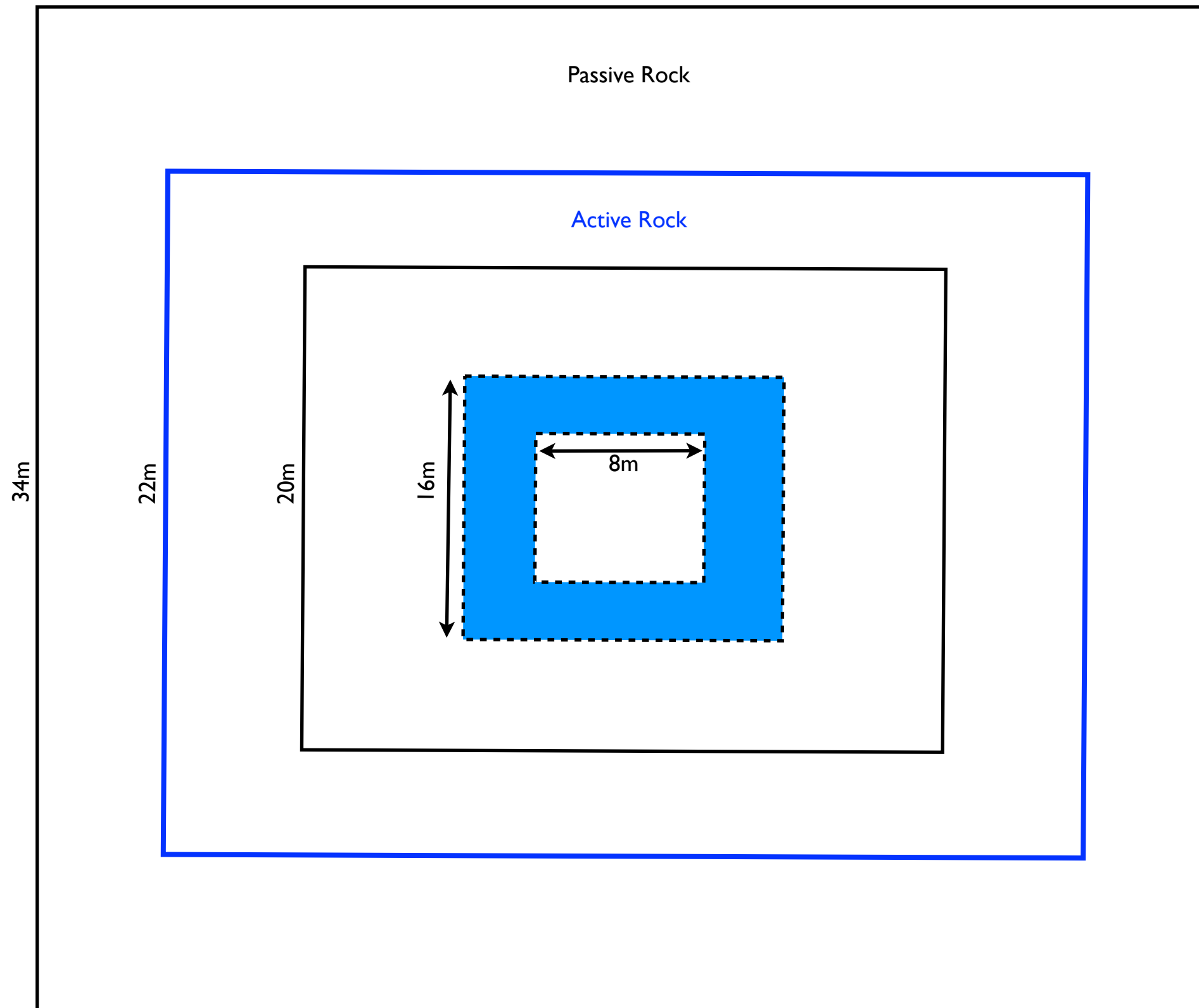


Update on FLUKA muon-induced secondaries at Homestake

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Updated for May 3, 2012

FLUKA Geometry



Summary of 1M muons (+and-)

Outside of the water shield and using the measured flux of
6.457e-9 muon/cm²/sec at Homestake

Muons at top face: 56134 = 2.7918e-02 muons/cm² = 4.3236e+06 sec

Muons at all faces: 91503 = 7.5849e-03 muons/cm² = 1.1746e+06 sec

Using top face muon flux:

Neutrons >100keV: 3005 = 2.4909e-04 neutrons/cm² = 5.7612e-11 n/cm²/sec

Neutrons >1 MeV: 2499 = 2.0714e-04 neutrons/cm² = 4.7909e-11 n/cm²/sec

Neutrons >10 MeV: 1529 = 1.2674e-04 neutrons/cm² = 2.9314e-11 n/cm²/sec

Neutrons >100 MeV: 529 = 4.3850e-05 neutrons/cm² = 1.0142e-11 n/cm²/sec

Into the OV (inside water shield)

Muons at top face: 13826 = 2.7505e-02 muons/cm²

Muons at all faces: 22641 = 7.5071e-03 muons/cm²

Neutrons >100keV: 224 = 7.4272e-05 neutrons/cm² = 1.7178e-11 n/cm²/sec

Neutrons >1 MeV: 215 = 7.1287e-05 neutrons/cm² = 1.6488e-11 n/cm²/sec

Neutrons >10 MeV: 183 = 6.0677e-05 neutrons/cm² = 1.4034e-11 n/cm²/sec

Neutrons >100 MeV: 77 = 2.5531e-05 neutrons/cm² = 5.9050e-12 n/cm²/sec

Top face surface of water shield = 2.010624e+06 cm²

Top face surface of OVC = 5.02656e+05 cm²

Total water shield surface = 1.2063744e+07 cm²

Total OVC surface = 3.015936e+06 cm²

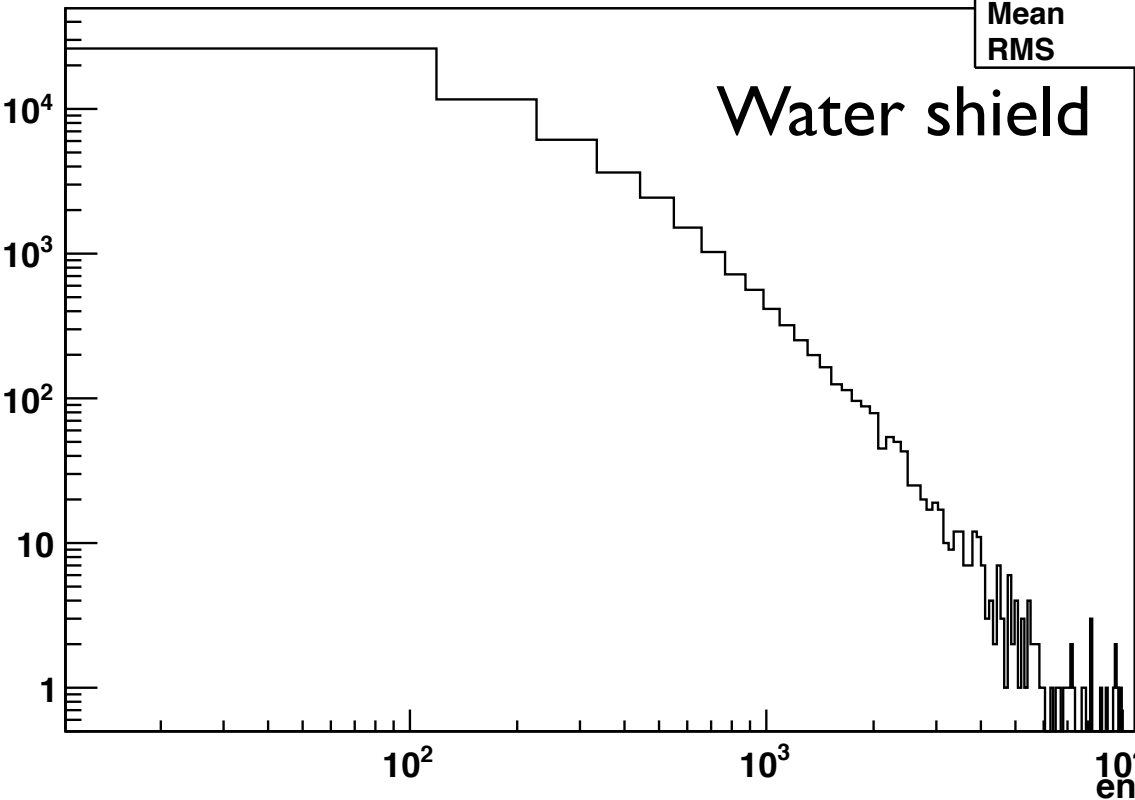
Table from Phys.Rev.D73:053004,2006

TABLE V: The muon-induced neutron flux for six sites (in units of $10^{-9} \text{ cm}^{-2} \text{ s}^{-1}$). The total flux is included along with those predicted for neutron energies above 1, 10, and 100 MeV.

Site	total	$> 1.0 \text{ MeV}$	$> 10 \text{ MeV}$	$> 100 \text{ MeV}$
WIPP	34.1	10.78	7.51	1.557
Soudan	16.9	5.84	4.73	1.073
Kamioka	12.3	3.82	3.24	0.813
Boulby	4.86	1.34	1.11	0.277
Gran Sasso	2.72	0.81	0.73	0.201
Sudbury	0.054	0.020	0.018	0.005
Homestake	0.058 ($> 100 \text{ keV}$)	0.048	0.029	0.010

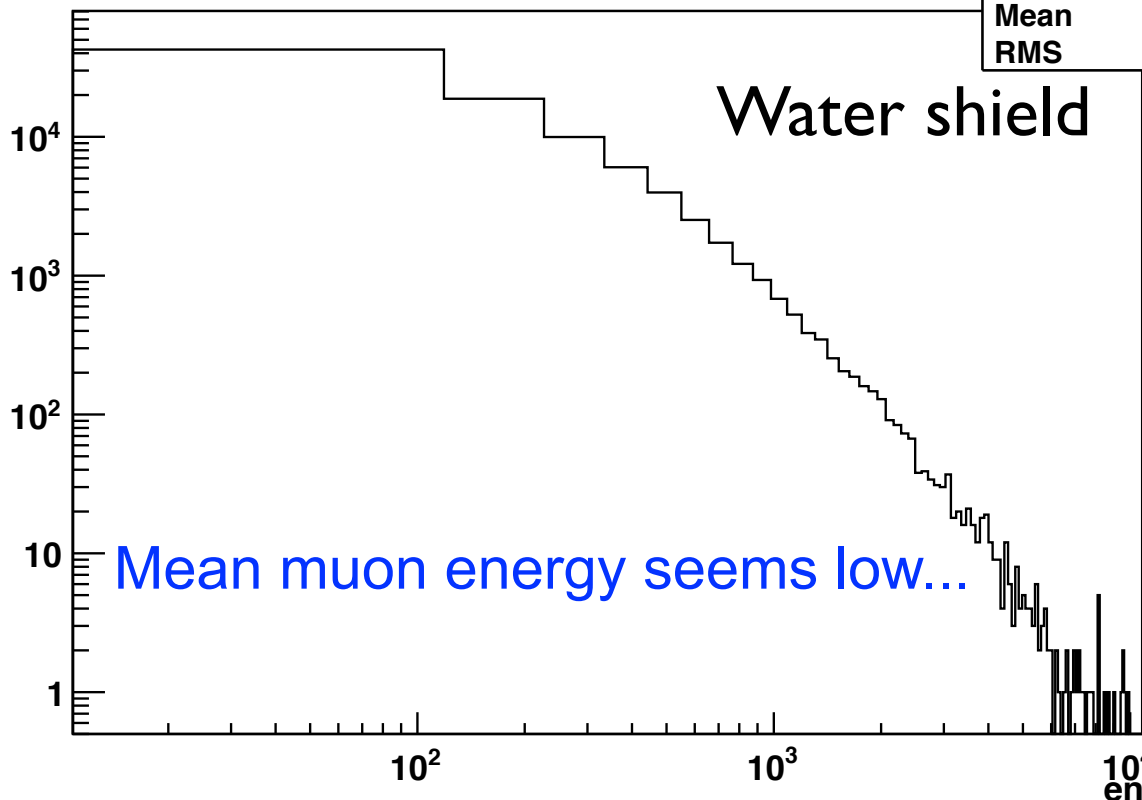
Some muon plots (x-axis Energy/GeV)

en {(id==10 || id==11) & z==800.0}



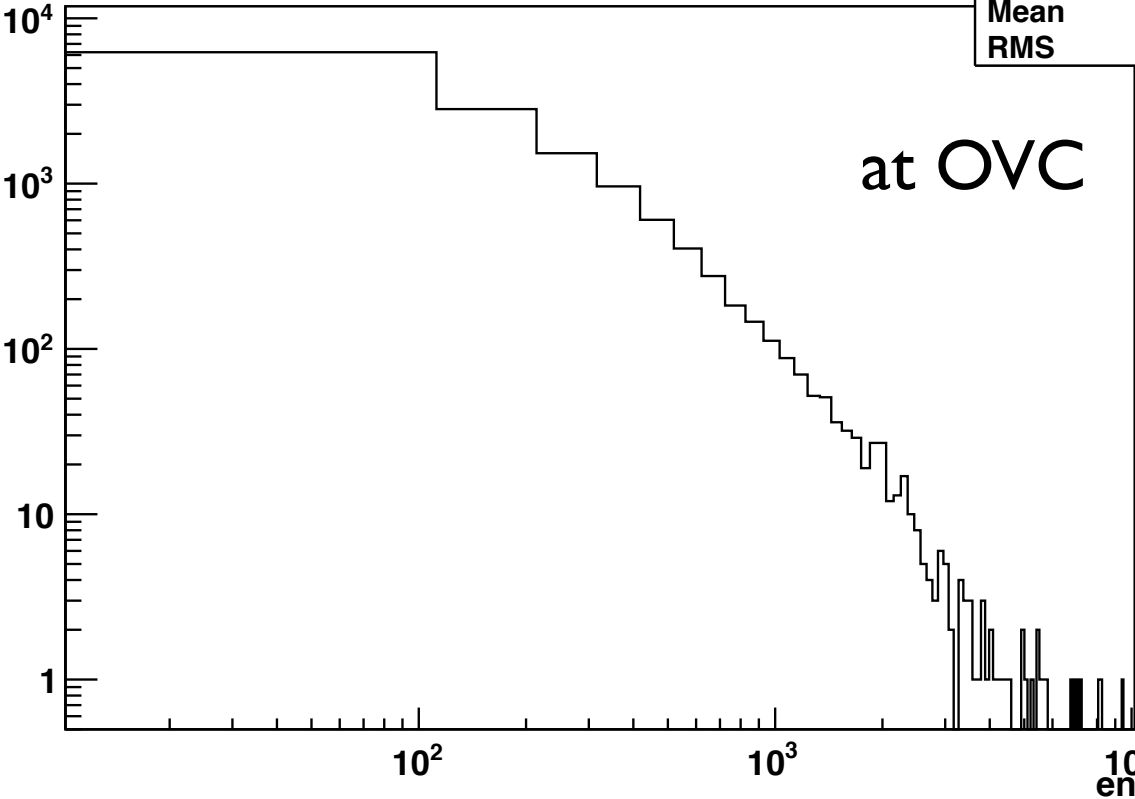
htemp	
Entries	56134
Mean	246.5
RMS	413.1

en {(id==10 || id==11)}



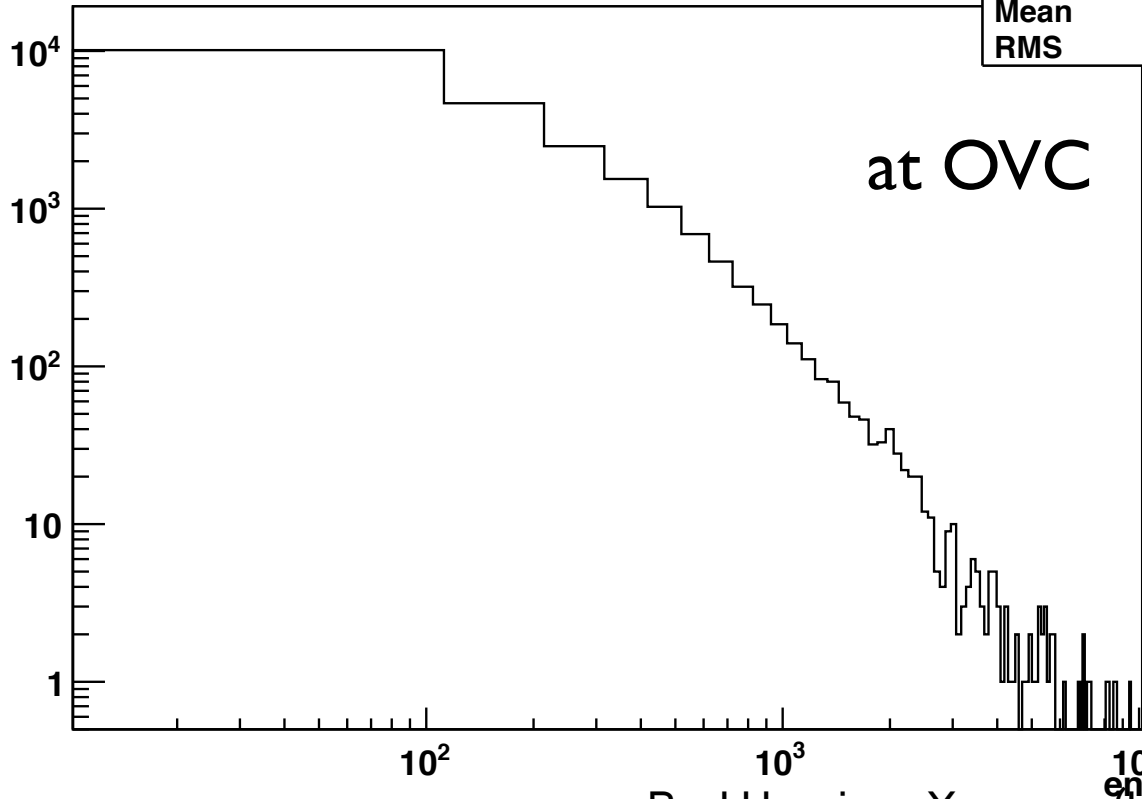
htemp	
Entries	91503
Mean	248.6
RMS	413.9

en {(id==10 || id==11) & z==400.0}



htemp	
Entries	13826
Mean	250.1
RMS	423.3

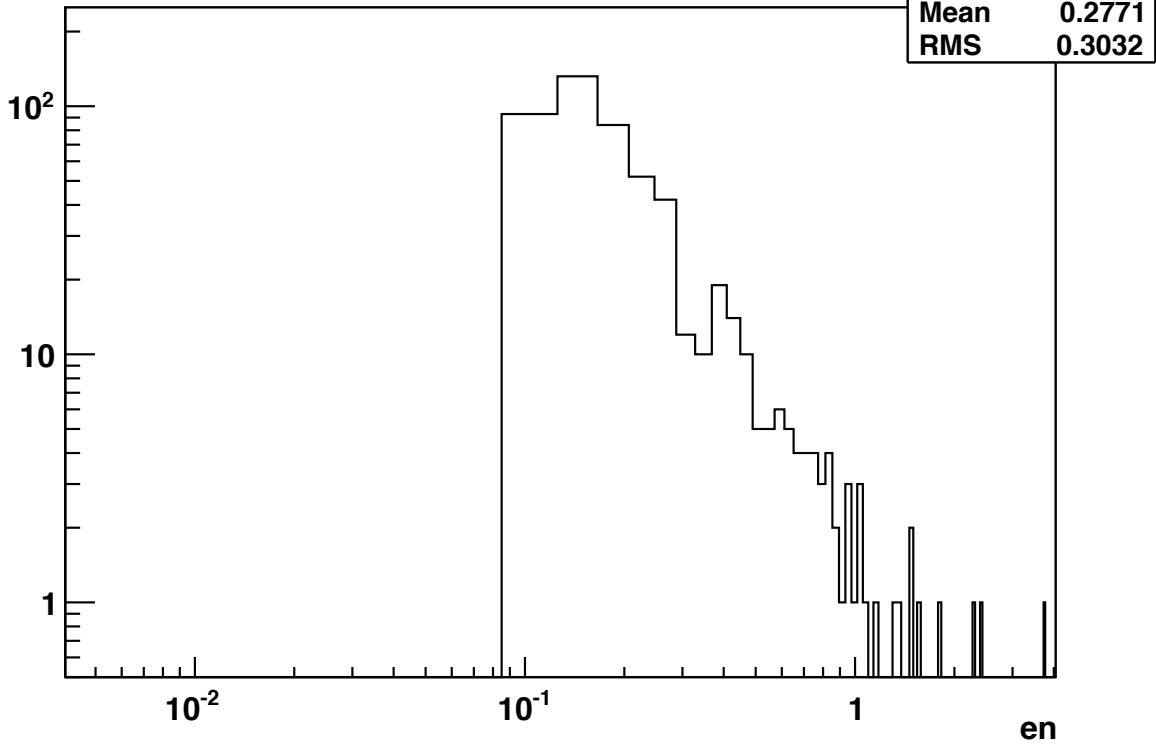
en {(id==10 || id==11)}



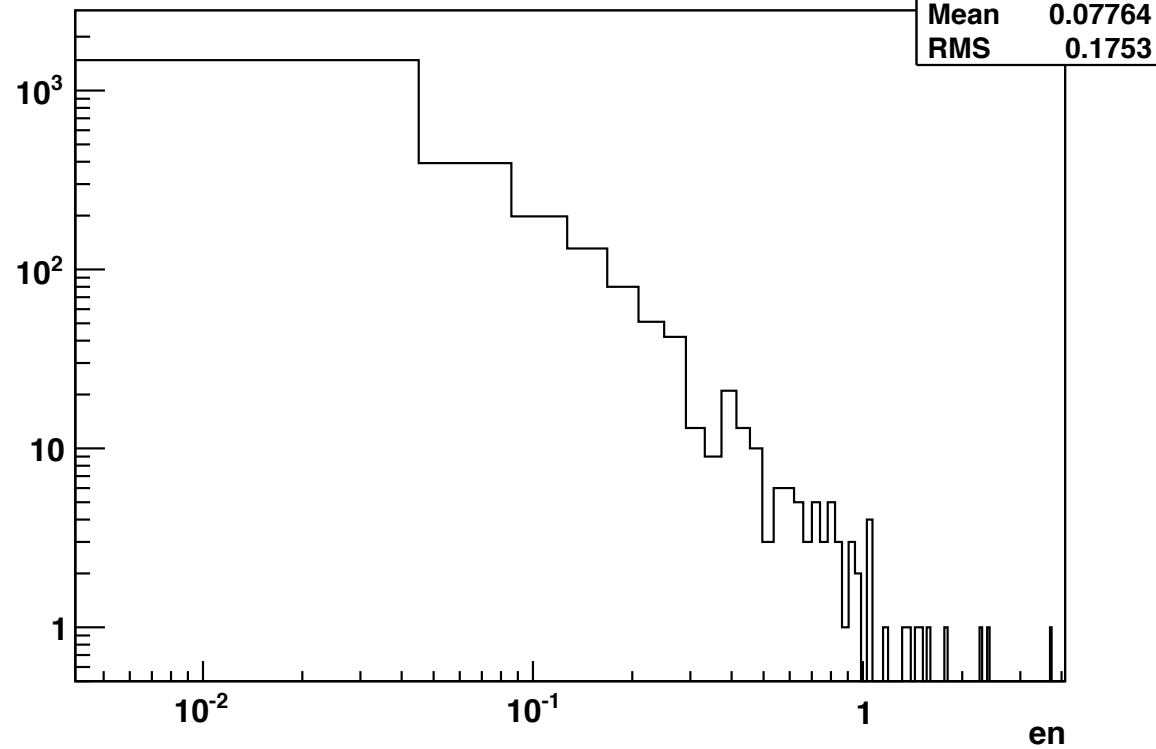
htemp	
Entries	22641
Mean	252.5
RMS	432.7

Some neutron plots at Water shield (x-axis Energy/GeV)

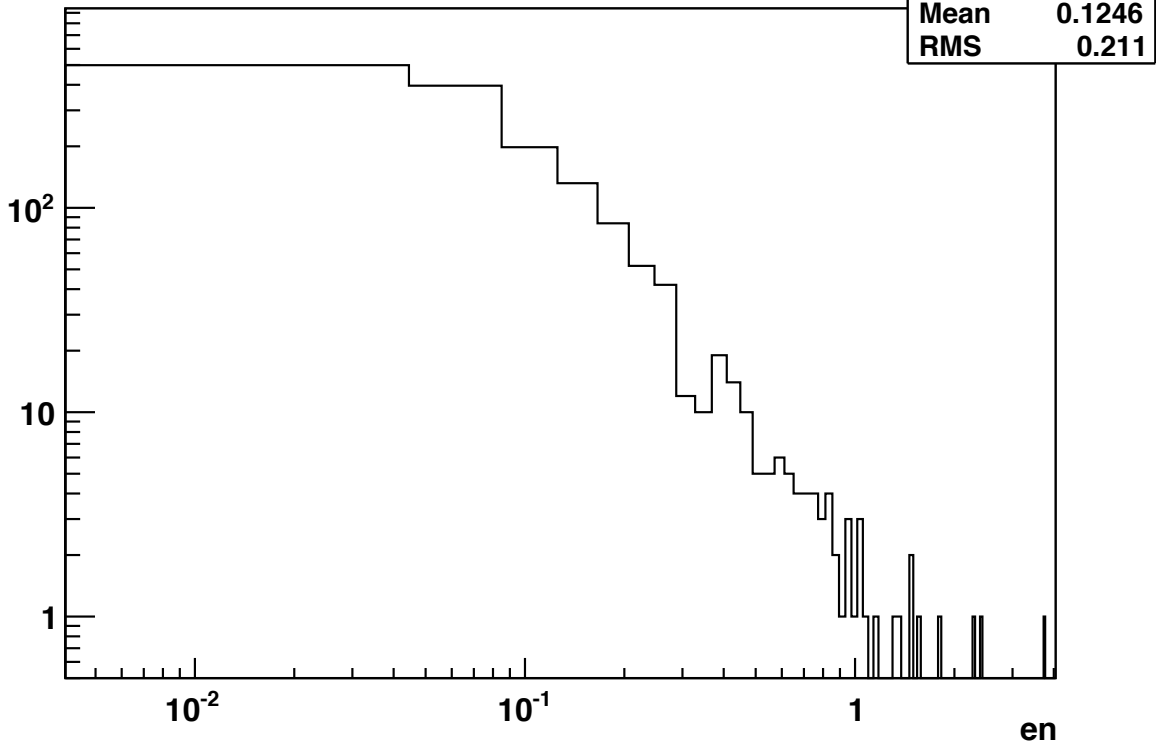
en {id==8 & en>0.1}



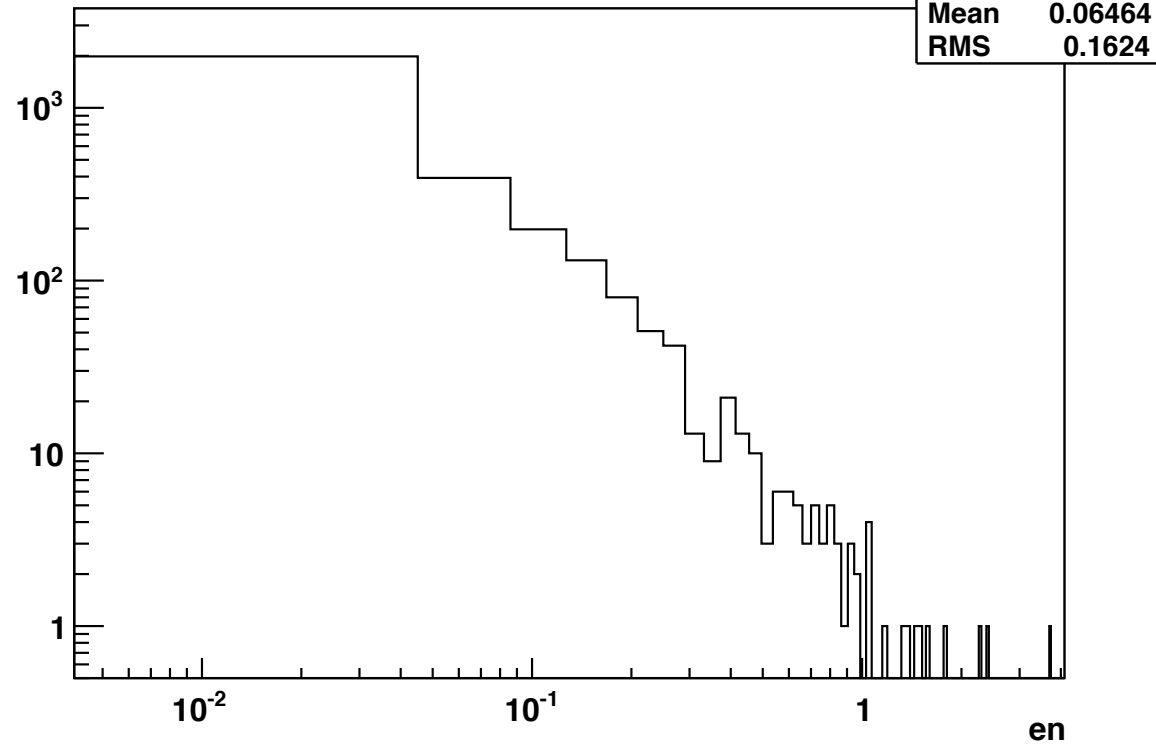
en {id==8 & en>0.001}



en {id==8 & en>0.01}

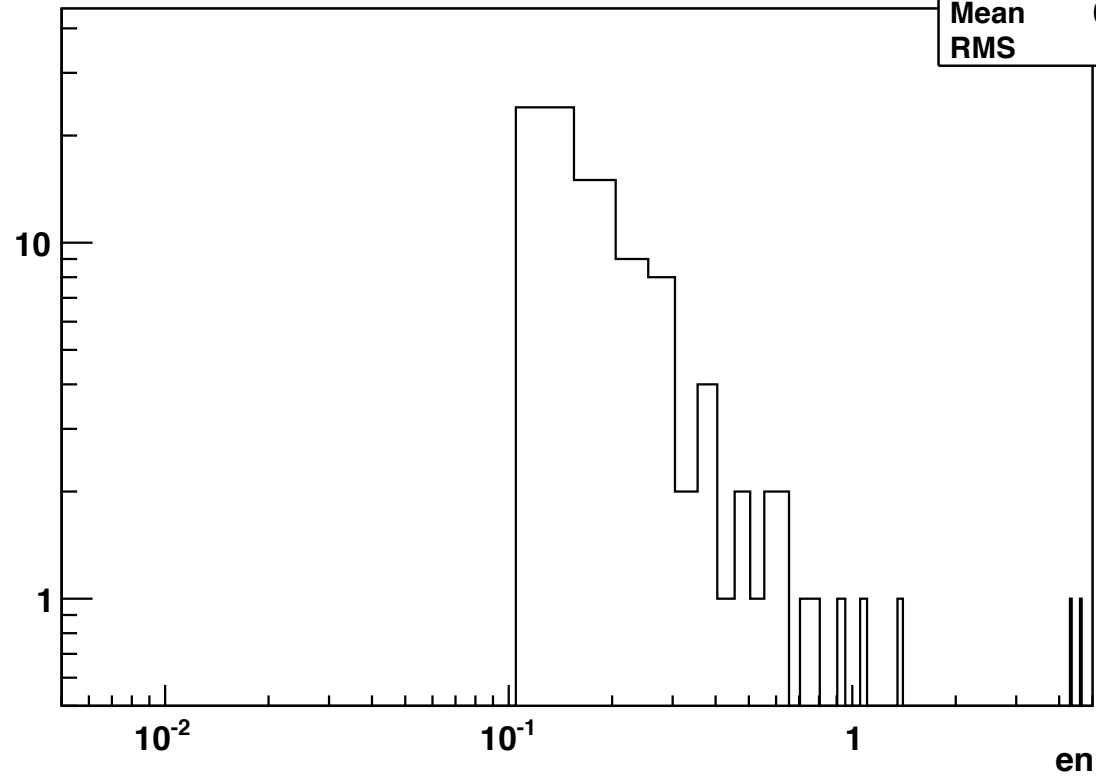


en {id==8 & en>0.0001}

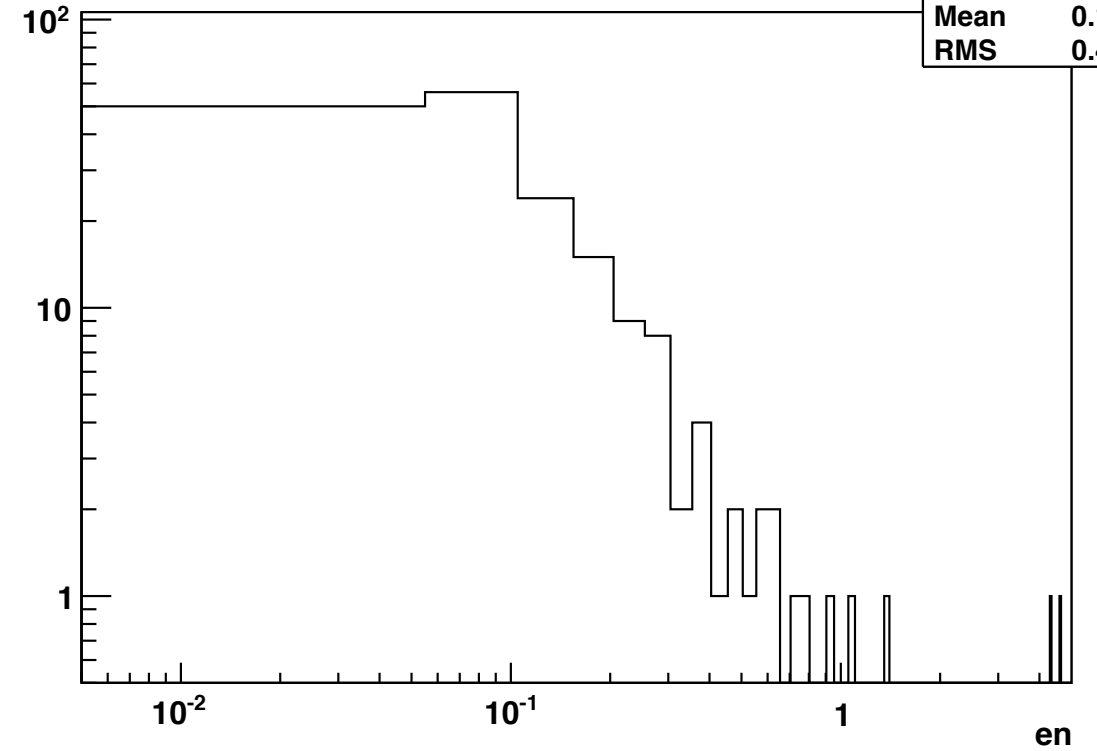


Some neutron plots at OVC (x-axis Energy/GeV)

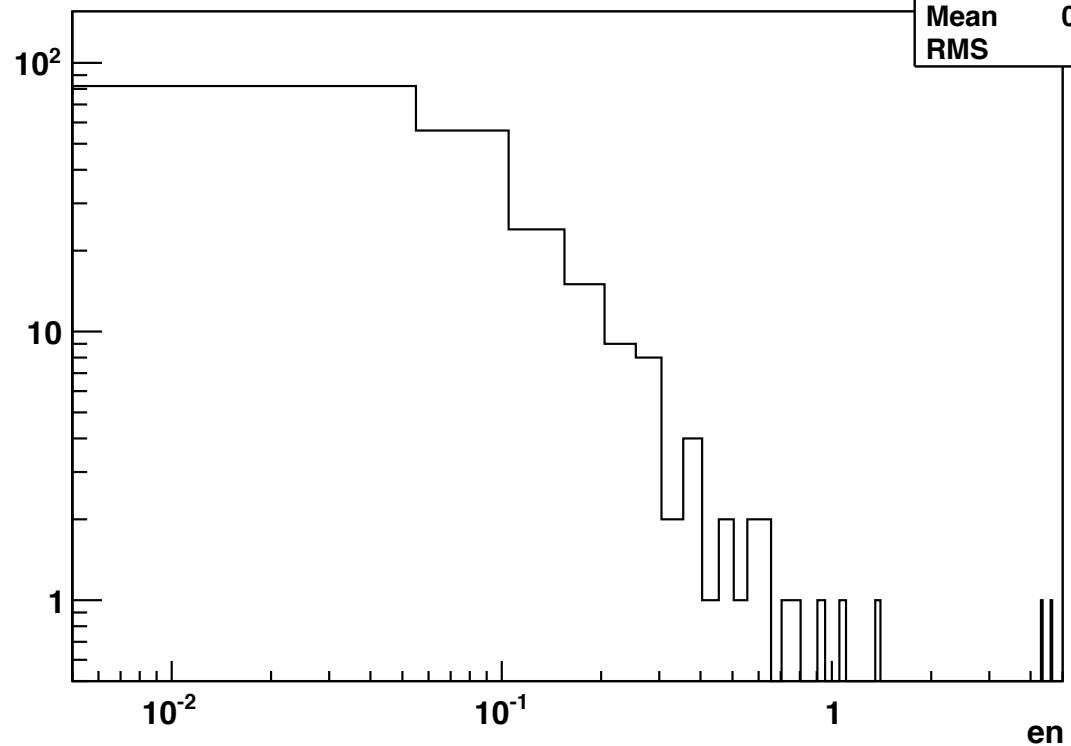
en {id==8 & en>0.1}



en {id==8 & en>0.01}



en {id==8 & en>0.001}



en {id==8 & en>0.0001}

