Beyond-the-Baseline Muons

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The top dilepton group wants to include CMU- and CMP-only muons as "second leptons" in order to increase acceptance

So, we need to get the efficiencies for these categories – look for Z's in btop1g (CMUP good run list applied)

I follow the same prescription as Ken – reject cosmics, allow any min-ionizing track as Z first-leg (also require good d_0, z_0, and COT hits as usual)

Definition: CM*-only means has a stub only in CM*, and MuonFiducialTool says yes only to CM*

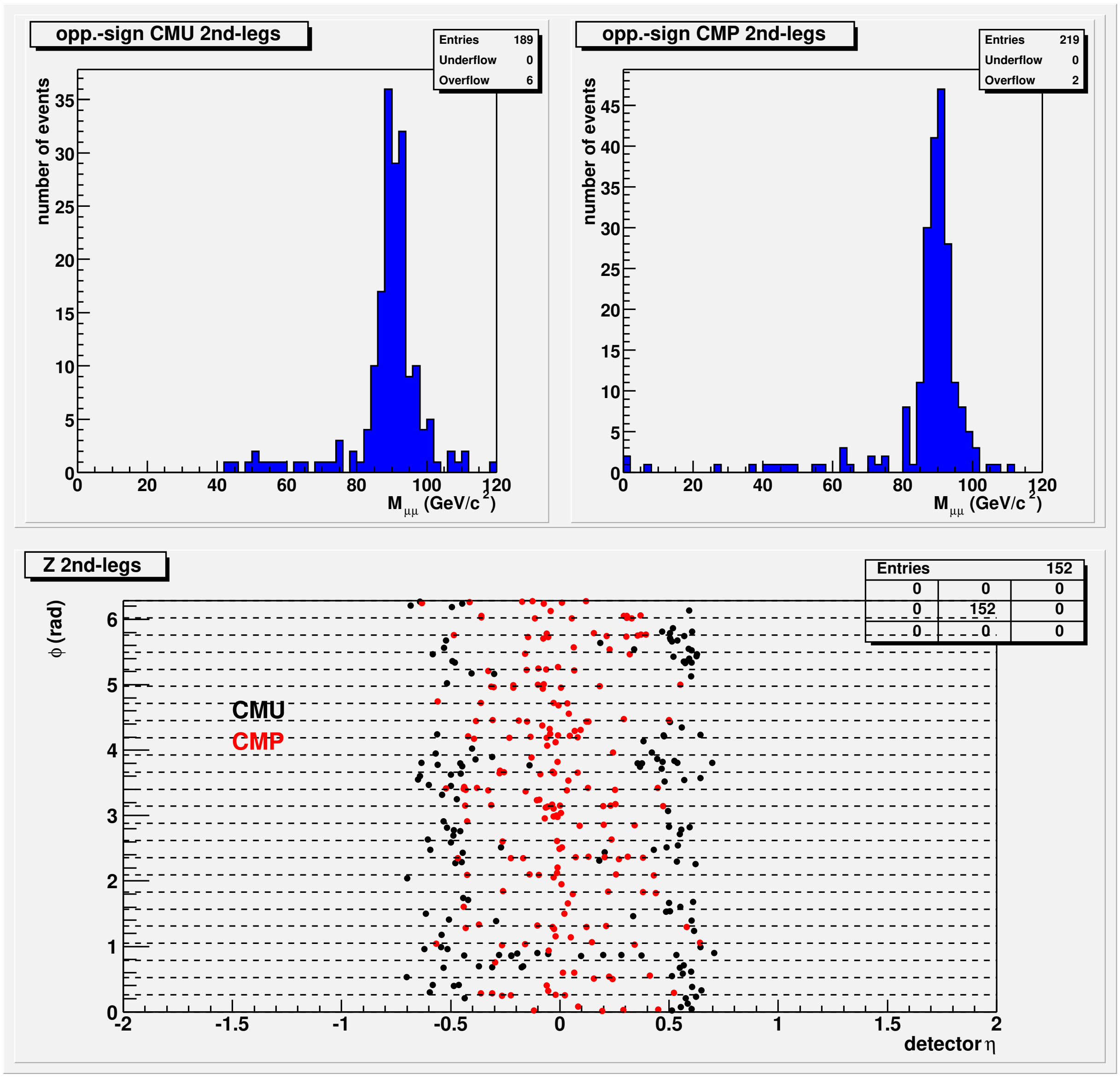
CMU-only

Cut	OS events passing	LS events passing	OS fail only	efficiency
Z	152	0		
N_{ax}^{seg}	152	0	0	1.00
N_{st}^{seg}	146	0	6	0.96 ± 0.02
E_{EM}	147	0	4	0.97 ± 0.01
E_{had}	150	0	2	0.99 ± 0.01
iso	149	0	2	0.98 ± 0.01
Δx	146	0	6	0.96 ± 0.02
All	131	0		0.86 ± 0.03

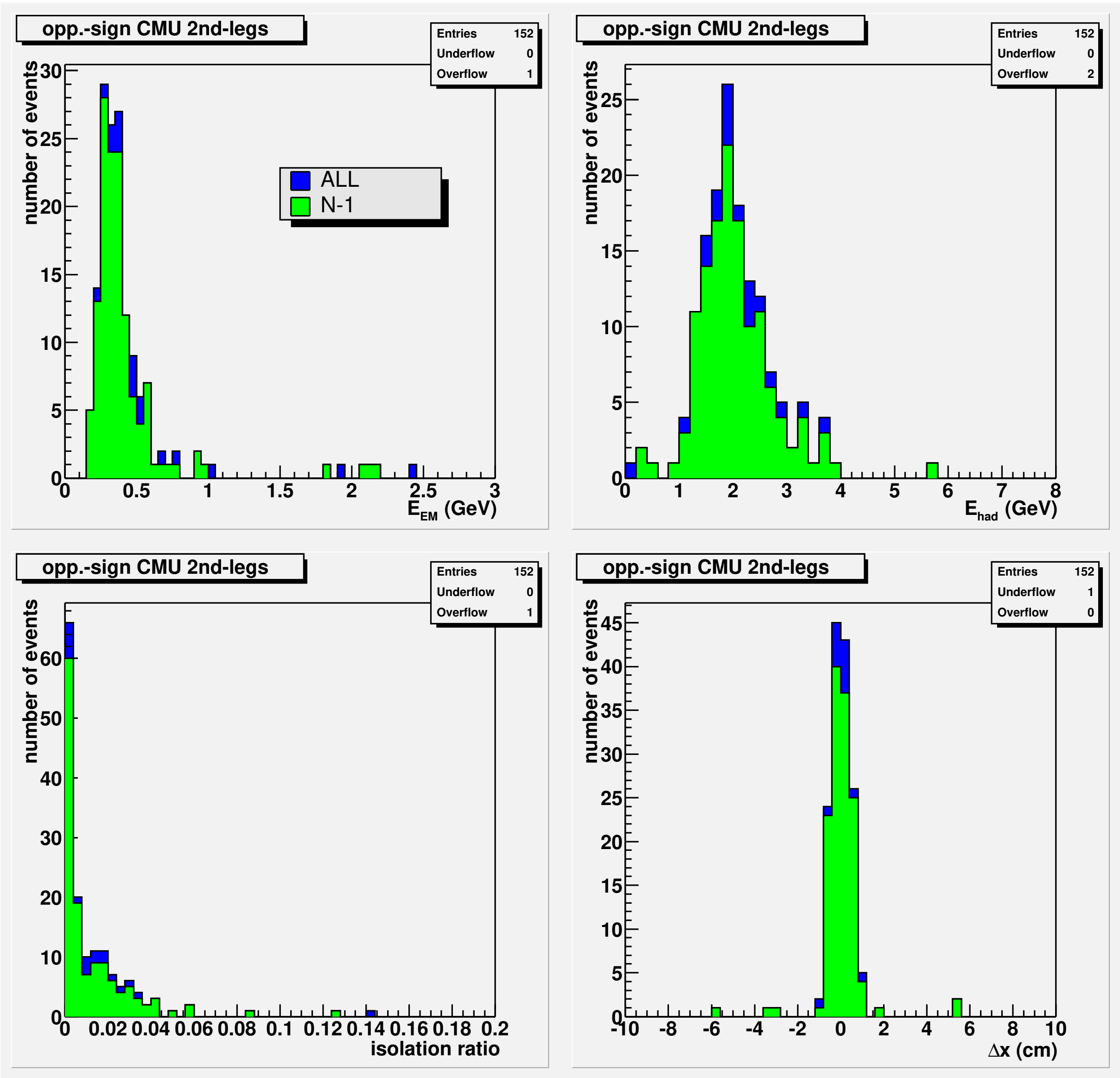
CMP-only

Cut	OS events passing	LS events passing	OS fail only	efficiency
Z	190	0		
N_{ax}^{seg}	190	0	0	1.00
N_{st}^{seg}	186	0	4	0.98 ± 0.01
E_{EM}	184	0	6	0.97 ± 0.01
E_{had}	189	0	1	0.99 ± 0.01
iso	187	0	3	0.98 ± 0.01
Δx	185	0	5	0.97 ± 0.01
All	171	0		0.90 ± 0.02

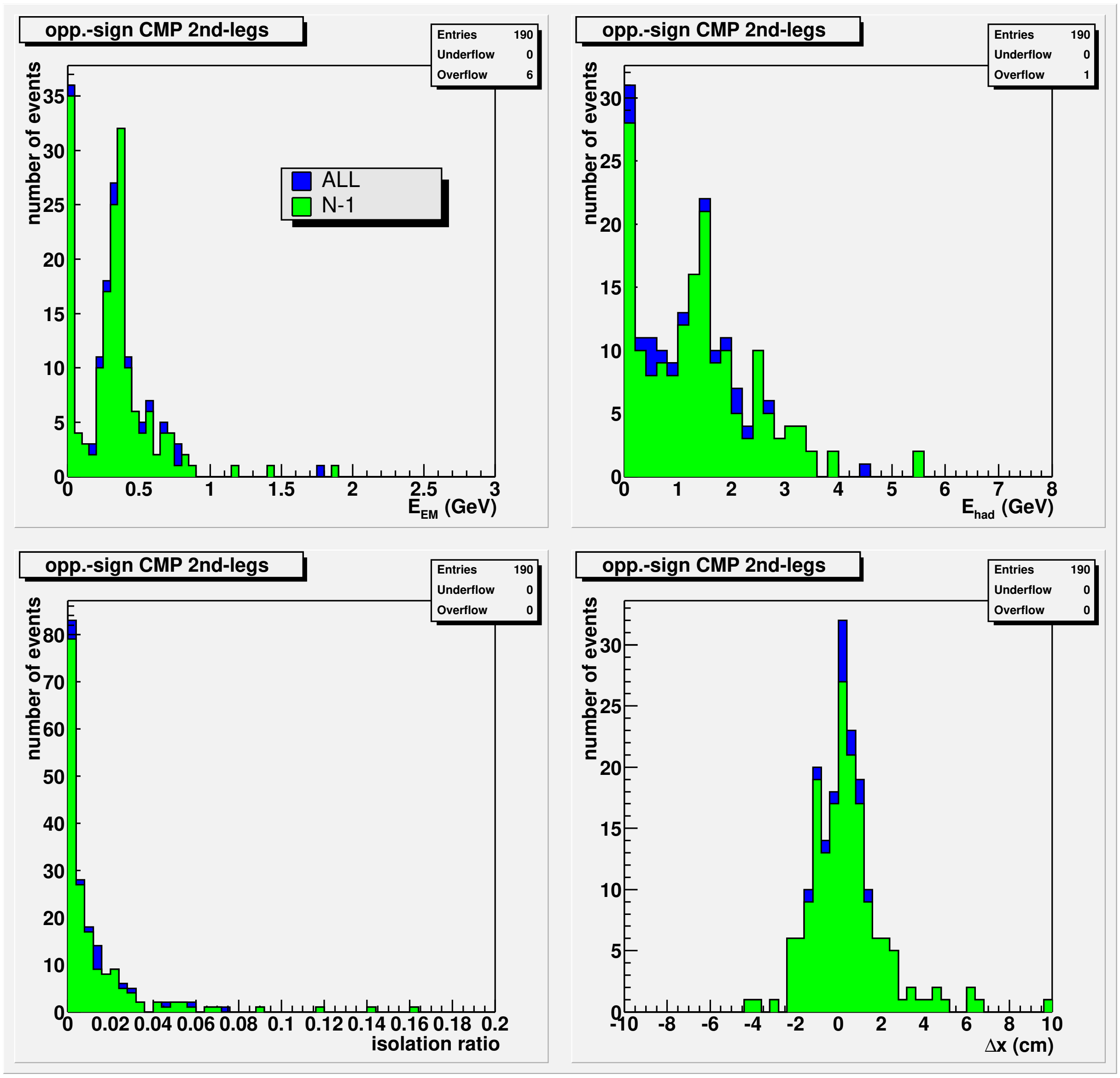
CMU- and CMP-only plots



CMU-only ID variables



CMP-only ID variables



Stubless Muons

We're also toying with the idea of including stubless muons as "second leptons"

Energetic particles that fall in calorimeter cracks can easily fake being a stubless muon – require fidEle to remove these:

1. **CEM**
2. **local $|x_{CES}| < 21$ cm**
3. **$9 < |z_{CES}| < 230$ cm**
4. **$|z_{CES}| < 193$ cm if in Tower 7 of chimney wedge**
5. **Not in Tower 9**

Definition: Stubless = has no stub and MuonFiducialTool says no to everything

Stubless - All

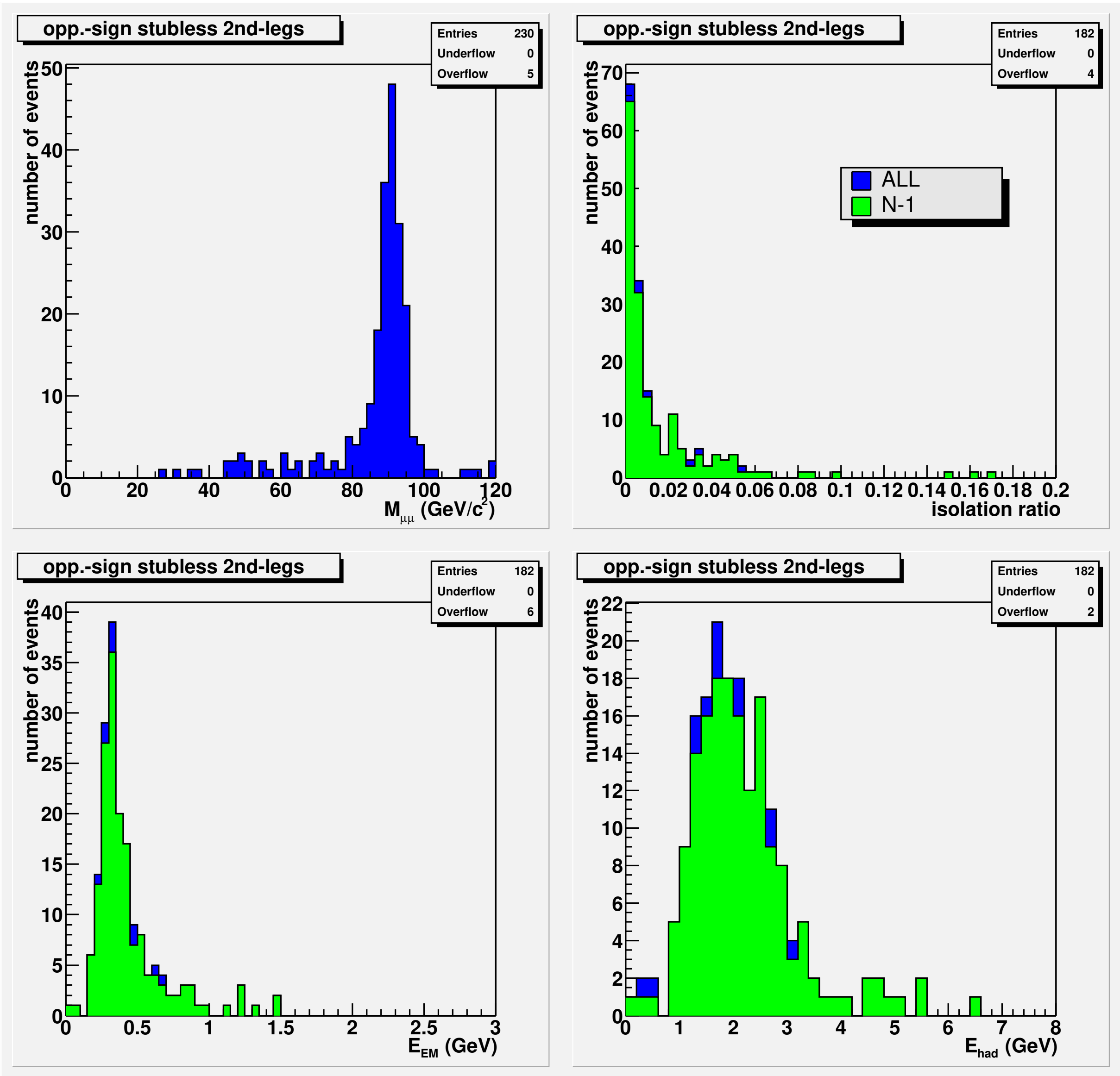
Cut	OS events passing	LS events passing	OS fail only	efficiency
Z	390	4		
N_{ax}^{seg}	320	4	x	0.81 ± 0.02
N_{st}^{seg}	333	4	x	0.85 ± 0.02
E_{EM}	379	0	x	0.98 ± 0.01
E_{had}	383	1	x	0.99 ± 0.01
iso	380	0	x	0.98 ± 0.01
All	291	0		0.75 ± 0.02

Stubless w/ fidEle

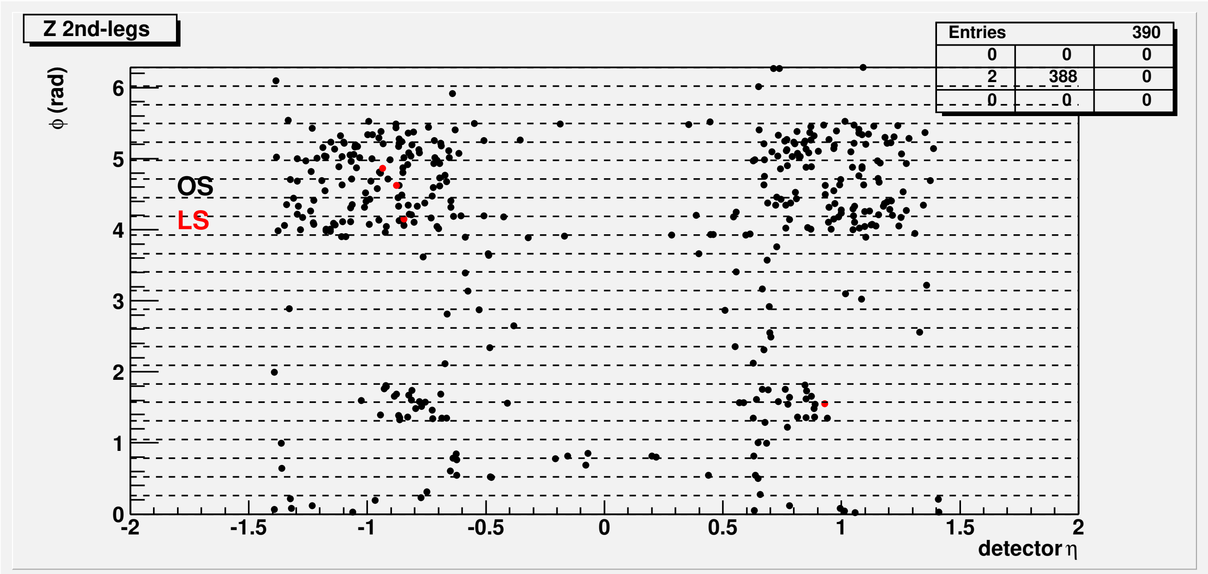
Cut	OS events passing	LS events passing	OS fail only	efficiency
Z	182	2		
N_{ax}^{seg}	181	2	x	0.99 ± 0.01
N_{st}^{seg}	176	2	x	0.97 ± 0.01
E_{EM}	176	0	x	0.98 ± 0.01
E_{had}	179	0	x	0.99 ± 0.01
iso	175	0	x	0.97 ± 0.01
All	166	0		0.92 ± 0.02

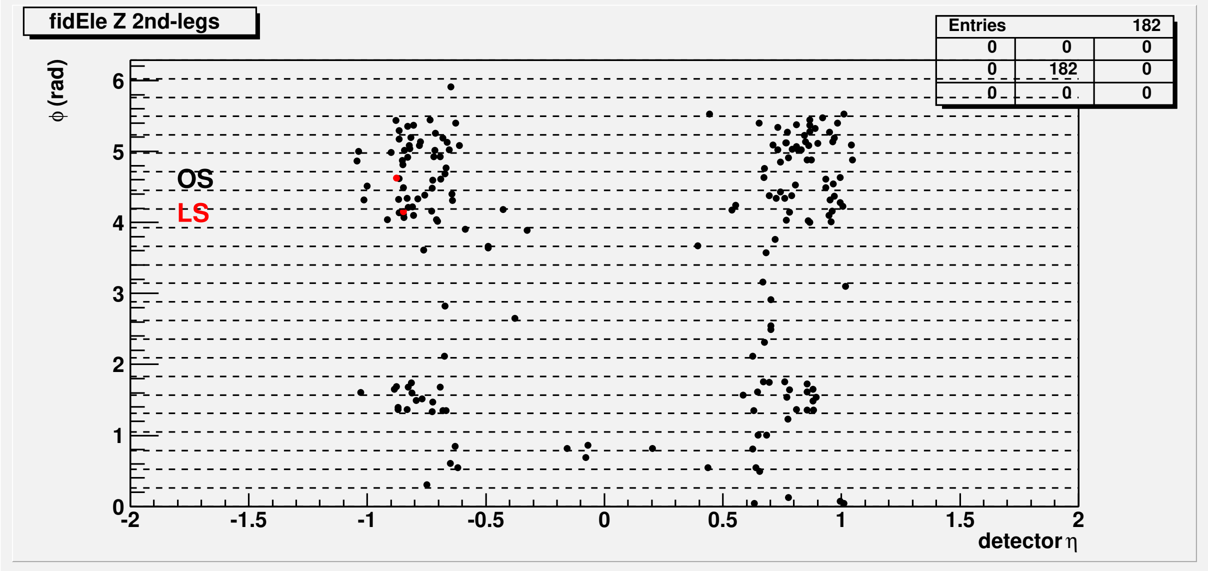
Stubless muon Z sample looks as clean as any other category!

fidEle stubless muon plots



Stubless muon plots





Stubless muons come mainly from the miniskirts...