

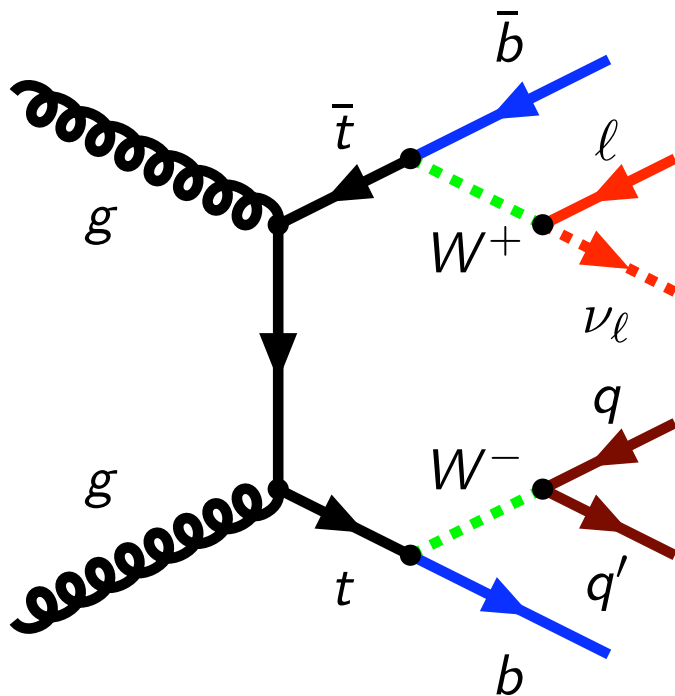
Update on Top Mass using Soft Muon Tagged Events and Atlfast II.

James Poll, QMUL
Dr. Lucio Cerrito, QMUL



- Brief analysis overview.
- Comparison of v13 to v14 Atlfast II.





- 1 isolated lepton $e > 25 \text{ GeV}, \mu > 20 \text{ GeV}$
- Veto on events with 2 high p_T leptons
- 3 or more jets with $p_T > 40 \text{ GeV}$
- $\text{MET} > 20 \text{ GeV}$
- Scalar $\text{HT} > 200 \text{ GeV}$
- One or more b-jet with a Soft Lepton Tag (SLT)
- Pass EF e25i and mu20i triggers



good electron

- e-gamma (author !=2)
- 'medium' (0x3FF)
- $p_T > 25 \text{ GeV}$
- $|\eta| < 2.5$
- exclude $1.37 < |\eta| < 1.52$

good muon

- STACO muid
- algo == 1
- $p_T > 20 \text{ GeV}$
- $|\eta| < 2.5$
- $eT \text{ cone20} < 6 \text{ GeV}$

good jet

- cone 0.4 (tower)
- $p_T > 25 \text{ GeV}$
- $|\eta| < 2.5$
- no e in $\Delta R < 0.4$

triggers

- e25i (EM25i)
- mu20i (MU20 || MU40)

<https://twiki.cern.ch/twiki/bin/view/Atlas/TopGroupCSCObjectSelection>



Fullsim

ttbar:

5200: semi-leptonic, dileptonic, $M_{\text{top}} = 175 \text{ GeV}/c^2$ v13.0.40

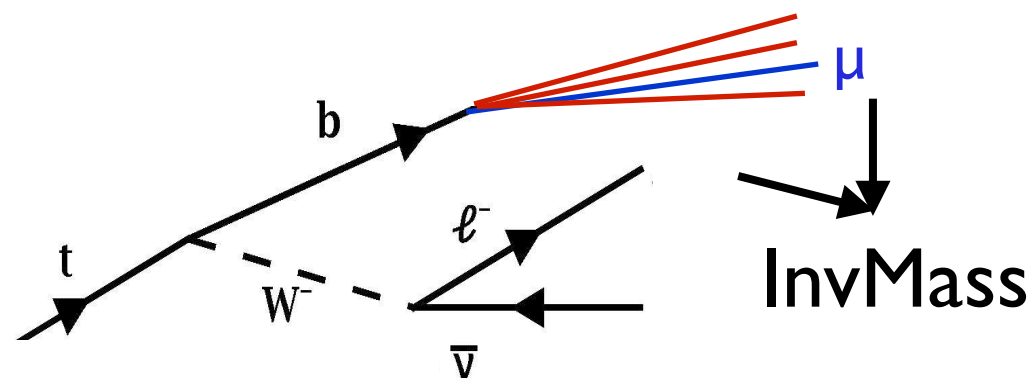
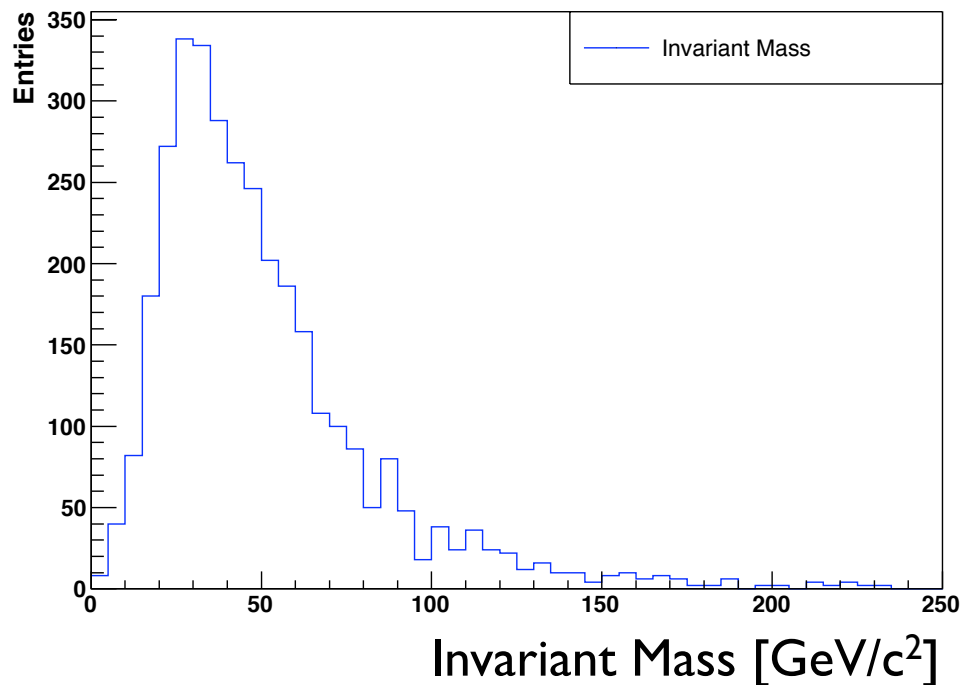
AtlfastII

ttbar:

5200: semi-leptonic, dileptonic, $M_{\text{top}} = 175 \text{ GeV}/c^2$ v14.1.0



Invariant Mass of the lepton from W decay and the soft muon within the b-jet.



There is a correlation between the mass of the top quark and the invariant mass of its decay products. It's not possible to get a handle on the neutrino but the hard lepton from W decay and the soft muon are accessible.

These decay products will carry a significant fraction of the original Top mass with them and from this it is possible to get a handle on the Top mass.



- v13 Fullsim & v14 AtlfastII



NJets:	Total	0	1	2	3	4	5	6	≥ 7
v13 Initial:	25000	630	3417	7493	7548	4107	1394	310	101
Electron Pt>25 GeV:	16259	419	2237	4858	4910	2678	887	207	63
Good Electron:	5950	151	827	1785	1777	971	337	75	27
No. Electron ==1:	4634	108	692	1484	1364	714	213	38	18
MEt>20GeV:	4236	103	645	1363	1233	648	188	36	17
Njets ≥ 3 :	2125	0	0	0	1233	648	188	36	17
HT>200GeV :	2075	0	0	0	1183	648	188	36	17
≥ 1 SLT jets:	183	0	0	0	72	75	23	9	4
SLT Ratio ≥ 0.7 :	114	0	0	0	72	32	4	4	2

Version 13

NJets:	Total	0	1	2	3	4	5	6	≥ 7
v14 Initial:	25000	654	3082	7028	7797	4368	1545	406	120
Electron Pt>25 GeV:	18669	502	2304	5206	5814	3278	1189	287	89
Good Electron:	6006	157	739	1693	1883	1046	365	95	28
No. Electron ==1:	5215	134	680	1560	1660	817	266	74	16
MEt>20GeV:	4780	120	631	1441	1525	734	240	66	15
Njets ≥ 3 :	2588	0	0	0	1525	734	240	66	15
HT>200GeV :	2530	0	0	0	1467	734	240	66	15
≥ 1 SLT jets:	192	0	0	0	79	71	30	10	2
SLT Ratio ≥ 0.7 :	126	0	0	0	79	35	10	1	1

Version 14



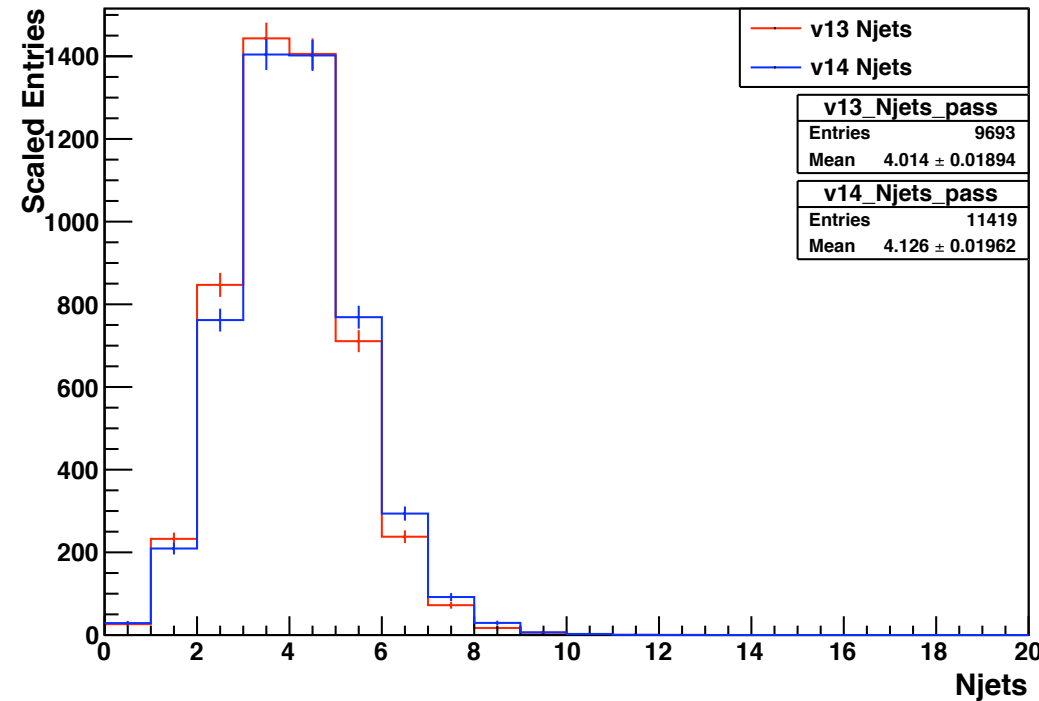
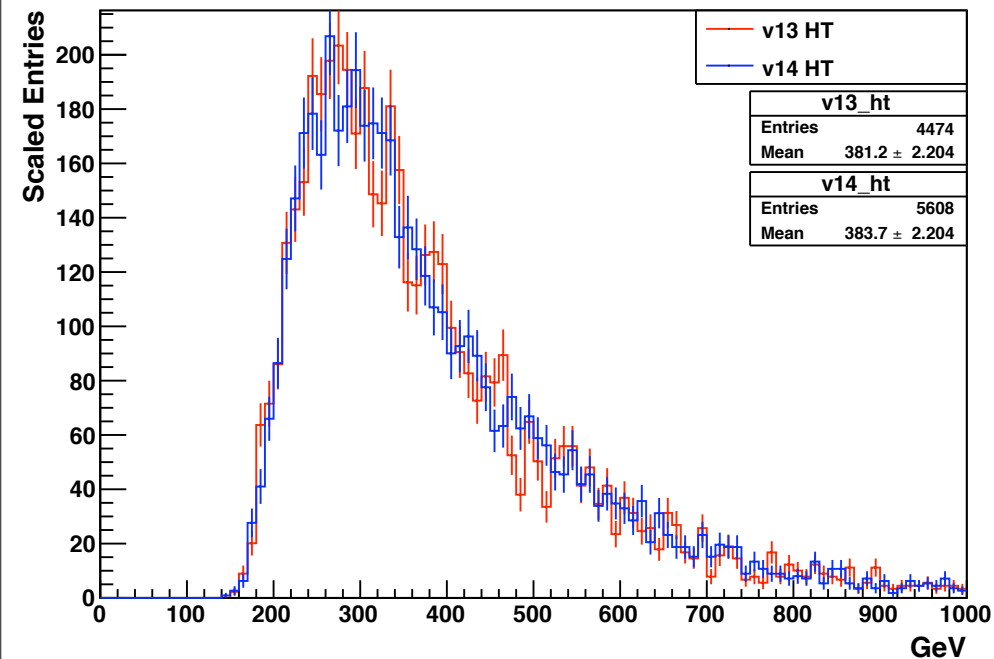
NJets:	Total	0	1	2	3	4	5	6	≥ 7
v13 Initial:	25000	630	3417	7493	7548	4107	1394	310	101
Muon Pt>20 GeV:	8822	228	1147	2693	2680	1461	490	94	29
Good muon:	7224	191	942	2203	2187	1191	416	75	19
No. Muon==1:	5065	136	705	1631	1603	717	208	47	8
MEt>20GeV:	4614	123	650	1486	1451	654	187	45	8
Njets ≥ 3 :	2355	0	0	0	1451	654	187	45	8
HT>200GeV :	2256	0	0	0	1352	654	187	45	8
≥ 1 SLT jets:	186	0	0	0	85	75	19	5	2
SLT Ratio ≥ 0.7 :	135	0	0	0	85	43	7	0	0

Version 13

NJets:	Total	0	1	2	3	4	5	6	≥ 7
v14 Initial:	25000	654	3082	7028	7797	4368	1545	406	120
Muon Pt>20 GeV:	8607	228	1062	2354	2723	1525	526	140	49
Good muon:	7109	180	880	1955	2229	1292	428	110	35
No. Muon==1:	6213	177	861	1881	1945	957	288	78	16
MEt>20GeV:	5718	161	801	1727	1793	873	266	72	15
Njets ≥ 3 :	3029	0	0	0	1793	873	266	72	15
HT>200GeV :	2925	0	0	0	1689	873	266	72	15
≥ 1 SLT jets:	243	0	0	0	92	98	37	10	4

Version 14

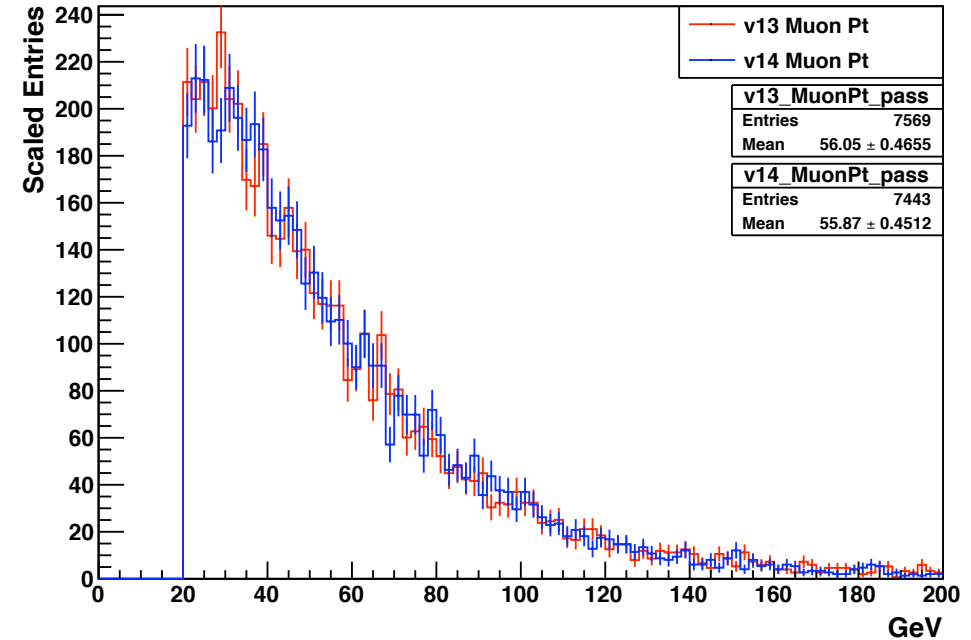
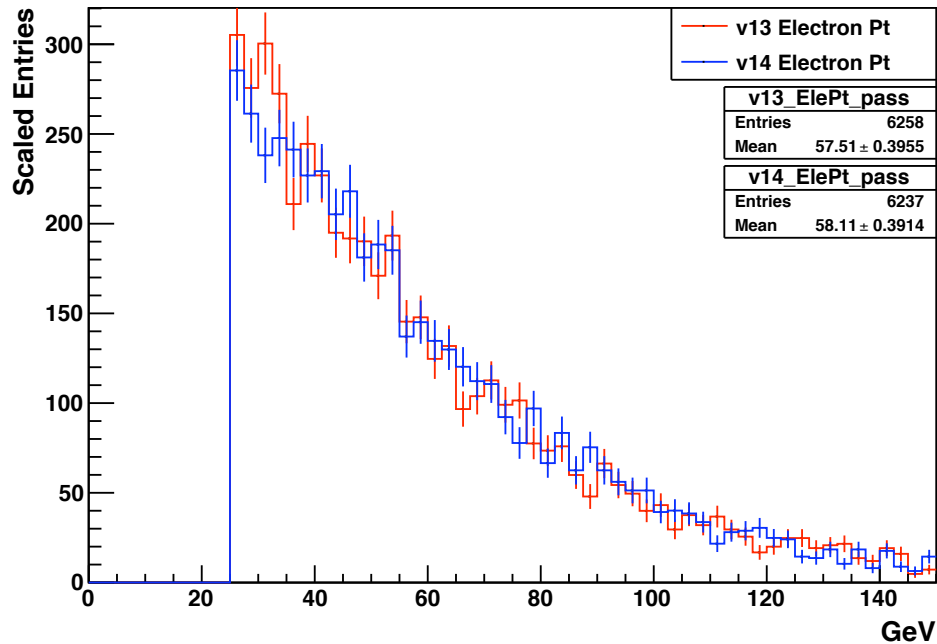




Scalar HT for njets > 3

Njets for events == 1 good lepton



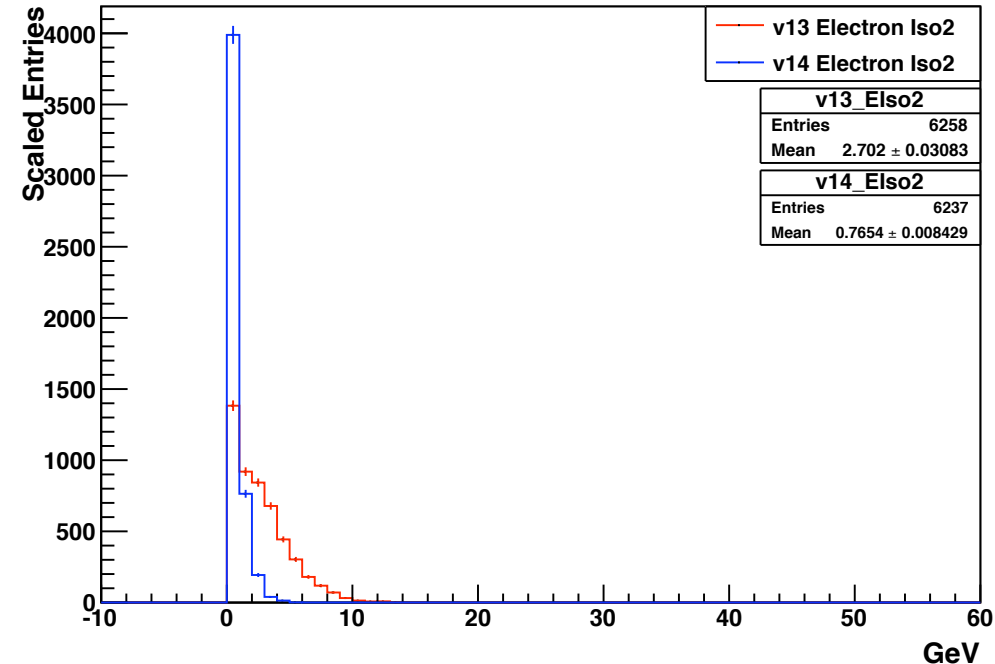
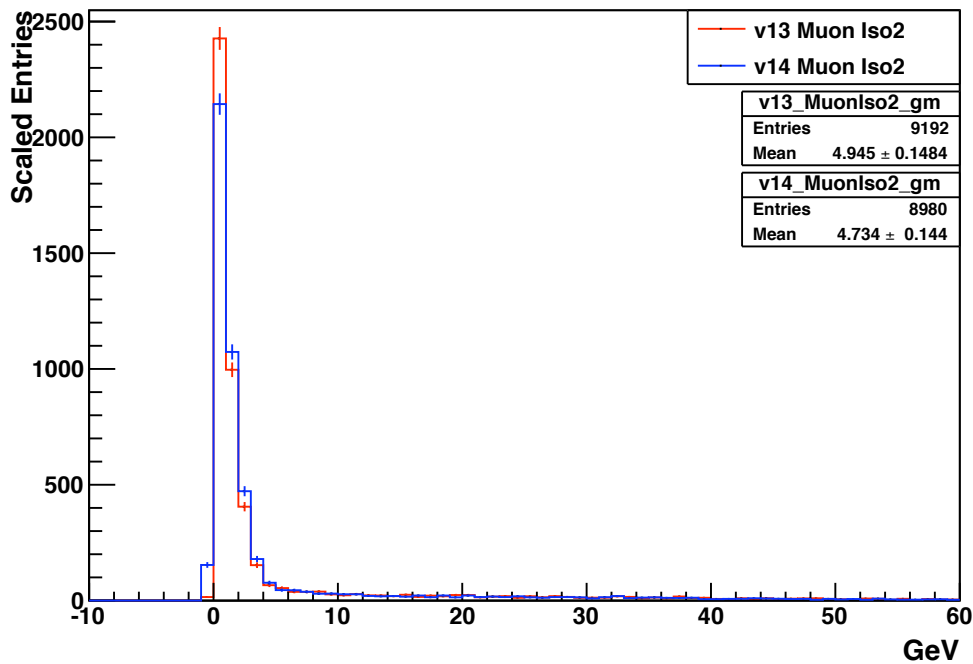


“Good” Leptons that have passed the required cuts.



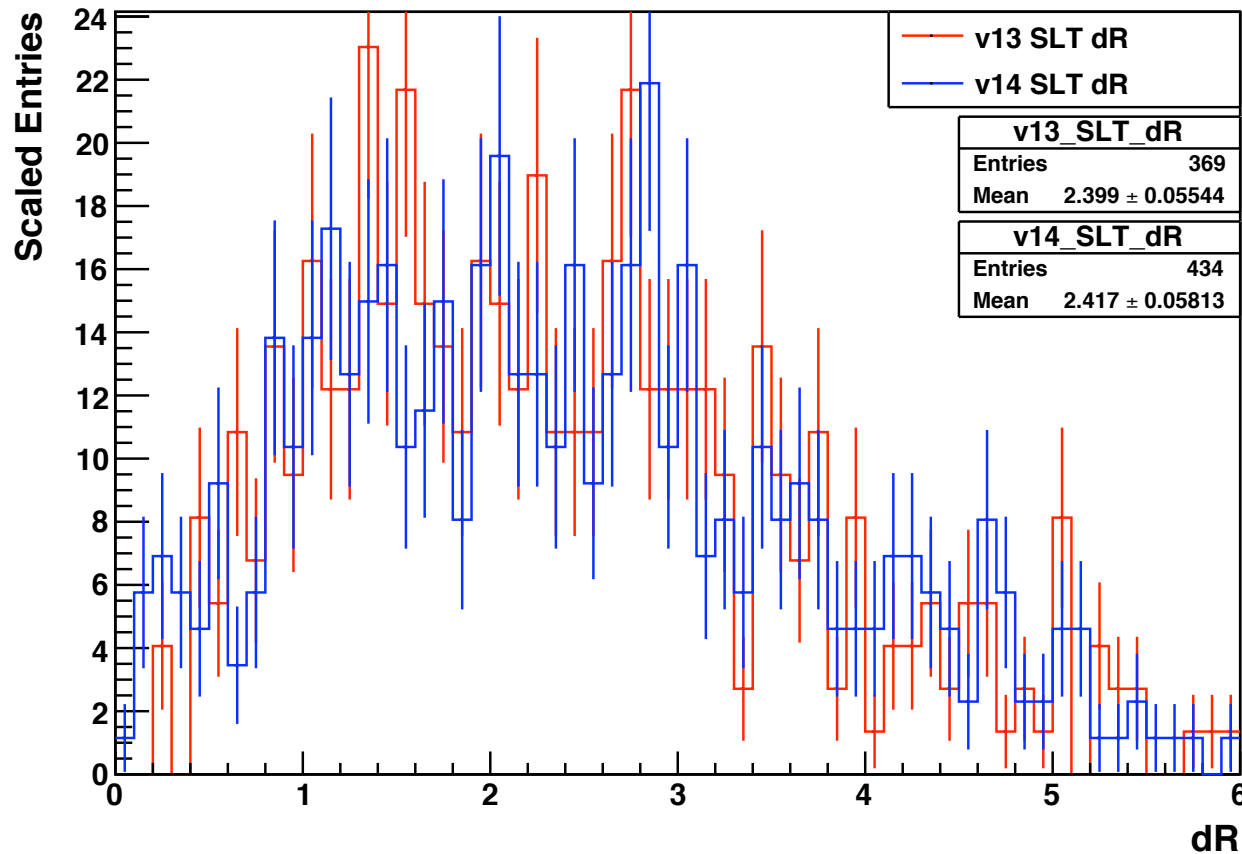
Muon and Electron Isolation Energy

v13 and v14



Isolation energy in cone 0.20 for muons and electrons above the pt cut.





dR between the tagged soft lepton and the lepton from W.



AtIfastII

- More generation of events
- Generate different top masses
- Using the LI trigger which **should** now work

Analysis

- Look into the soft lepton tagging code

