Table 5 - results for Sep.29, 2010

- previous: $\frac{\sigma_{tot} \cdot N_n}{N_{MCevents}}$
- Sep.29: $\frac{N_n}{N_{beam} \cdot n_t}$

where N_{beam} = $N_{MCfiles} \cdot 2 \cdot 10^5$

	Data	$DPMJET$ $FLUKA$	LAQGSM
H_2-58	5.8	4.9	4.7
Be-58	44.0	18.6 (28.1)	25.3
C-58	45.9	32.7 (32.9)	27.5
Bi-58	193.2	143.4(167.6)	88.3
U-58	178.8	165.0(184.7)	91.5
H_2-84	8.8	6.4	5.4
Be-120	55.0	31.6 (43.0)	33.4
C-120	64.5	56.5 (51.8)	36.6
Bi-120	300.2	296.1(293.9)	120.1

Table 1: Numbers in parenthesis represents results for Sep.29 - σ_n(2).

Table 5 - results for Sep.30, 2010

- previous: $\frac{\sigma_{tot} \cdot N_n}{N_{Remained}}$
- Sep.30: $\frac{N_n}{N_{beam} \cdot CF \cdot n_t}$

where N_{beam} = $N_{MCfiles} \cdot 2 \cdot 10^5$

	N_f	Evts/f	Tot-gen	Remained	CF
Be-58	34	4000	135499	130333	0.962
C-58	162	7000	1125201	1081497	0.961
Bi-58	160	4000	631844	592021	0.937
U-58	133	4000	546006	510787	0.935
Be-120	178	4000	708894	618192	0.872
C-120	165	7000	1155860	1010810	0.874
Bi-120	185	4000	739838	589542	0.797

Table 2: Correction factor to N_{beam} values - last column

	Data	$DPMJET$ $FLUKA$	LAQGSM
H_2-58	5.8	4.9	4.7
Be-58	44.0	18.6 (29.1)	25.3
C-58	45.9	32.7 (34.2)	27.5
Bi-58	193.2	143.4(179.0)	88.3
U-58	178.8	165.0(197.4)	91.5
H_2-84	8.8	6.4	5.4
Be-120	55.0	31.6 (49.3)	33.4
C-120	64.5	56.5 (59.3)	36.6
Bi-120	300.2	296.1(369.1)	120.1

Table 3: Numbers in parenthesis represents results for Sep.30 - σ_n(2).

some details

Approach 1: $\sigma_n(1) = \frac{N_n \cdot \sigma_{tot}}{N_{evnts}}$

	N_{evnts}(1)	N_n(1)	σ_{tot}	σ_n(1)
Be-58	130333	9399	258	18.6
C-58	1081497	107321	330	32.7
Bi-58	592021	26106	3246	143.1
U-58	510787	23552	3585	165.3
Be-120	618157	75278	260	31.7
C-120	1010806	171943	332	56.5
Bi-120	583163	52996	3255	295.8

Table 4: σ_n(1) with approach 1

Approach 2: $\sigma_n = \frac{N_n}{N_{files} \cdot 2 \cdot 10^5 \cdot CF \cdot n_t}$

	N_f	N_n(2)	CF	n_t	σ_n(2)
Be-58	34	9399	0.962	0.4925	29.2
C-58	162	107321	0.961	1.006	34.3
Bi-58	160	26106	0.937	0.0487	178.8
U-58	133	23552	0.935	0.0479	197.7
Be-120	178	75278	0.872	0.4925	49.2
C-120	165	171943	0.874	1.006	59.3
Bi-120	185	52996	0.797	0.0487	369.0

Table 5: σ_n(2) with approach 2

Cross - check

How good is our MC settings?

The total cross section values can tell something about it:

$$\sigma_{tot} = \frac{N_{gen}}{N_{beam} \cdot n_t} = \frac{N_{gen}}{N_{files} \cdot 2 \cdot 10^5 \cdot n_t} \times 10^4, \text{ mb}$$

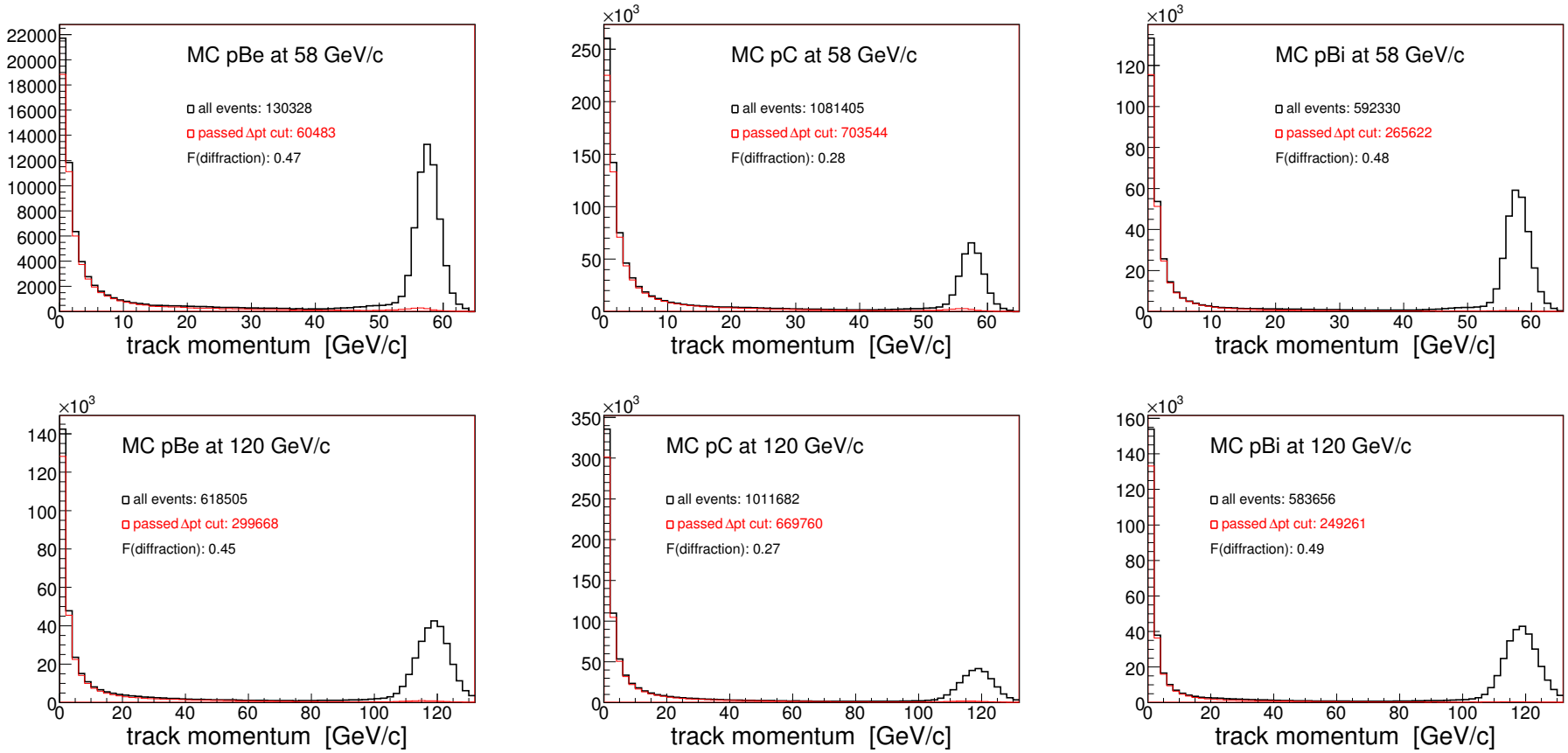
	N_{files}	Tot-gen	MC n_t	σ_{tot}	$expected$ $\sigma_{tot} MC$	Δ/σ_e
Be-58	34	135499	0.4925	405	258	0.57
C-58	162	1125201	1.006	345	330	0.05
Bi-58	160	631844	0.0487	4054	3246	0.25
U-58	133	546006	0.0479	4285	3585	0.20
Be-120	178	708894	0.4925	404	260	0.56
C-120	165	1155860	1.006	348	332	0.05
Bi-120	185	739838	0.0487	4106	3255	0.26

Table 6: MC σ_{tot} estimates using the number of generated events.

Why above calculated σ_{tot} is much differ from that expected?

Cross - check, continue

Durga suggested that it because MC generated “too much” of straight through events.



Cross - check, continue

What's to do? If we will cut-out the diffraction peak (and uninteracted beam), then remaining sample would represents only the inelastic processes. Cut-out can be done by using Δp_T >0.15 GeV/c cut

Appr 1: $\sigma_n(1) = \frac{N_n \cdot \sigma_{inel}}{N_{evnts}}$ Appr 2: $\sigma_n(2) = \frac{N_n}{N_{files} \cdot 2 \cdot 10^5 \cdot CF \cdot n_t}$

	N_{evnts}(1)	N_n(1)	σ_{inel}	σ_n(1)	σ_n(2)	σ_n(data)
Be-58	60483	8641	201	28.7	29.2	44.0±8.3
C-58	703218	98959	286	40.2	34.3	45.9±7.2
Bi-58	265306	24564	1875	173.6	178.8	193.2±32.5
U-58	236186	22020	2081	194.0	197.7	178.8±30.8
Be-120	299290	71181	203	48.3	49.2	55.0±8.2
C-120	669066	162871	287	69.9	59.3	64.5±8.8
Bi-120	248794	50801	1880	383.8	369.0	300.2±52.0

Table 7: σ_n(1) and σ_n(2), where results for approach 1 were recalculated using Δp_T cut

correcting of σ_n(MC) for n_t(MC) / n_t(data) ratio

How to make correction for n_t(MC) if it is differ from data?

If n_t(MC) is greater than n_t(data), it means that MC σ_n is underestimated.

Appr 1: $\sigma_n(1) = \frac{N_n \cdot \sigma_{inel}}{N_{evnts}} \times$CC

Appr 2: $\sigma_n(2) = \frac{N_n}{N_{files} \cdot 2 \cdot 10^5 \cdot CF \cdot n_t} \times$CC

	n_t(data)	n_t(MC)	CC	$\sigma_n(1)$	$\sigma_n(2)$	σ_n(data)
Be-58	0.4744	0.4925	1.038	29.0	30.3	44.0$\pm$8.3
C-58	0.8408	1.006	1.196	40.6	41.0	45.9$\pm$7.2
Bi-58	0.0487	0.0487	1.000	175.1	178.8	193.2$\pm$32.5
U-58	0.0474	0.0479	1.011	196.7	199.9	178.8$\pm$30.8
Be-120	0.4744	0.4925	1.038	48.5	51.1	55.0$\pm$8.2
C-120	0.8408	1.006	1.196	70.2	70.9	64.5$\pm$8.8
Bi-120	0.0487	0.0487	1.000	386.0	369.0	300.2$\pm$52.0

Table 8: $\sigma_n(1)$ and $\sigma_n(2)$ both were corrected for n_t(MC)/n_t(data) ratio

What to use as the final MC results?

$\sigma_n(1)$ is almost free from assumptions. $\sigma_n(2)$ based on CF which has contribution of the uninteracted events.