Proposal for new GhostBusting for "4 out of 5"

Current GhostBusting uses only chi–square to eliminate dupulicate track.

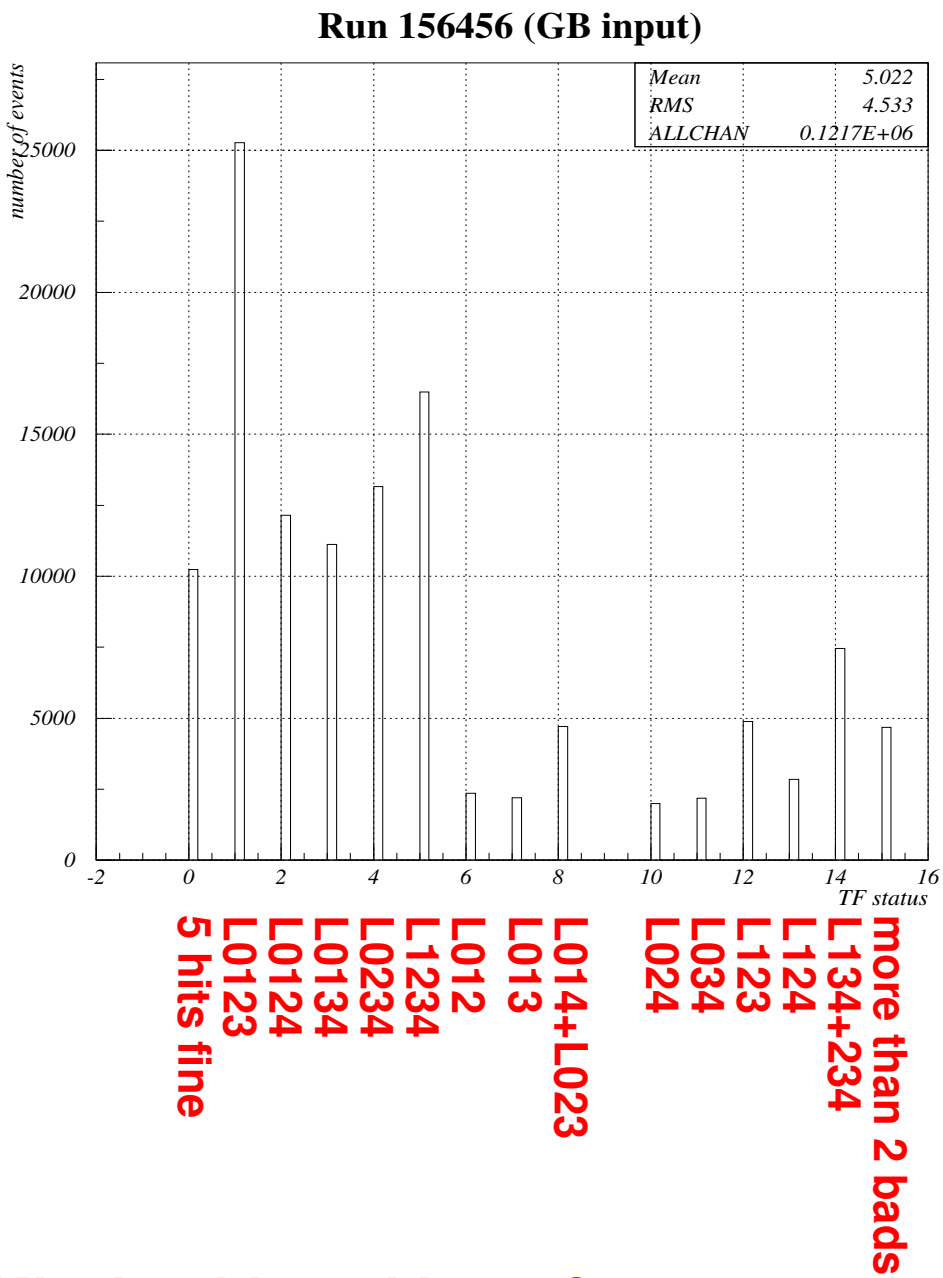
Proposal:

New GB employes SVX hit information also.

A priori: Track with "TF error status" should be removed to compare other tracks. (3% of GB input in run156456)
TF error –>hit overflow, layer overflow, comb. overflow, invalid data, overflow in the hit and FIFO overflow.

Priority of track quality as a function of (SVX hit status, chisq) instead of (only chisq) is needed.

Track Fitter Status (Hit Status word)



Missing hit and LongClusters are operated as same here. (meybe this can be improved)

Proposal for priority

1. hit_status 0 ~ 4 (5hits, L0123, L0124, L0134, L0234)
2. hit_status 5 ~ 11 (L1234, L012, L013, L014, L023, L024, L034)
3. hit_status 12 ~ 13 (L123, L124)
4. hit_status 14 ~ 15 (L234+L134, more than 2layers are bad)

LongCluster study may be recovered L123, etc which has
LC L0 hits.

Proposal for function (chisq, status)

original chisq	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	>16
priority 1								+0									
priority 2	4	4	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6
priority 3									+20								
priority 4									+40								

To select the track we use "original chisq + correction chisq".

To make chisq correction mapping.

Comparing (1) chisq<=3
(2) 4<=chisq<=10
(3) chisq>10

of impact parameter distribution of
"each hit_status"

Total point of
(a) Fitted sigma of Gauusian
(b) RMS
(c) tail fraction (>100um/total)

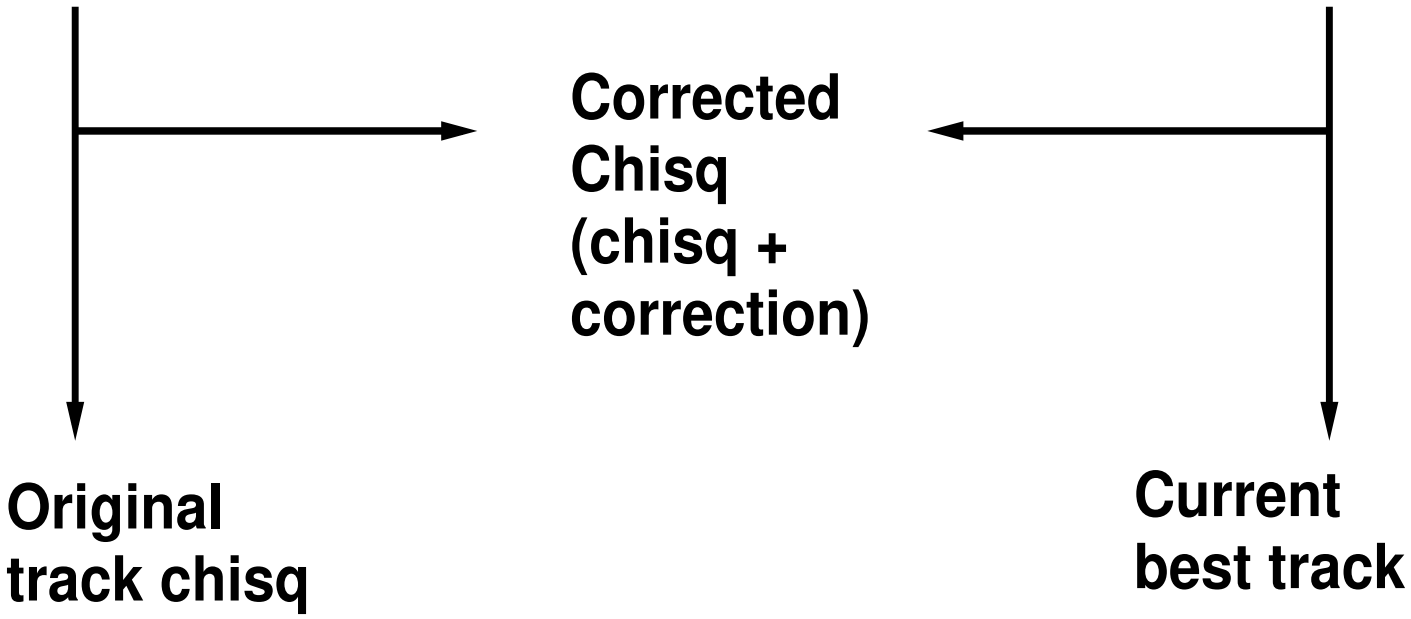
is used.

These priority and table is come from judgement of (fitted sigma, RMS, tail fraction(>100um))

TF status	chisq	sigma	RMS	fraction
0	<=3	56.5	182	24.7%
	4<= <=10	74.7	258	28.6%
	>10	140	442	54.9
1	<=3	57.8	176	24.6%
	4<= <=10	95.3	239	32.8%
	>10	172	396	59.3
2	<=3	55.3	189	25.6%
	4<= <=10	70.0	305	31.0%
	>10	129	506	56.8
3	<=3	57.2	201	24.5%
	4<= <=10	76.4	242	29.2%
	>10	118	437	50.0
4	<=3	80.9	208	30.7%
	4<= <=10	112.	353	42.1%
	>10	216	658	73.2
5	<=3	102.	202	33.8%
	4<= <=10	123.	290	43.6%
	>10	202	489	68.8
6	<=3	80.3	231	28.4%
	4<= <=10	88.9	308	40.6%
	>10	143	496	60.4
7	<=3	65.2	254	28.6%
	4<= <=10	78.7	397	37.5%
	>10	130	468	52.5
8	<=3	78.5	227	32.4%
	4<= <=10	111.	368	44.0%
	>10	149	509	57.2
10	<=3	64.5	262	33.3%
	4<= <=10	110.	516	49.1%
	>10	144	562	60.3
11	<=3	113	229	38.9%
	4<= <=10	139	413	48.5%
	>10	175	523	63.8
12	<=3	106	234	38.3%
	4<= <=10	132	285	50.6%
	>10	170	387	63.0
13	<=3	108	223	36.8%
	4<= <=10	124	355	45.9%
	>10	154	509	65.7
14	<=3	132	243	47.3%
	4<= <=10	150	338	55.5%
	>10	181	470	65.4
15	<=3	146	346	53.4%
	4<= <=10	163	391	59.9%
	>10	188	539	70.3

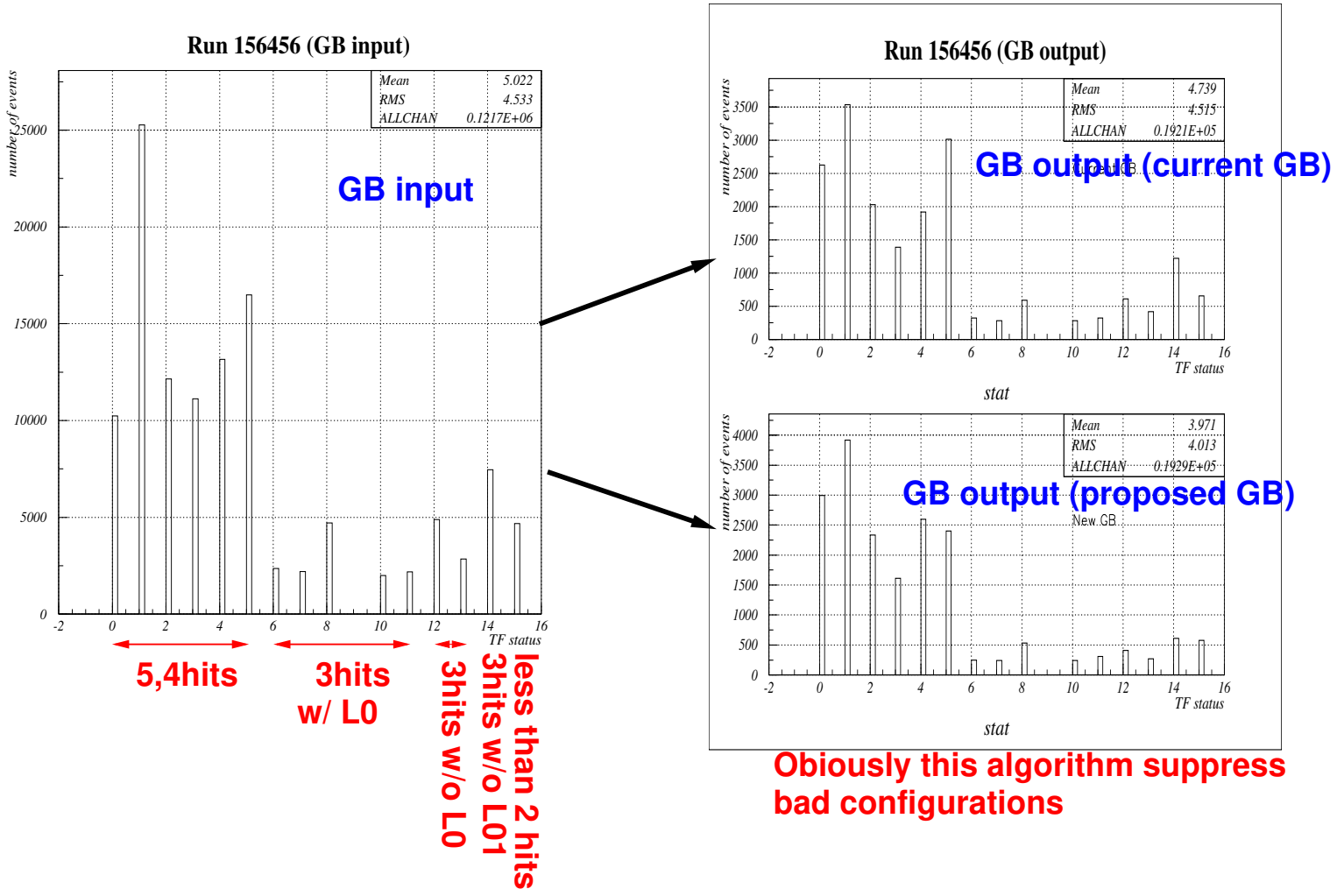
Ambiguous

Technical View



Corrected chi–square is used to select better quality track. But, original track chi–square is stored in track packet. (To keep smooth chi–square distribution)

Expected Performance

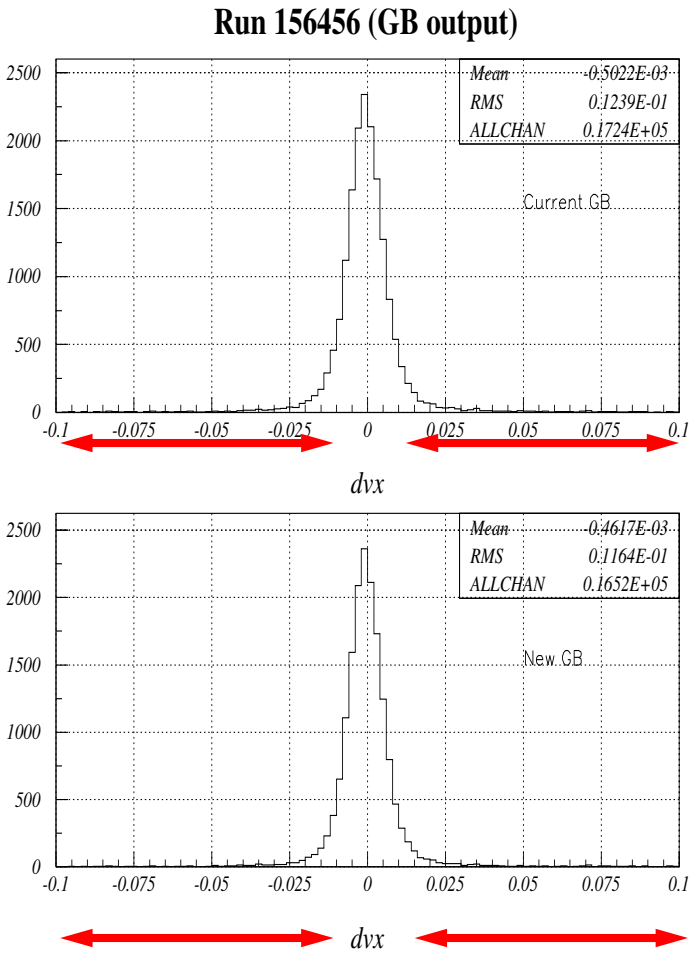


Expected Performance (II)

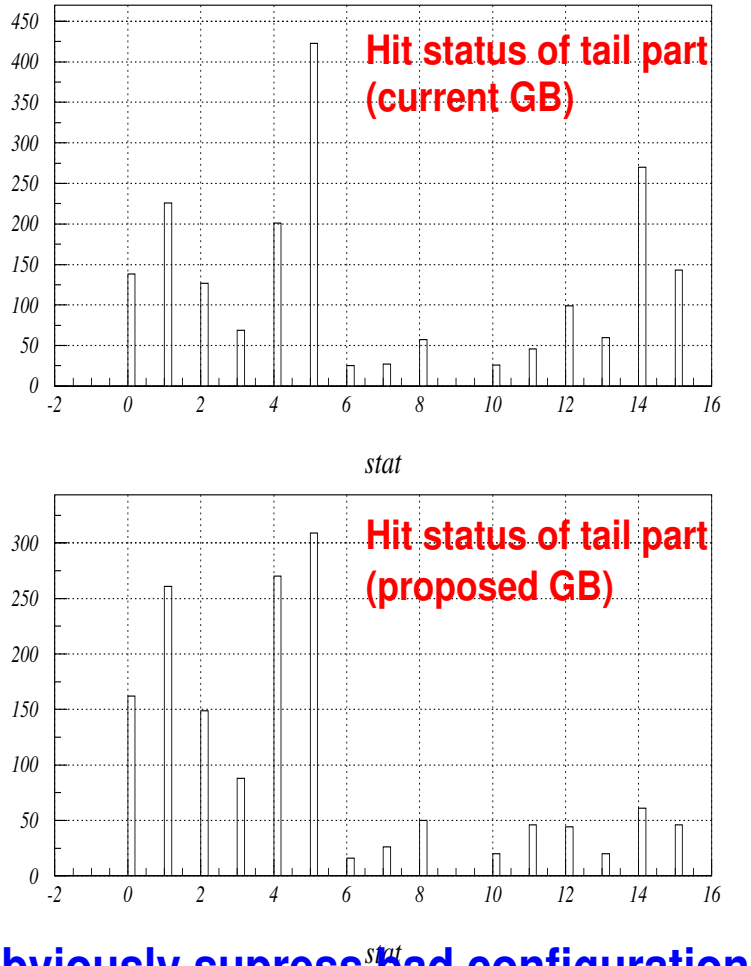
		Current	Proposal	
chi–square<25	abs(ip)<0.1	364838	357334	(–2.1%)
	+abs(ip)>0.012	49447	44341	(–10.3%
	tail fraction	13.6%	12.4%	(–9.1%)
	Gauss fit sigma	58.1um	56.3um	
	RMS	140.5	137.2	
chi–square<12	abs(ip)<0.1	337237	326310	(–3.2%)
	+abs(ip)>0.012	38502	32289	(–16.1%
	tail fraction	11.4%	9.9%	(–14.0%
	Gauss fit sigma	57.0um	55.1um	
	RMS	124.0	118.0	

(* fit sigma error ~ 0.1um)

Expaected Performance (III)
chisq<12, abs(ip)<0.1 case



(tail == >0.012cm)



Obviously supress bad configuration

Summary and Plan

1. Hit status can be used for smarter Ghost Buster
2. It reduces 15% of tail fraction in the case chisq<12
3. This new algorithm reduces obvoious bad configuration of SVX hit.

Plan for near;

(a) Firmware and software improvement is ready.
(it takes 30 min. to install everything.)

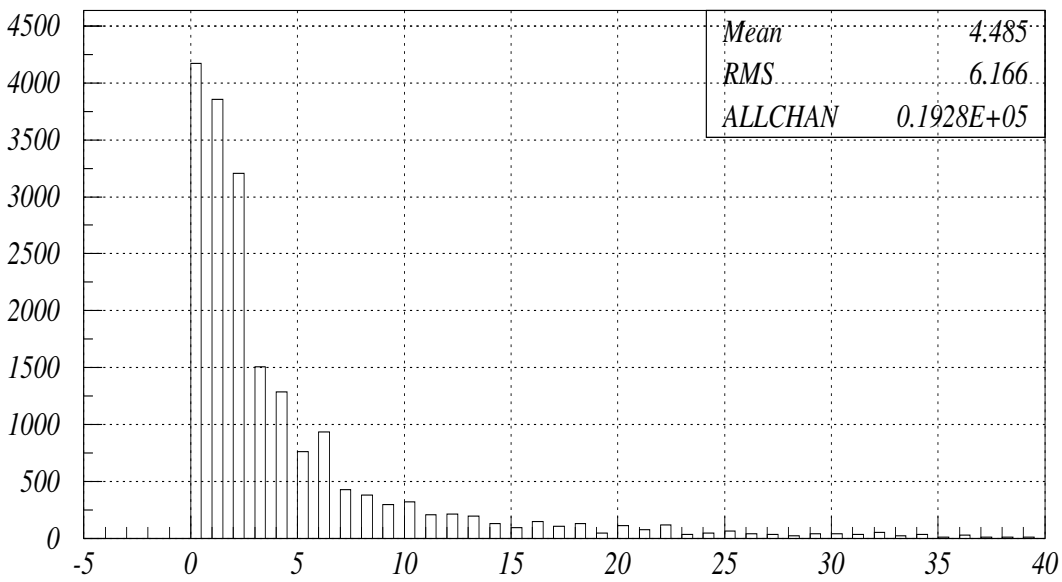
(b) It is sure that we can go back to old scheme employing 0...0 adding table.

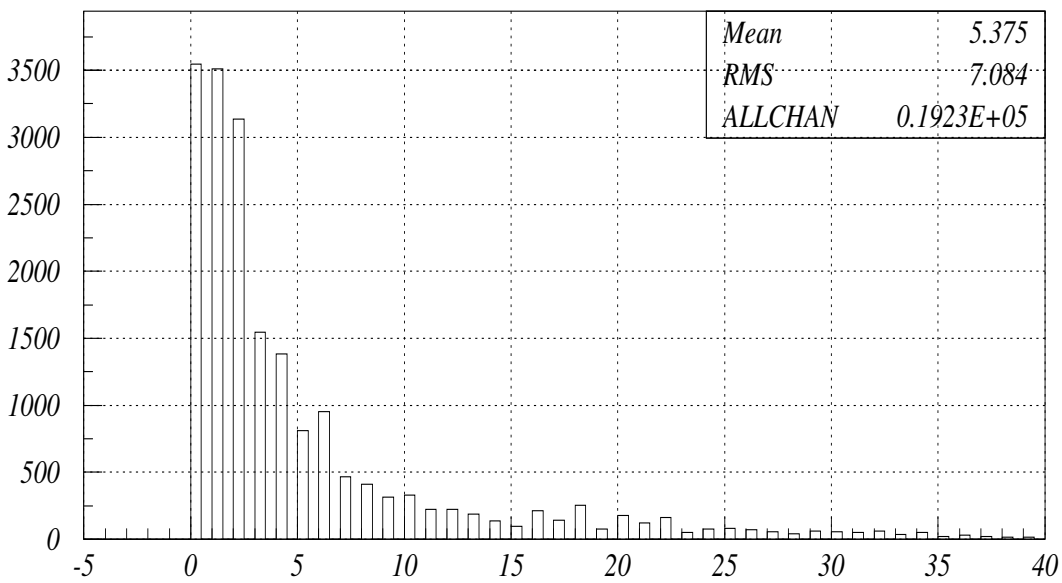
(c) VME test using 2000 words are already succeeded. (no error). and this has no interaction between VME and board, I think it is ready to install.

Plan for greater (radical) improvement

(a) More precise mapping might get more powerful results.

(b) Long cluster operation may be improved more.


Mean 4.485
RMS 6.166
ALLCHAN 0.1928E+05
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-5
0
5
10
15
20
25
30
35
40


Mean 5.375
RMS 7.084
ALLCHAN 0.1923E+05
3500
3000
2500
2000
1500
1000
500
0
-5
0
5
10
15
20
25
30
35
40