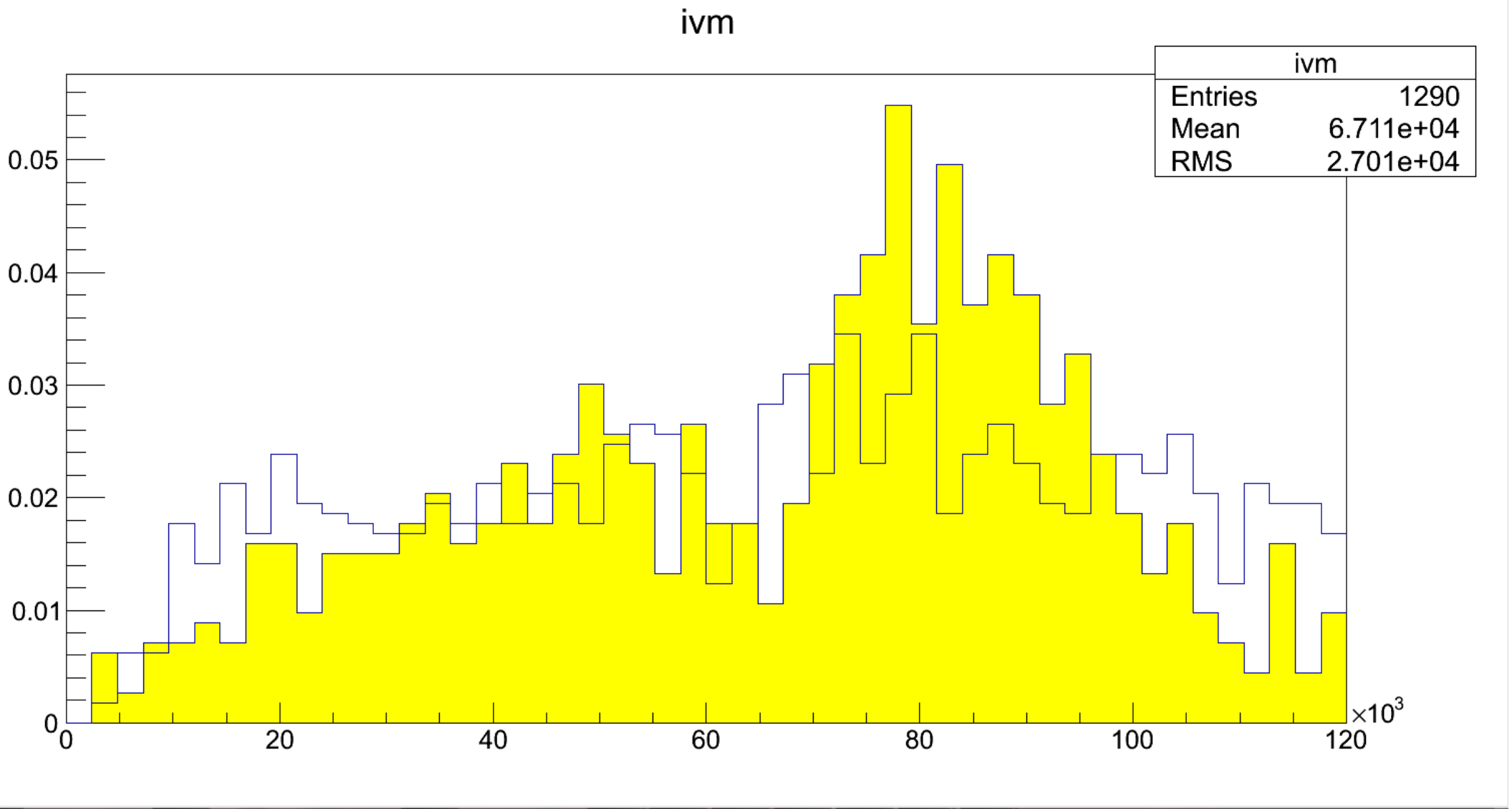
- **MC:**
- we lost 530 lost out of 29841(cut efficiency =98.3%) signal jets
- compared with if we roughly require number of track =1, we lost 933 jets (cut efficiency =96.9%).
- **Data**
- we lost 86 out of 5429(98.3%)
- Compared with 210 out of 5429(96.1%).

Tau rejection efficiency

- **MC**
- we can reject 398 out of 460 taus with one track.

- **Data**
- we can reject 173 out of 280 taus with one track

The invariant mass of Z ->ττ process



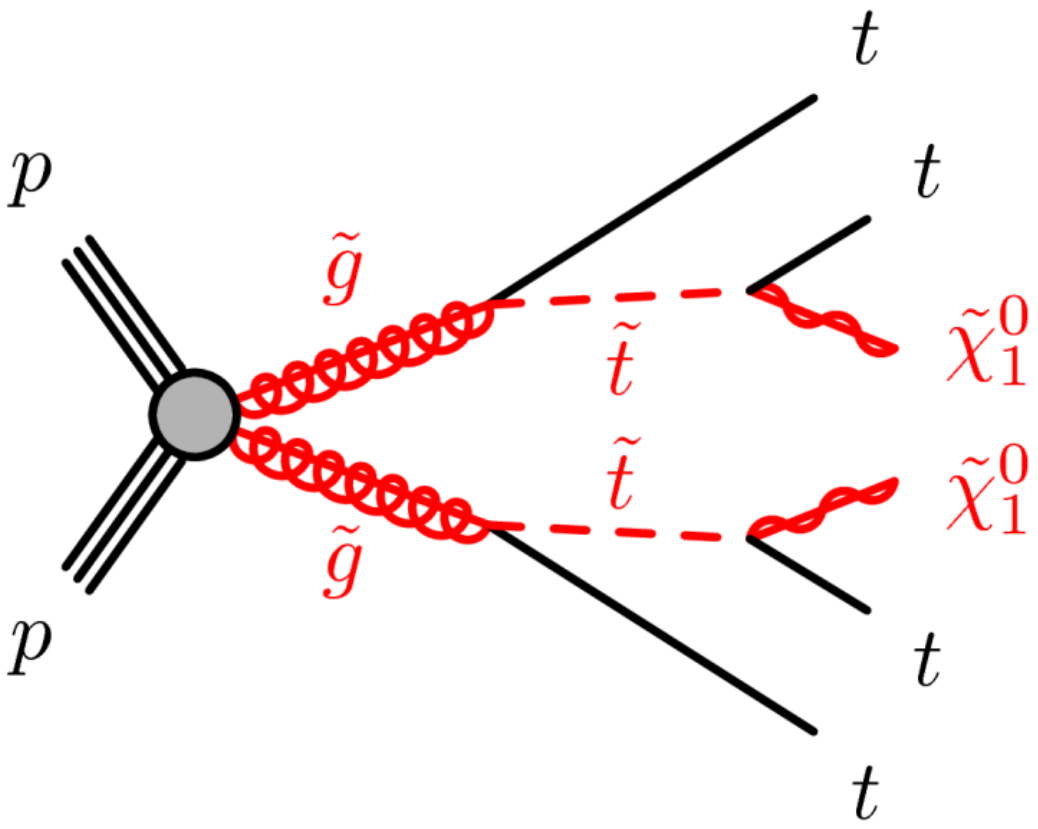
SUSY test

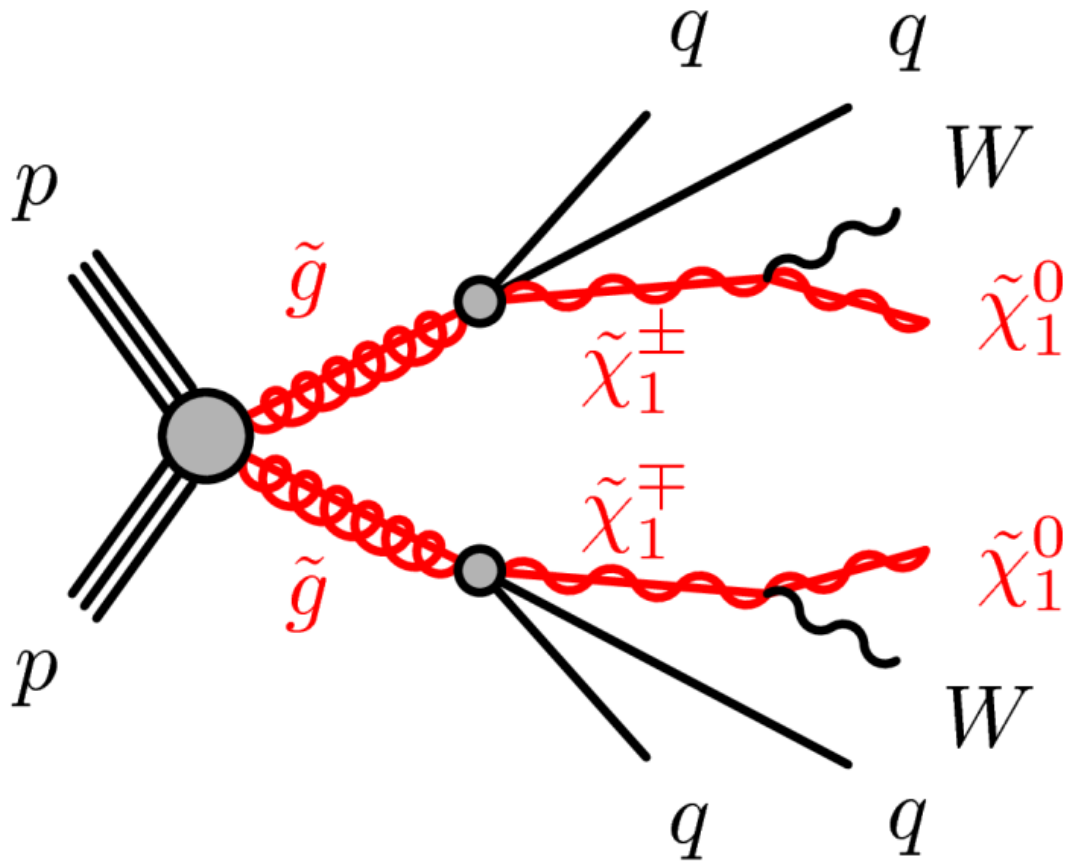
Good jet	Pt >50GeV
	-2.0<η<2.0
	Electron removal : any jet with pt >20 and hasΔR<0.2 will be regard as an electron and removed
Muons	pt>10
	SUSY muon selected by SUSY Tool
	Overlap removal : any muon with hasΔR<0.4 with a jet which pt >20 will be removed
electron	Pt >10
	mediumPP =1
	-2.7<η<2.7
	Overlap removal: any electron with hasΔR<0.4 with a jet which pt >20 will be removed
loose	Event with any Jet with exactly one track will fail this selection
tight	Event with any Jet with exactly one track and emfrac < 0.55 and SumTrkPt /Pt >0.1 will fail this selection.

Result

Sample:	Signal 1	Signal 2	Signal 3	Background
6 g_ jet	3351	10693	6465	34003
6 loose	3019	9867	5922	26487
6 tight	3116	10158	6077	27878
7 g_jet	2510	3804	2592	6647
7 loose	2251	3505	2366	5100
7 tight	2329	3624	2433	5456
8 g_jet	771	1095	823	1195
8 loose	684	994	743	921
8 tight	710	1038	768	999
9 g_jet	771	263	196	183
9 loose	684	240	174	150
9 tight	710	253	181	161

Signal


p
p
$\tilde{g}$
$\tilde{g}$
$\tilde{t}$
$\tilde{t}$
t
t
t
t
$\tilde{\chi}_1^0$
$\tilde{\chi}_1^0$


p
p
$\tilde{g}$
$\tilde{g}$
$\tilde{\chi}_1^{\pm}$
$\tilde{\chi}_1^{\mp}$
q
q
q
q
W
W
$\tilde{\chi}_1^0$
$\tilde{\chi}_1^0$

Conclusions

- Cut efficiency of signal is always above 90%, which is matched to the 99% cut efficiency of jets.
- Background rejection efficiency for tight is from 13% to 19%
- While the rejection efficiency for loose is from 18% to 23%
- About 80% of background 1-track taus while keep 90% signals.

- I hope this result can be accept by ATLAS while we searching for SUSY

Outlook

- More variables
- Things with 2 tracks
- Maybe MVA

Thank you