Search for time-dependent fluctuations in cosmic rays spectra with the AMS01 detector

1. Towards time-dependent Kinetic Energy Spectra

March 15, 2006

Data sample

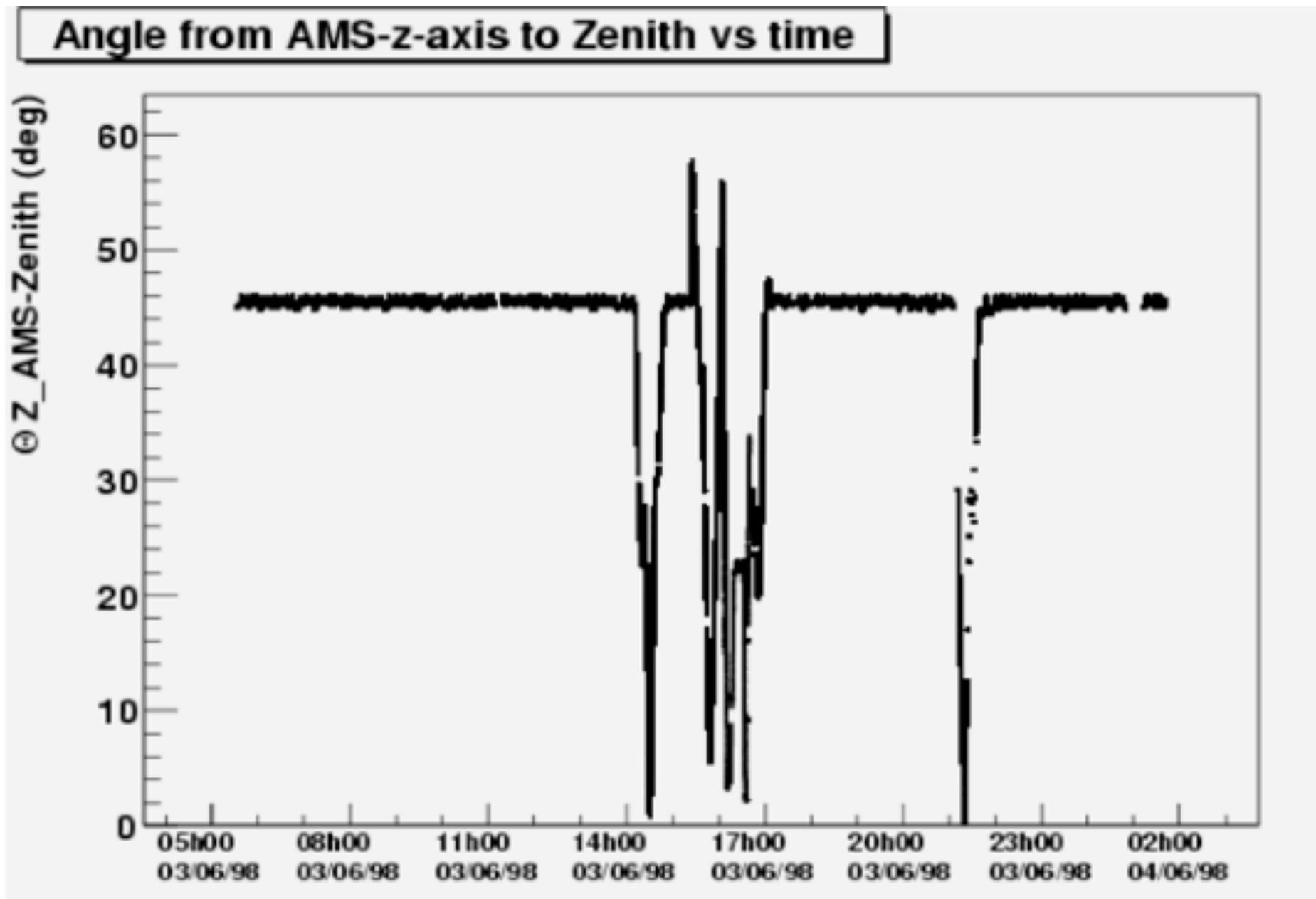- 9 862 567 triggered events

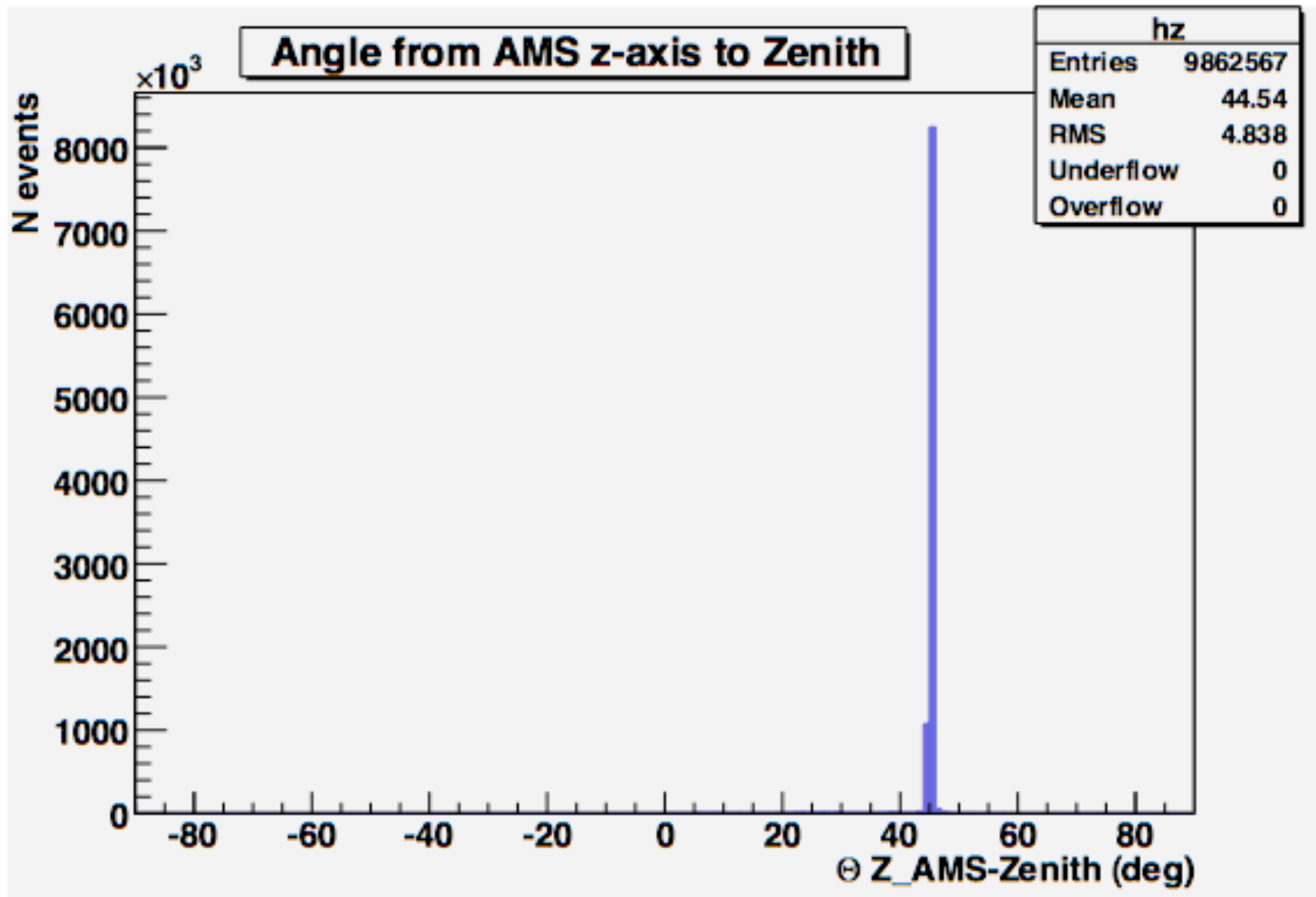start: June 3, 1998   5h32 AM GMT
end: June 4, 1998 11h52 AM GMT

Shuttle altitude: 340 Km

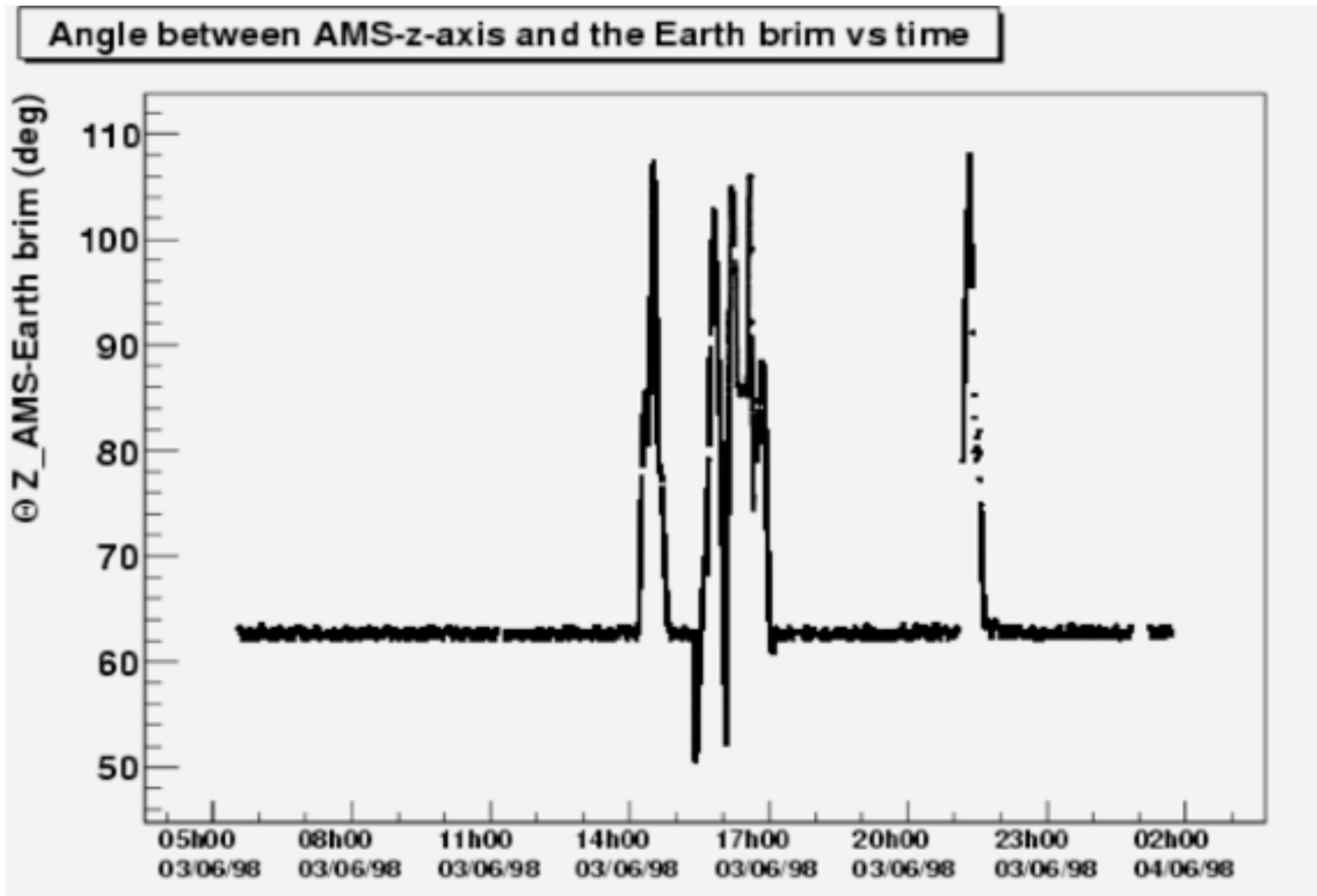(not full statistics for this configuration)

Pointing

Angle from AMS-z-axis to Zenith vs time

Pointing

Angle from AMS z-axis to Zenith

N events

×10³

hz	
Entries	9862567
Mean	44.54
RMS	4.838
Underflow	0
Overflow	0

Θ Z_AMS-Zenith (deg)
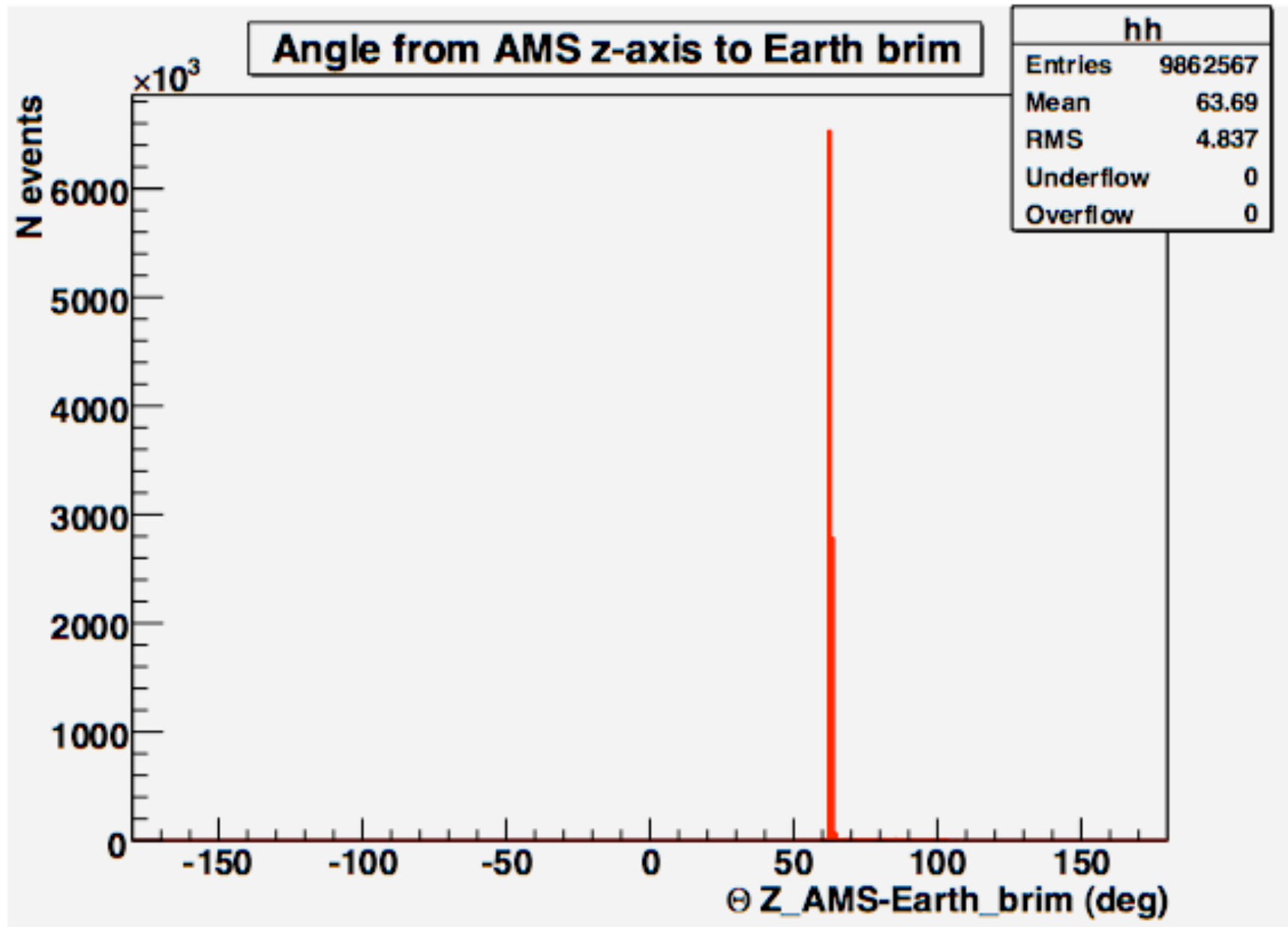
Field of view

Angle between AMS-z-axis and the Earth brim vs time

Field of view

Attitude selection

Selected only events for which:

- AMS was pointing 45 deg to Zenith (within 1 deg)

- The Earth was not in AMS field of view

9 324 279 events

Geomagnetic latitude, θm, ranges & Kinetic Energy bins

- $|\theta m|<0.2$
- $0.2 \leq |\theta m| < 0.3$
- $0.3 \leq |\theta m| < 0.4$
- $0.4 \leq |\theta m| < 0.5$
- $0.5 \leq |\theta m| < 0.6$
- $0.6 \leq |\theta m| < 0.7$
- $0.7 \leq |\theta m| < 0.8$
- $0.8 \leq |\theta m| < 0.9$
- $0.9 \leq |\theta m| < 1.0$
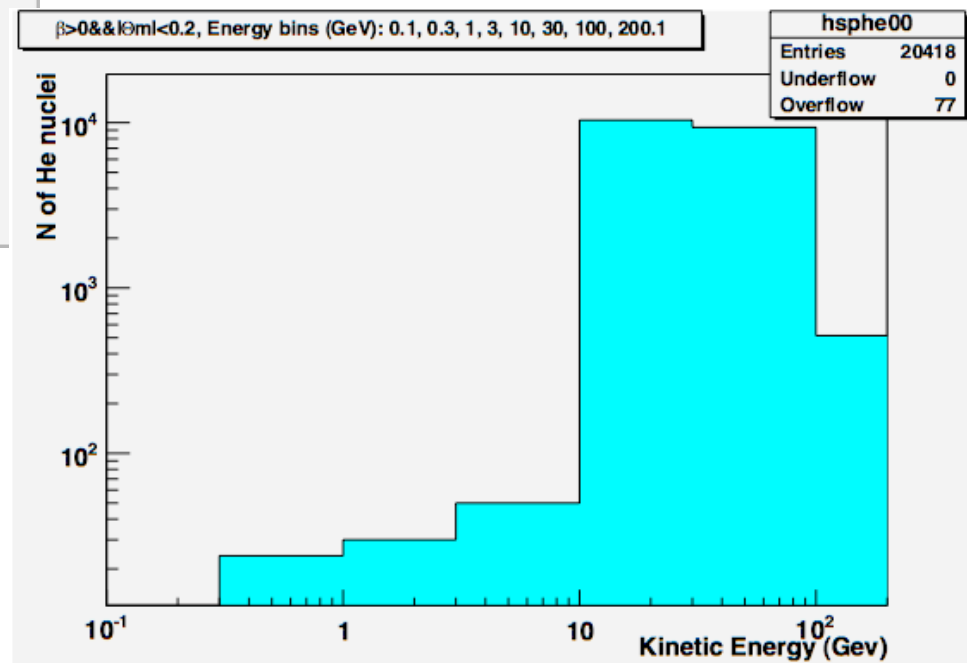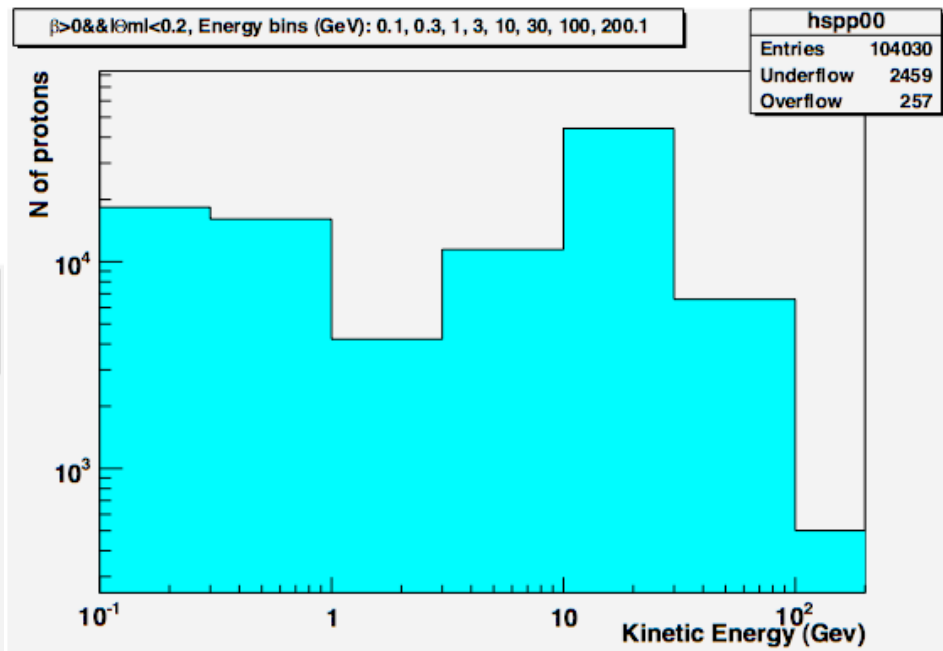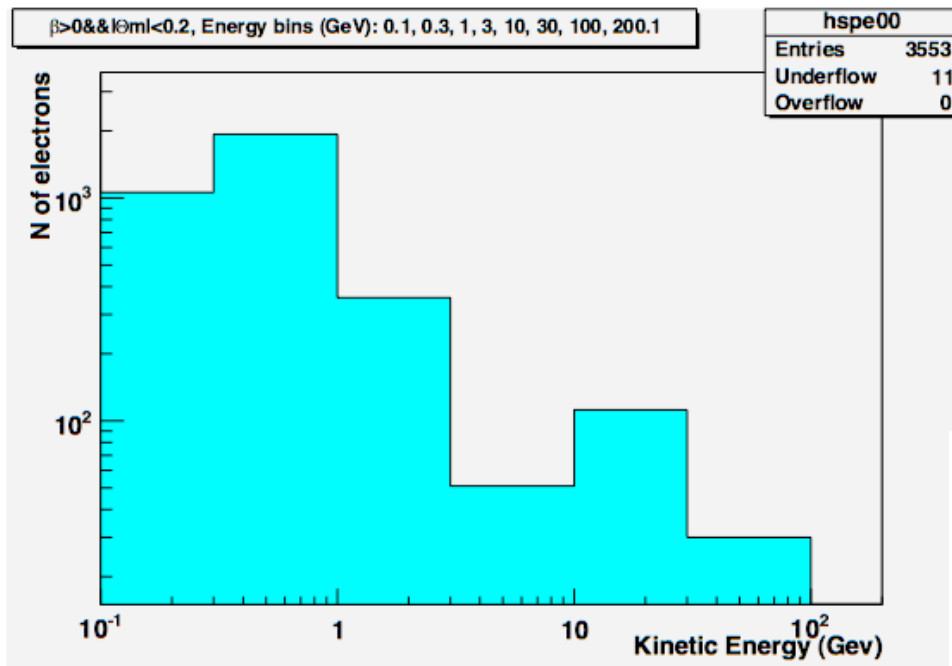- $|\theta m| \geq 1.0$

Kinetic Energy Bins (GeV):

1. 0.1 - 0.3
2. 0.3 - 1
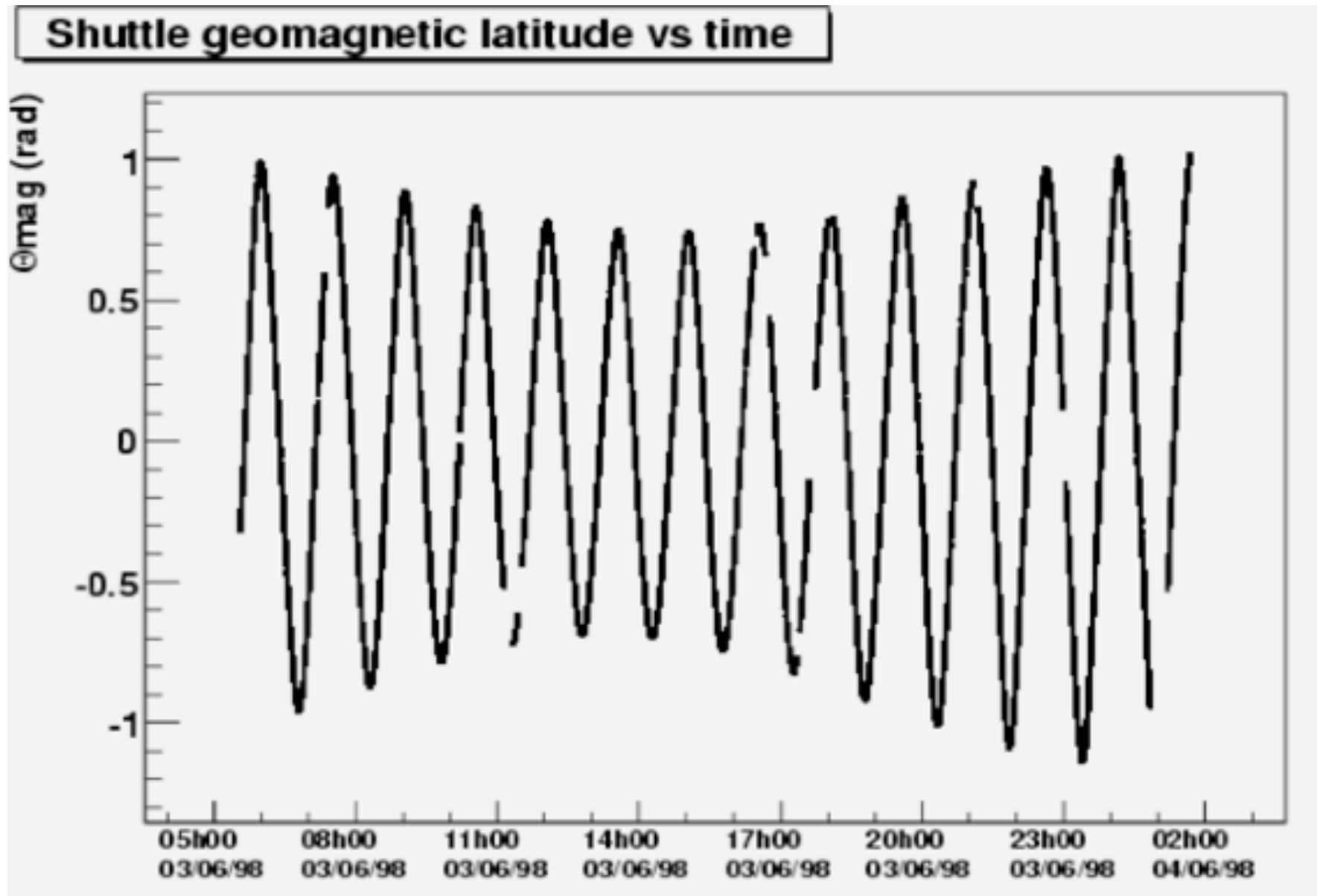3. 1 - 3
4. 3 - 10
5. 10 - 30
6. 30 - 100
7. 100 - 200.1

Selected events summary:

	electrons	protons	He nuclei
$\|\theta_m\|<0.2$	3 553	104 030	20 418
$0.2\leq\|\theta_m\|<0.3$	1 890	54 783	11 954
$0.3\leq\|\theta_m\|<0.4$	2 027	60 688	14 884
$0.4\leq\|\theta_m\|<0.5$	2 368	75 329	19 873
$0.5\leq\|\theta_m\|<0.6$	3 186	106 035	29 094
$0.6\leq\|\theta_m\|<0.7$	6 114	204 312	55 814
$0.7\leq\|\theta_m\|<0.8$	9 085	299 392	81 101
$0.8\leq\|\theta_m\|<0.9$	9 011	307 315	82 925
$0.9\leq\|\theta_m\|<1.0$	9 178	339 586	80 662
$\|\theta_m\|\geq1.0$	5 164	214 626	40 420

$|\theta_m|<0.2$

β>0&&|θm|<0.2, Energy bins (GeV): 0.1, 0.3, 1, 3, 10, 30, 100, 200.1

hspe00	
Entries	3553
Underflow	11
Overflow	0

N of electrons — Kinetic Energy (Gev)

β>0&&|θm|<0.2, Energy bins (GeV): 0.1, 0.3, 1, 3, 10, 30, 100, 200.1

hspp00	
Entries	104030
Underflow	2459
Overflow	257

N of protons — Kinetic Energy (Gev)

β>0&&|θm|<0.2, Energy bins (GeV): 0.1, 0.3, 1, 3, 10, 30, 100, 200.1

hsphe00	
Entries	20418
Underflow	0
Overflow	77

N of He nuclei — Kinetic Energy (Gev)

Geomagnetic latitude (period ~ 1h30min)

Geomagnetic latitude occupancy (total)

Shuttle geomagnetic latitude distribution:(Θ_ZAMS_EarthBrim>50)&(Θ_ZAMS_Zenith>44)&(Θ_ZAMS_Zenith<46)

hm	
Entries	9324279
Underflow	0
Overflow	0

N of triggered events

|Θlm (rad)

θm period ~ 1h30min $\Rightarrow$ |θm| period ~ 45min

First 15 min

45 min later
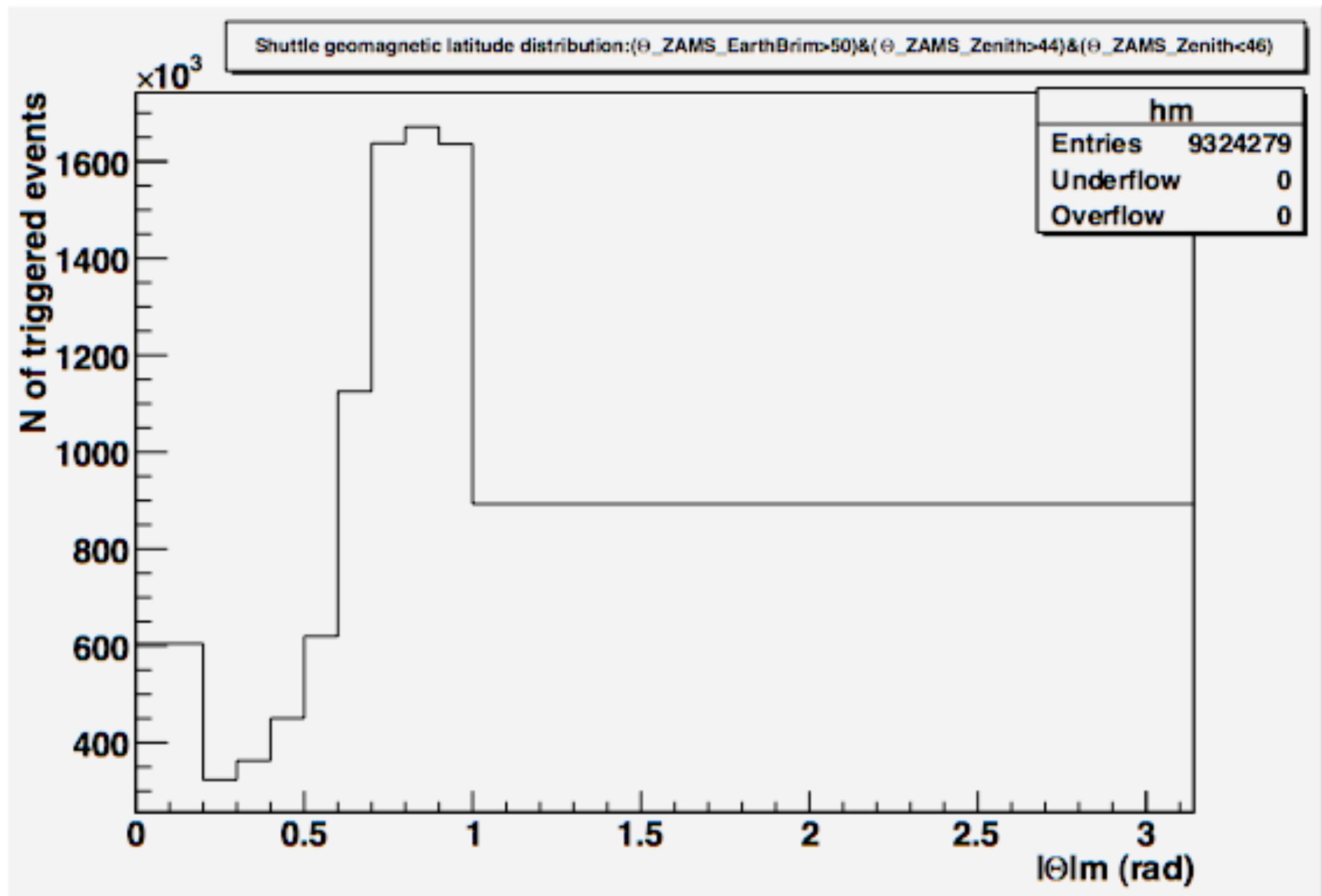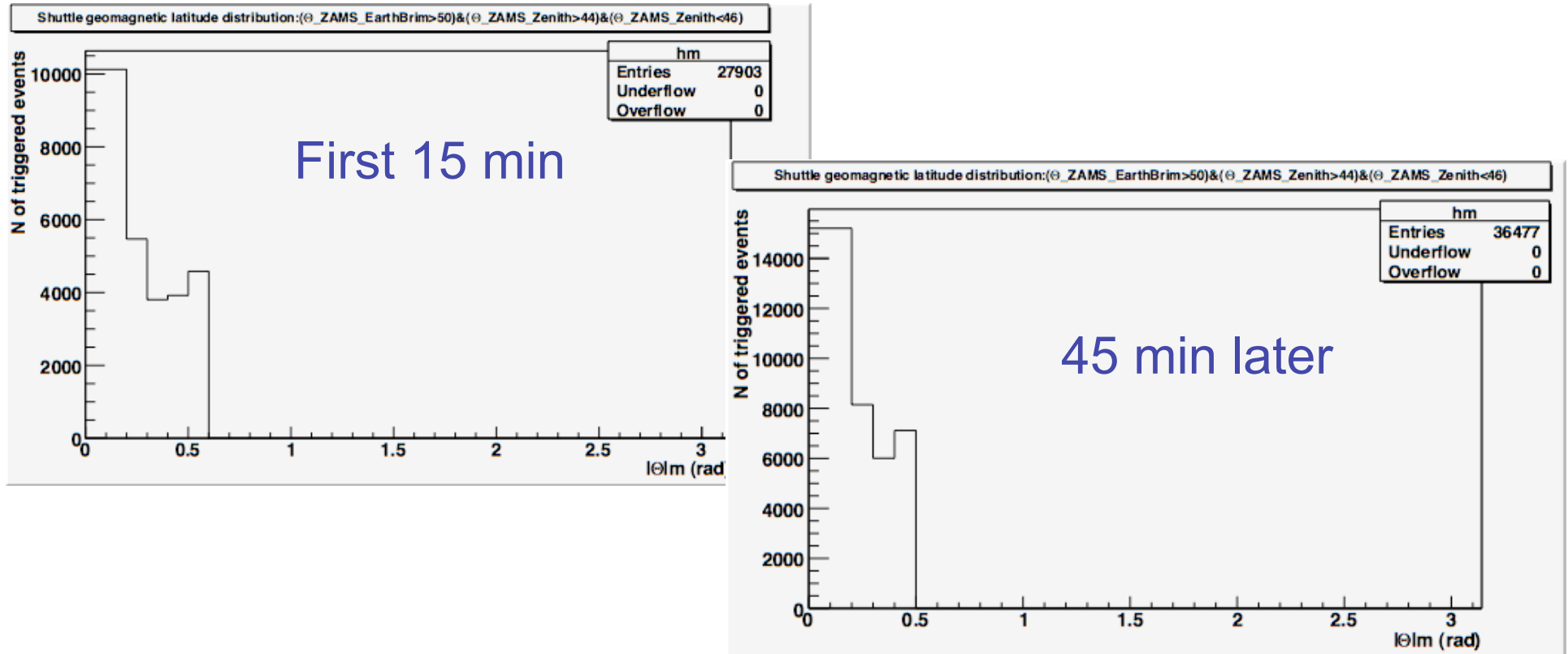
When producing time-dependent Kinetic energy spectra the number of events will depend on how the time interval has been chosen! Correction factor needed