J/ψ Data Quality Check

— from Run13500–14640

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— Introduction

— Stability of Data Taking

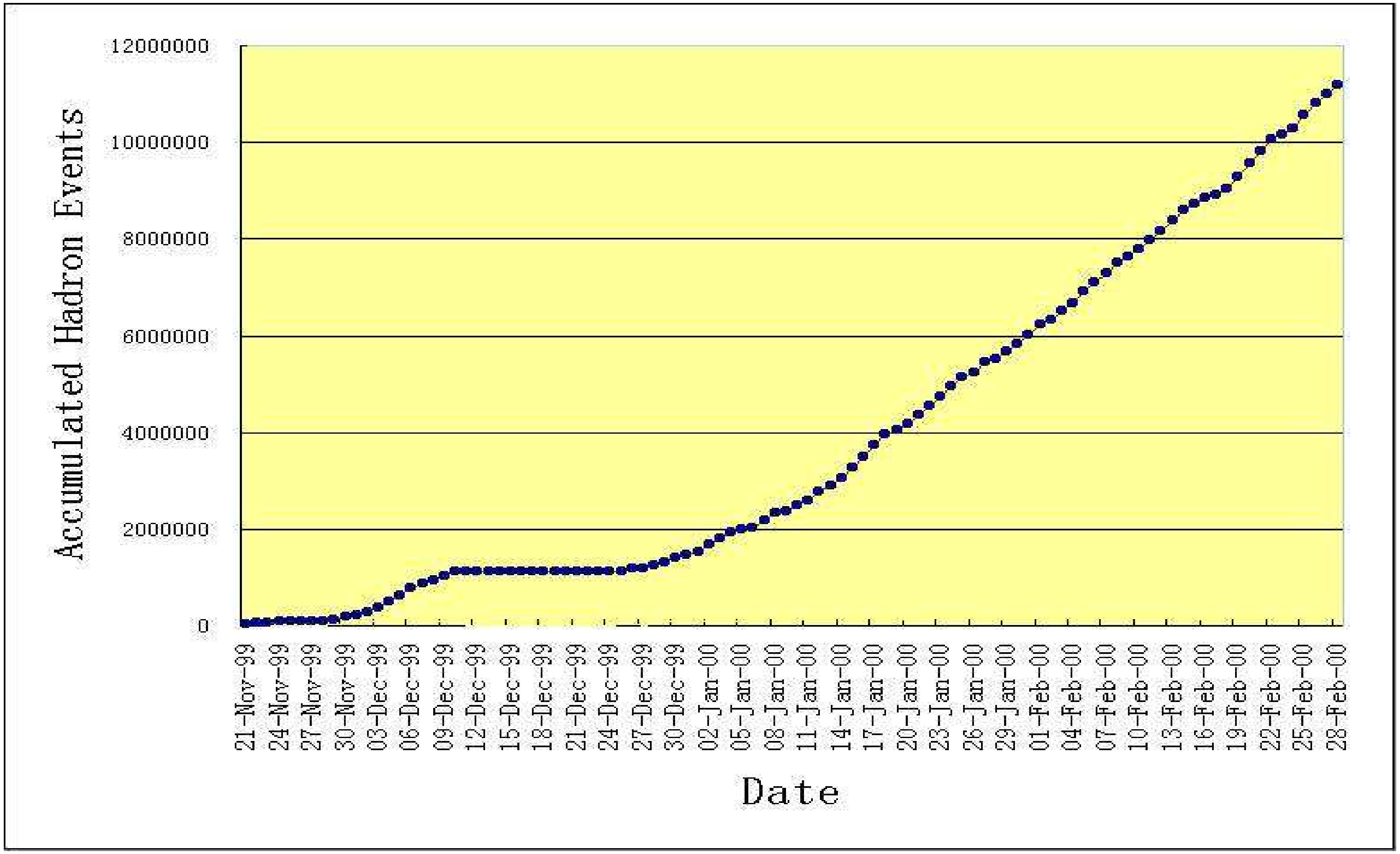
— Sub-detector Status

— Discussion & Comments

— For 50M J/ψ events!

- From Nov. 31, 1999 – Feb. 28, 2000, about 12M J/ψ hadron events accumulated at BESII
- Status of offline calibration
  - run13531–13699 old cali. constants, ver 101
  - run13700–13800 after a fine cali. except for mu counter, ver 102
  - run13801 begin including mu counter
- Contents of data quality check
  - stability of the data taking
  - status of the sub-detectors

Here we just adopt run13500–13547; run13770–13800; 14371–14401, 14601–14640 as examples to give a brief description of the results of our check.



12000000
10000000
8000000
6000000
4000000
2000000
0
Accumulated Hadron Events
21-Nov-99
24-Nov-99
27-Nov-99
30-Nov-99
03-Dec-99
06-Dec-99
09-Dec-99
12-Dec-99
15-Dec-99
18-Dec-99
21-Dec-99
24-Dec-99
27-Dec-99
30-Dec-99
02-Jan-00
05-Jan-00
08-Jan-00
11-Jan-00
14-Jan-00
17-Jan-00
20-Jan-00
23-Jan-00
26-Jan-00
29-Jan-00
01-Feb-00
04-Feb-00
07-Feb-00
10-Feb-00
13-Feb-00
16-Feb-00
19-Feb-00
22-Feb-00
25-Feb-00
28-Feb-00
Date

- Bhabha + Dimuon + Hadron + Neutral events

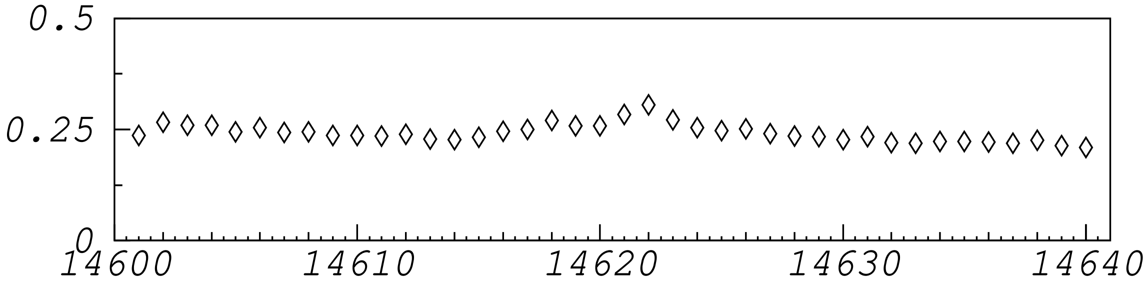
- Notation of the checked variables
  - NTOT, NHAD, NBHA, NDIMU, NEUTRAL, NGOOD

    (after selection)
  - N0PRG, N2PRG, N4PRG , N6PRG, NGE2PRG

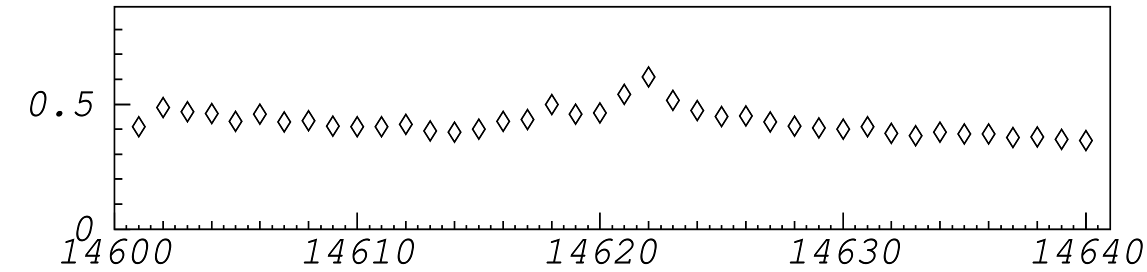
    (no selection)

- Run14601-14640 (taken during Feb. 8-9, 2000)
  - run 14621 and 14622 beam lost
  - run 14632 to 14638 TOF map plot is not normal

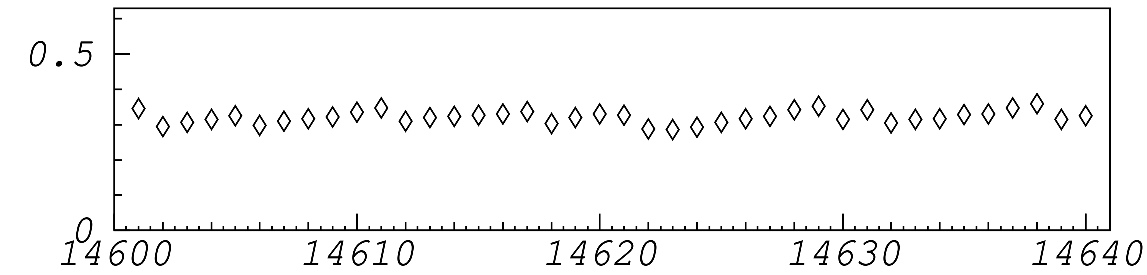
After run13531, the stability of BESII data taking is satisfactory on the whole. The abnormal runs will be tagged and treated specially in future physics analysis.



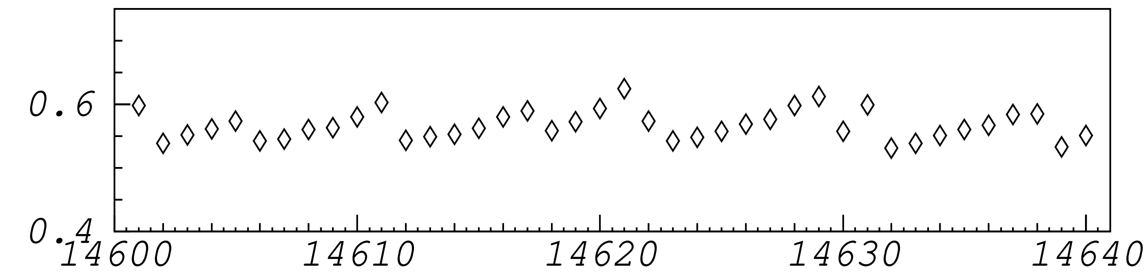
N0PRG/NTOT VS IRUN



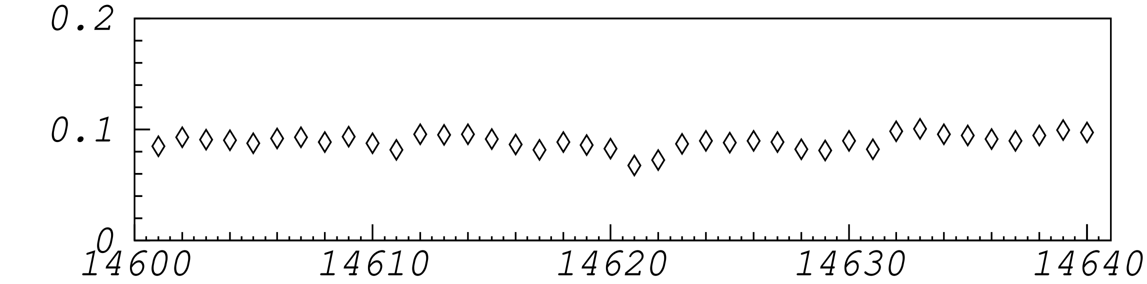
N0PRG/NGE2PRG VS IRUN



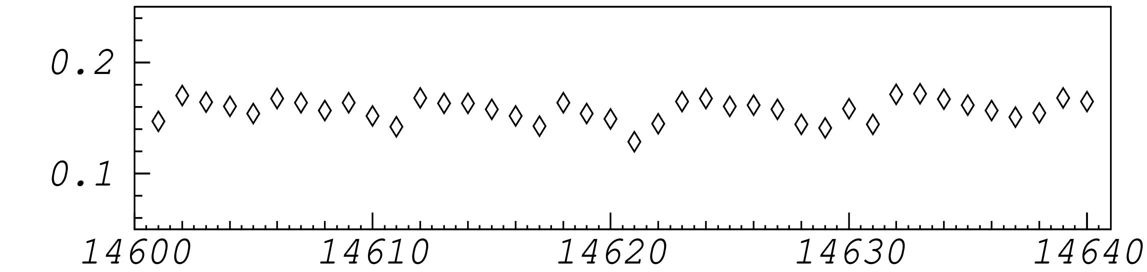
N2PRG/NTOT VS IRUN



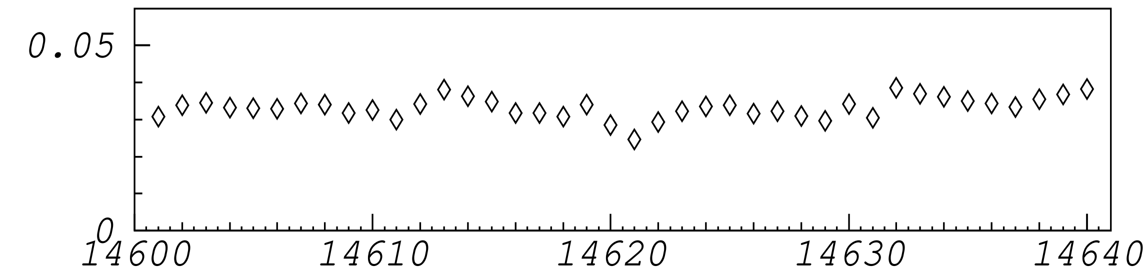
N2PRG/NGE2PRG VS IRUN



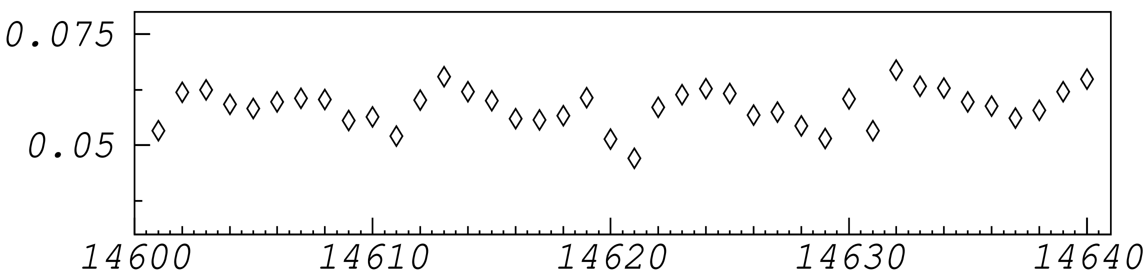
N4PRG/NTOT VS IRUN



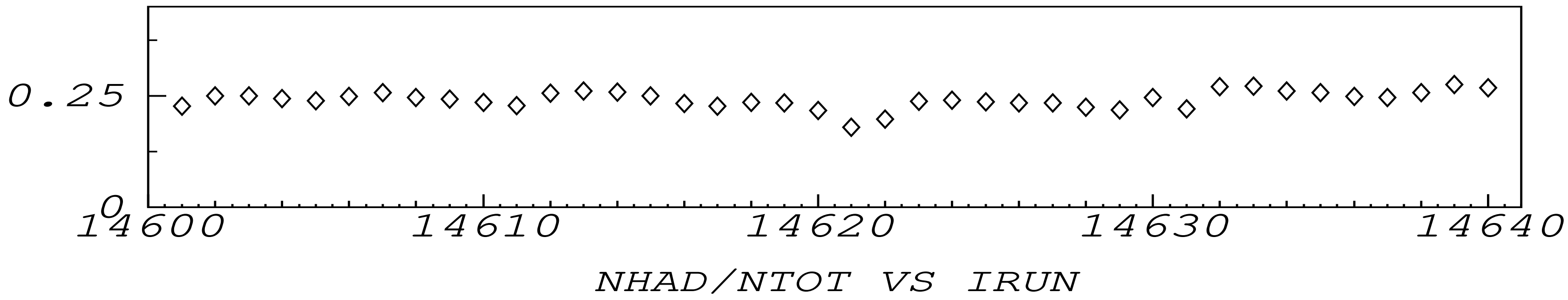
N4PRG/NGE2PRG VS IRUN

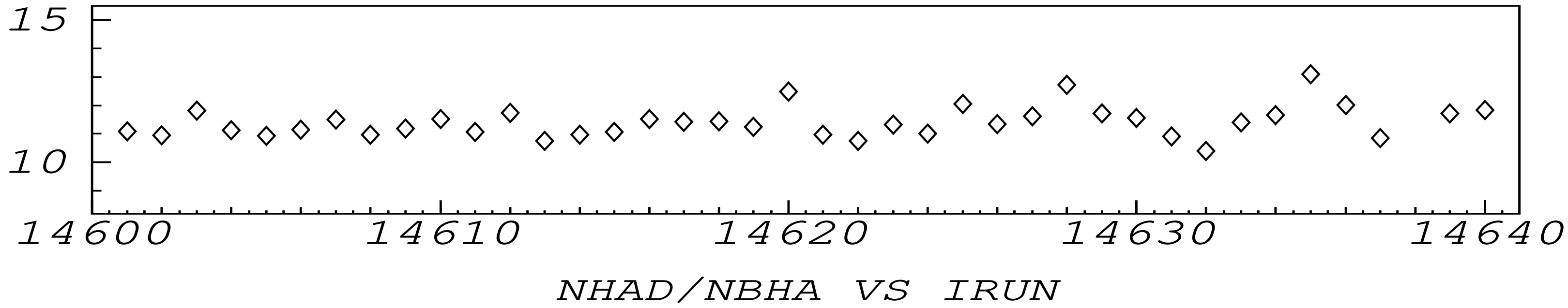


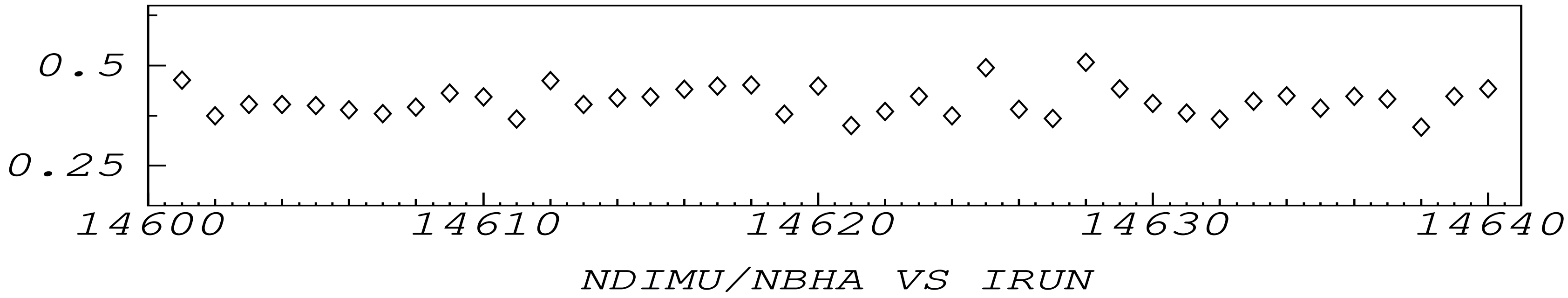
N6PRG/NTOT VS IRUN

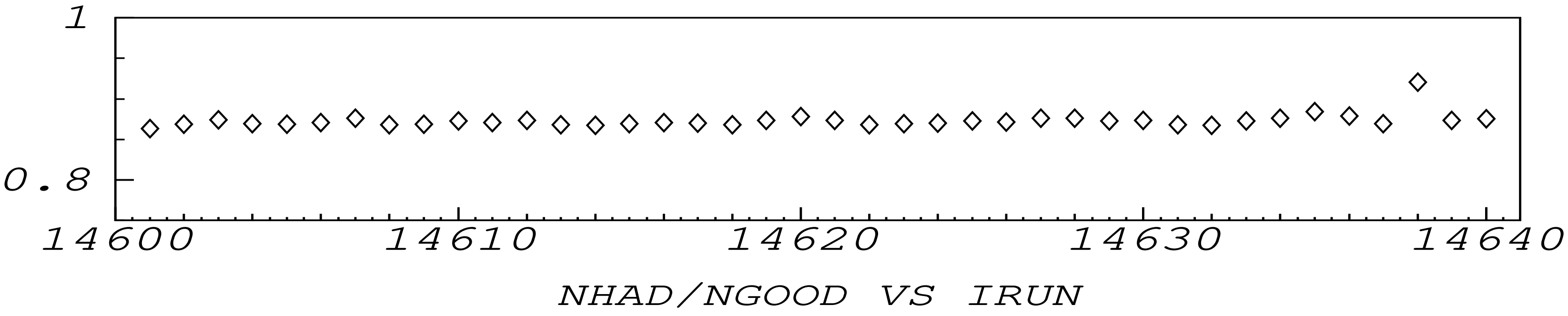


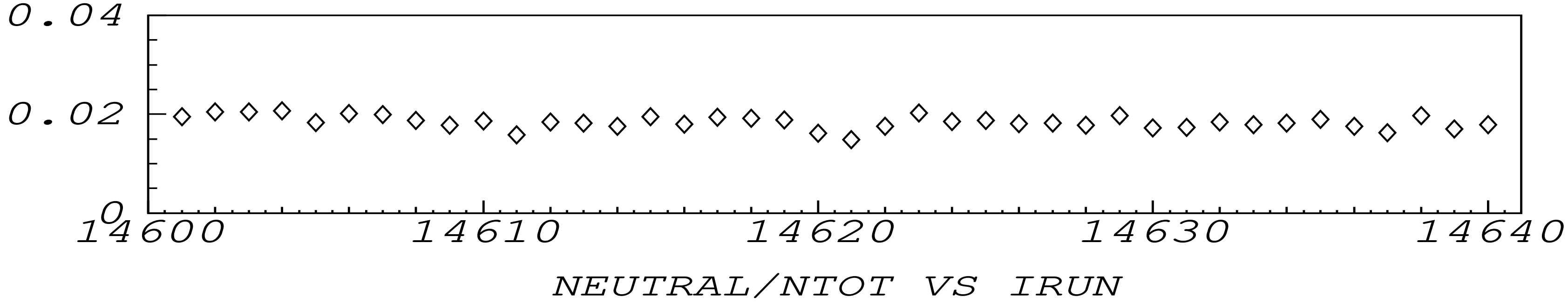
N6PRG/NGE2PRG VS IRUN

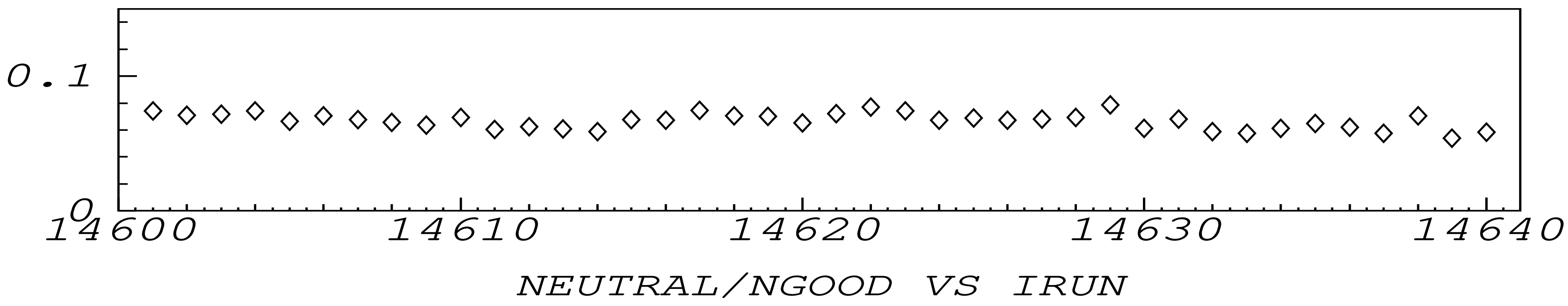

0.25
0
14600
14610
14620
14630
14640
NHAD/NTOT VS IRUN


15
10
14600
14610
14620
14630
14640
NHAD/NBHA VS IRUN

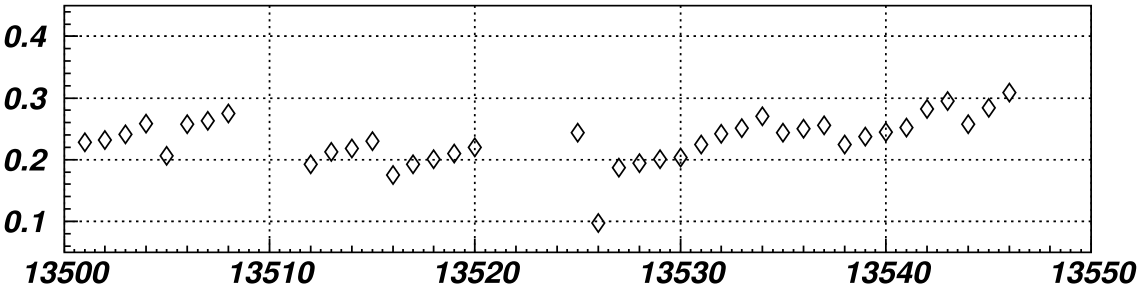

0.5
0.25
14600
14610
14620
14630
14640
NDIMU/NBHA VS IRUN



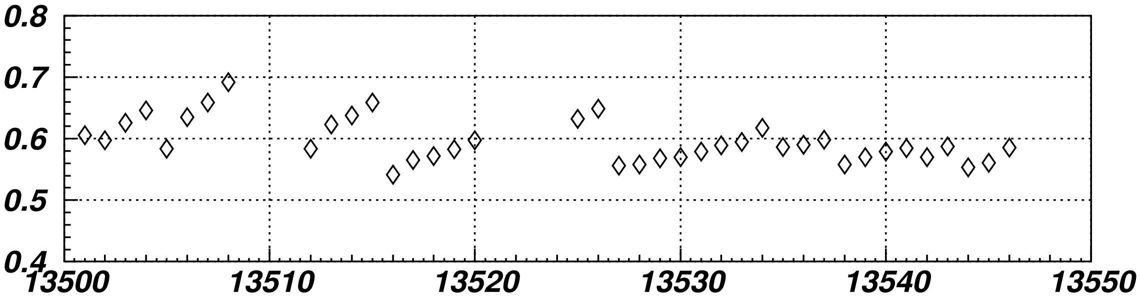




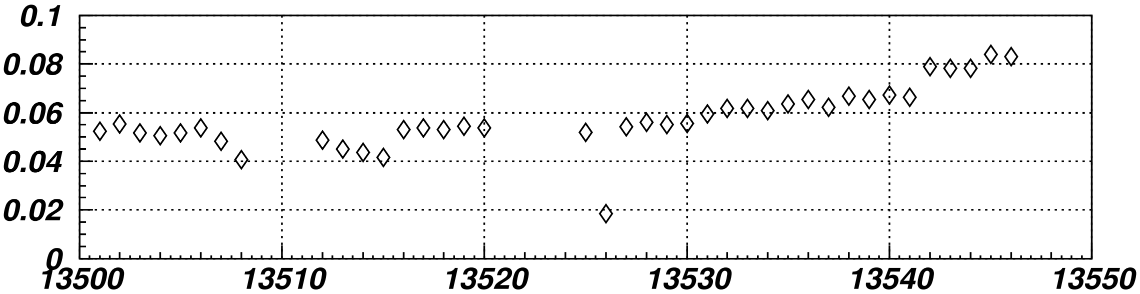
— For 50M J/ψ events!



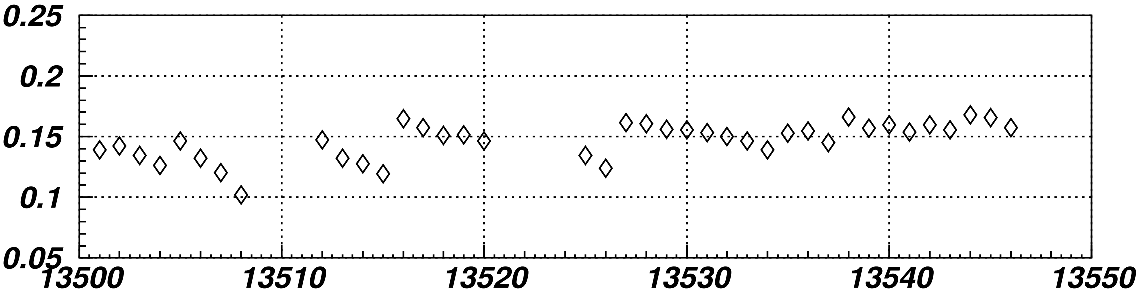
N2PRG/NTOT VS IRUN



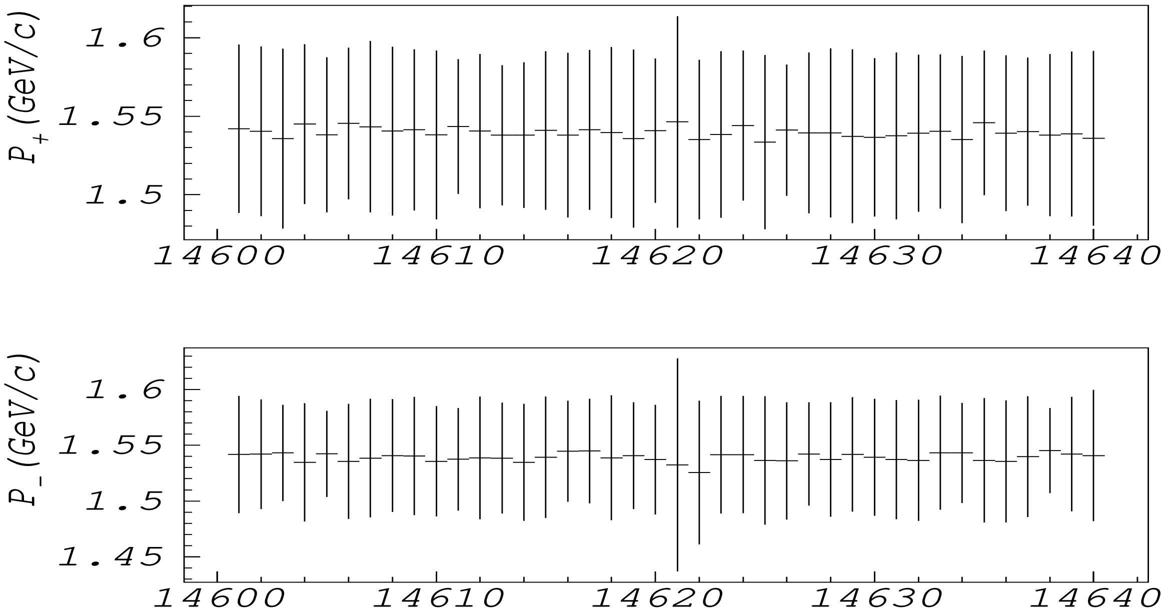
N2PRG/NGE2PRG VS IRUN



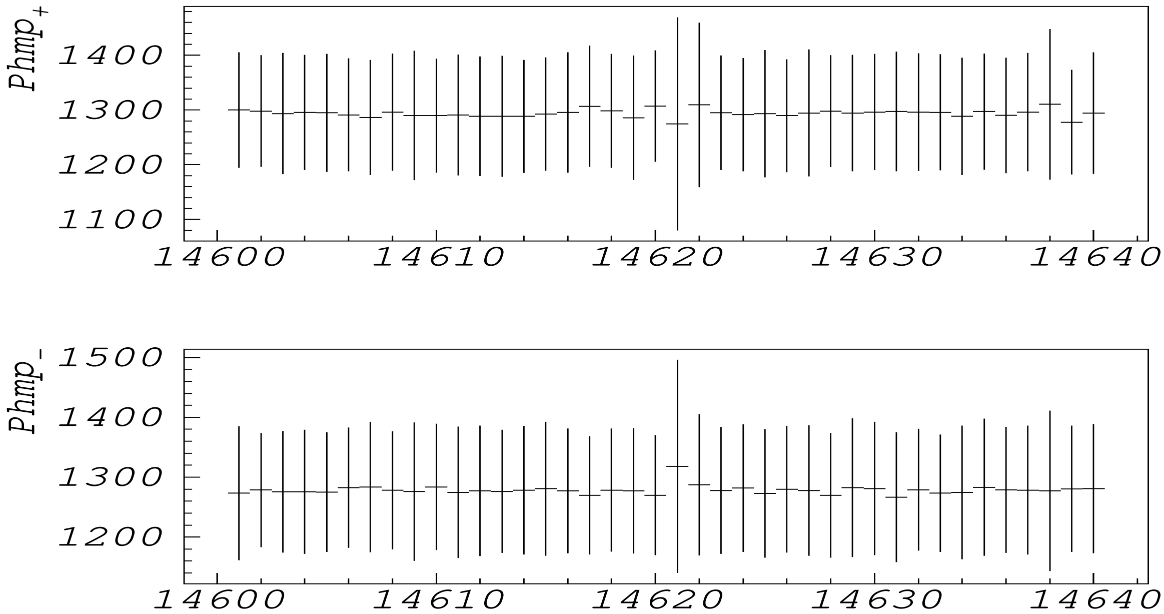
N4PRG/NTOT VS IRUN



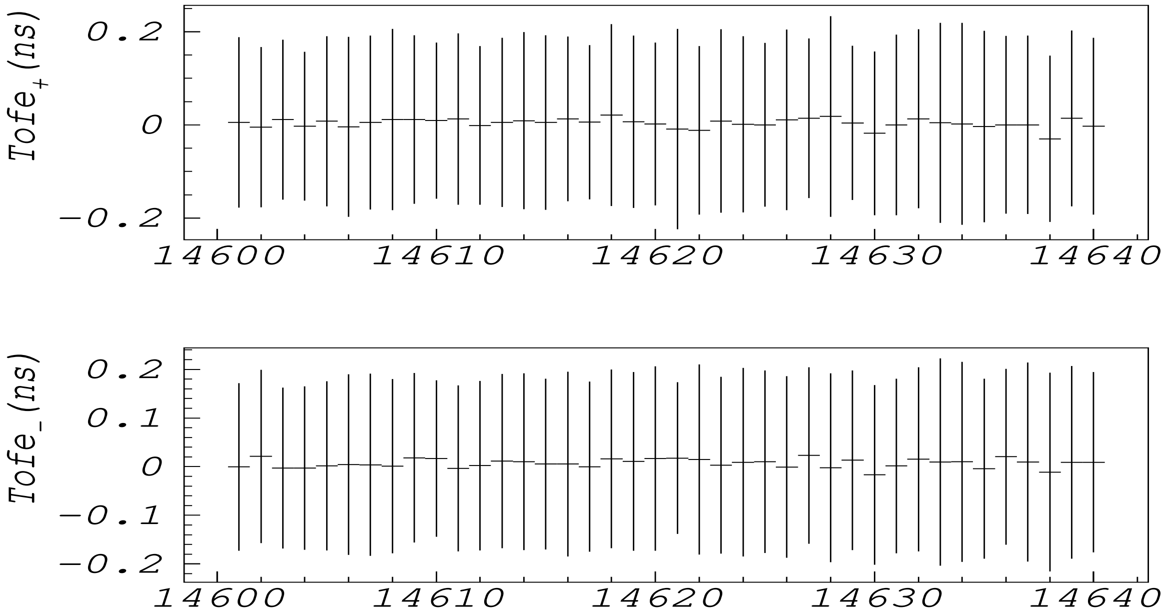
N4PRG/NGE2PRG VS IRUN



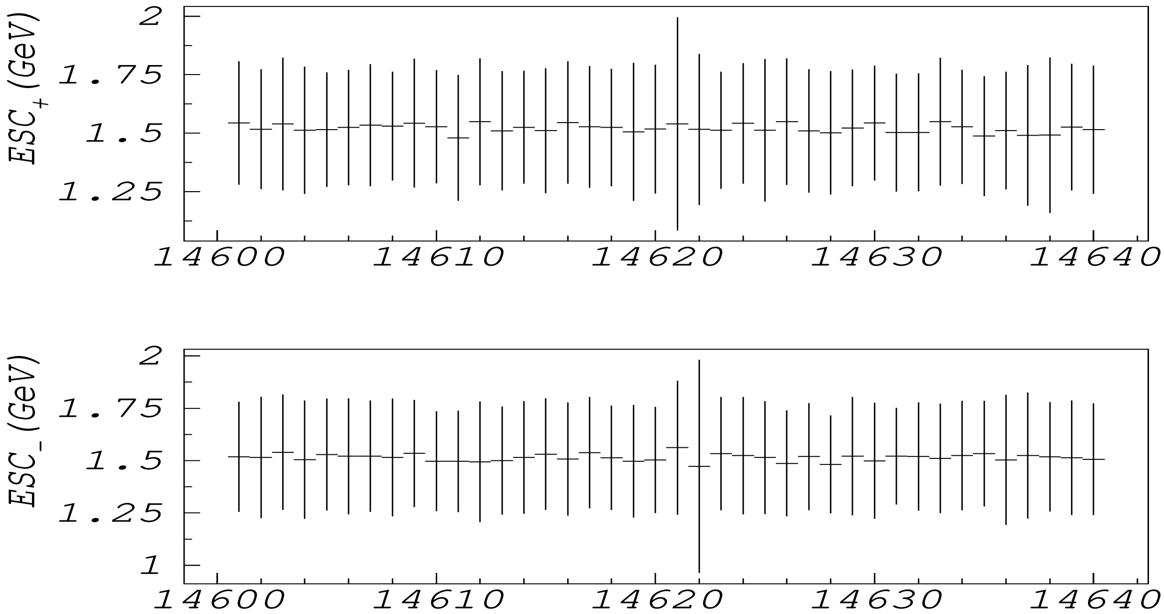
momentum vs run number



dE/dx pulse height vs run number



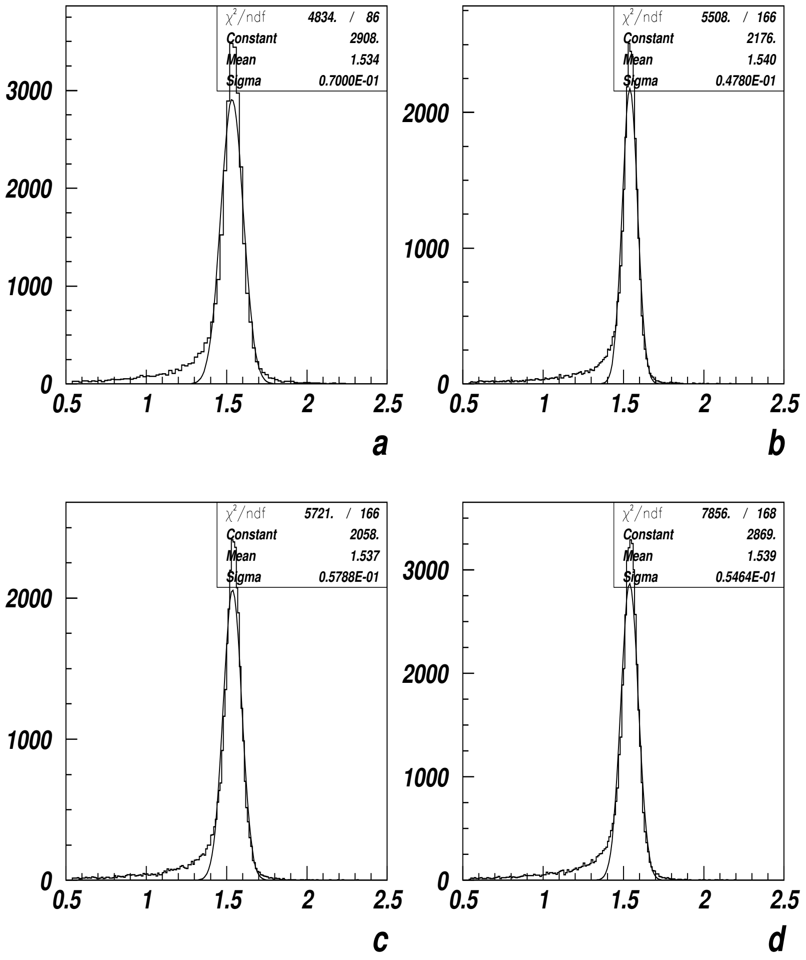
tof resolution vs run number



bsc energy vs run number

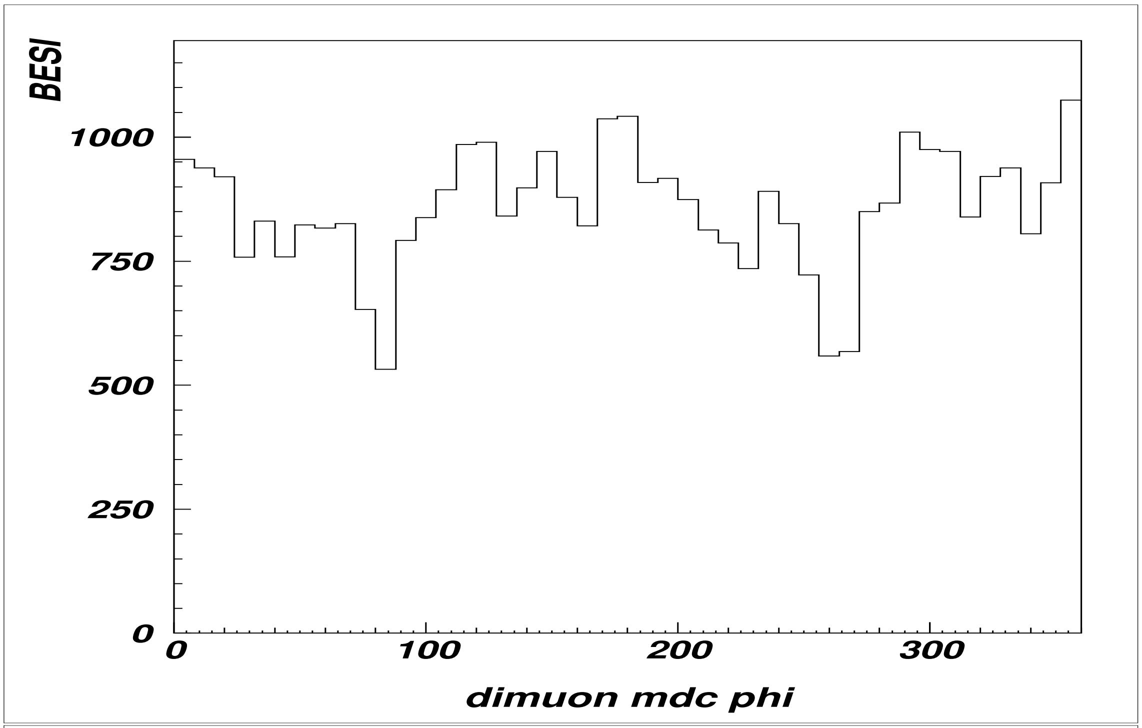
Main Drift Chamber

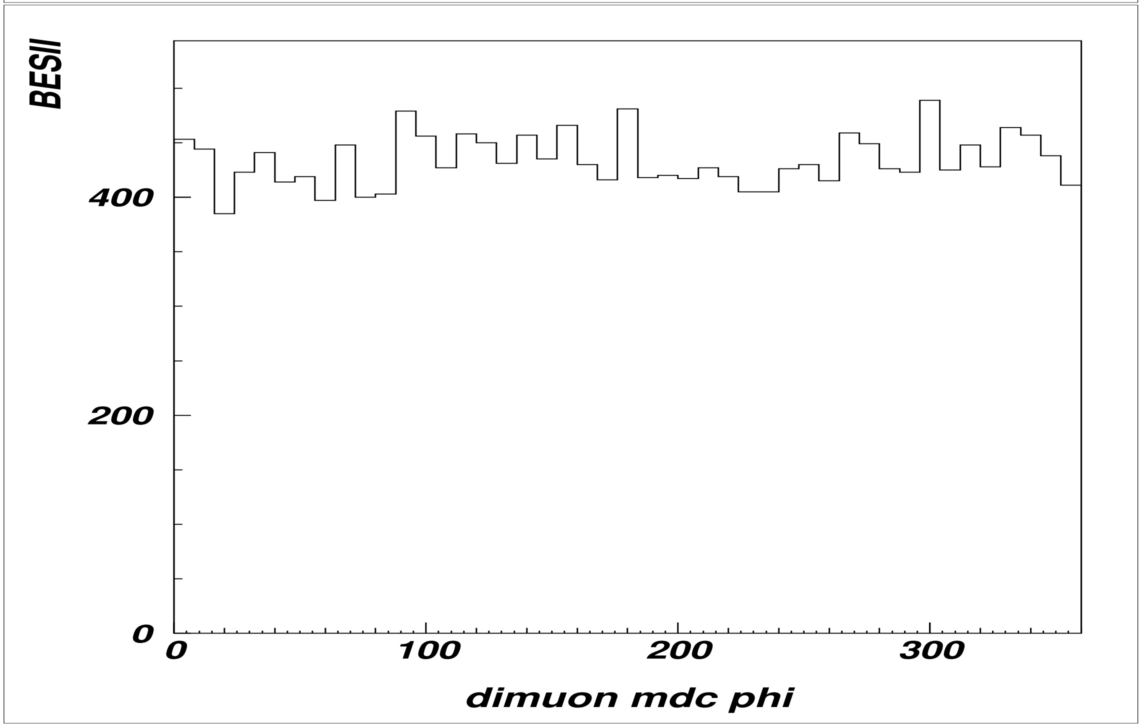
- Vertex x_0, y_0, z_0, $cos\theta$, ϕ, momentum p, MDC hit $etc.$ (Bhabha Dimuon Hadron samples)



momentum of bhabha events

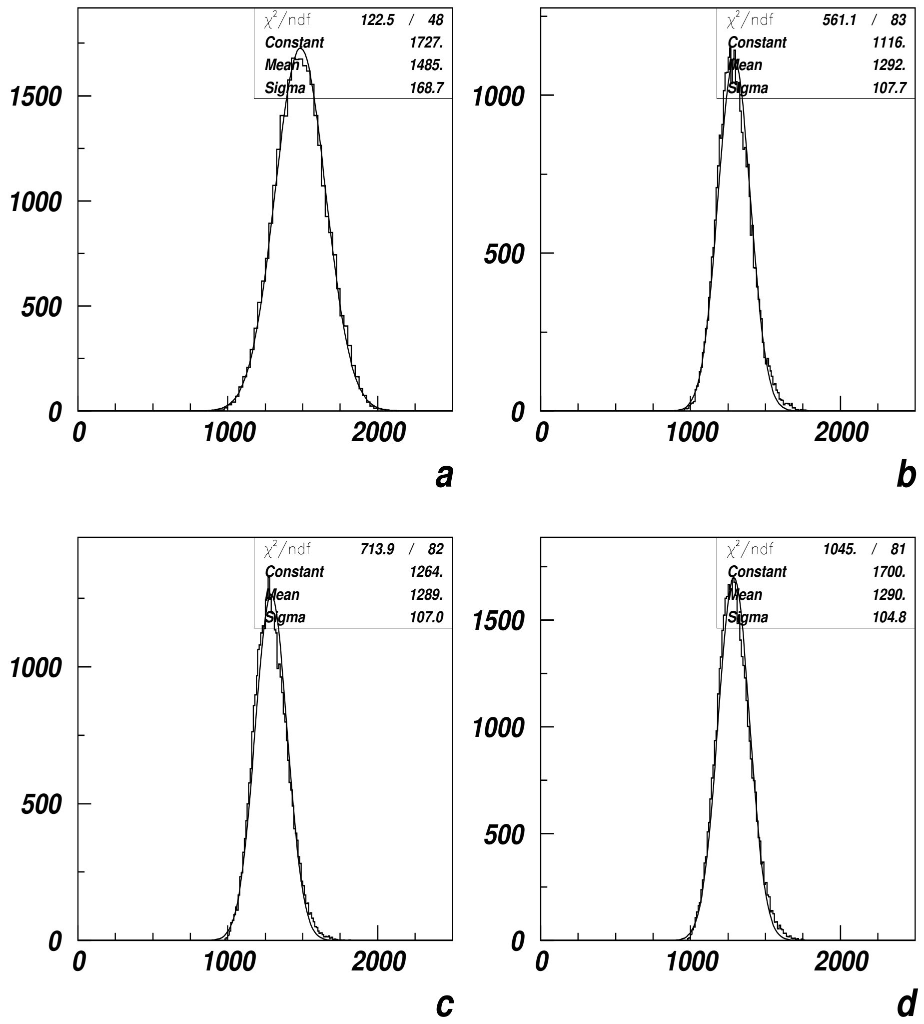
- For new J/ψ data, momentum resolution (1.7%) better than BESI (2.0%)


BESI
1000
750
500
250
0
0
100
200
300
dimuon mdc phi


BESII
400
200
0
0
100
200
300
dimuon mdc phi

dE/dx

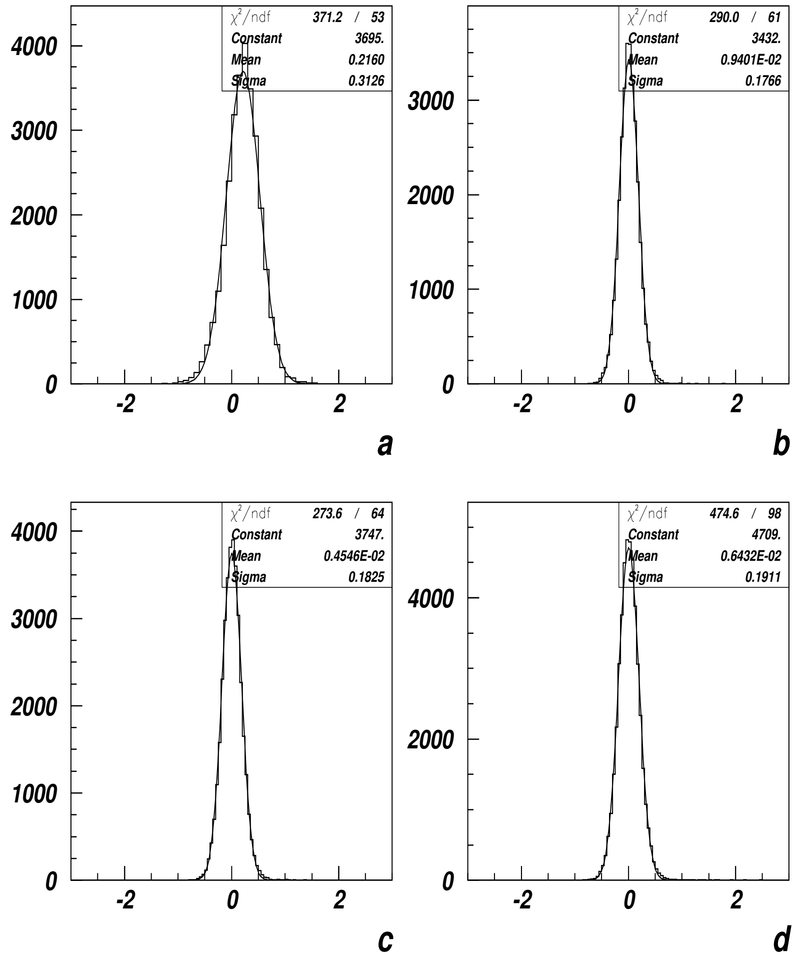
- dE/dx hit, pulse height, xse, xsmu, 'dE/dx vs p', $etc.$ (Bhabha Dimuon Hadron samples)



dedx pulse height of bhabha events

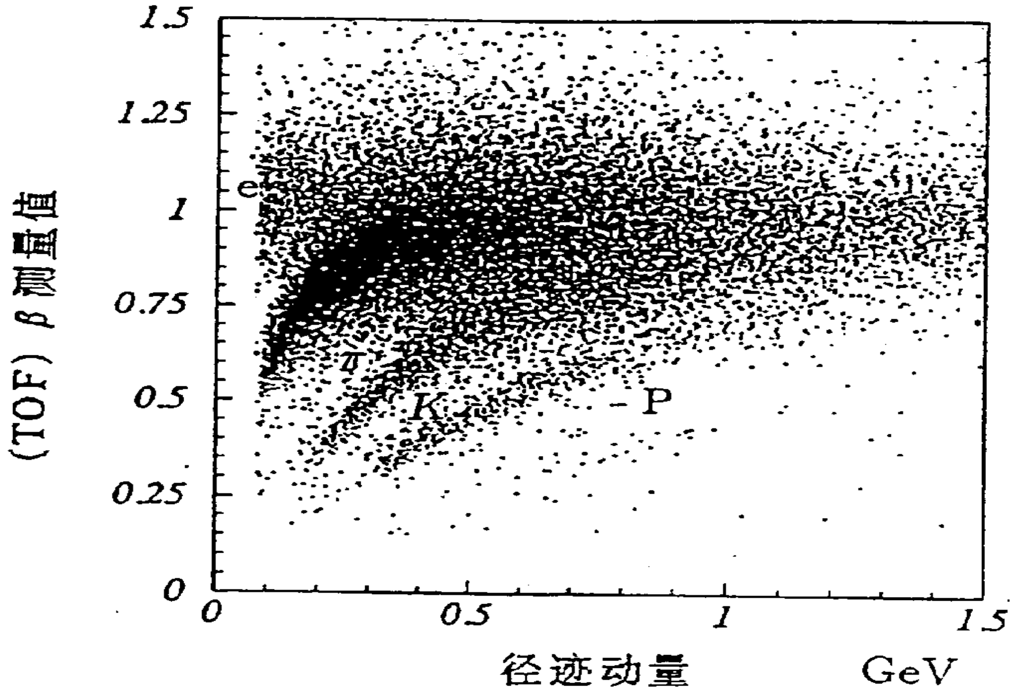
Time Of Flight

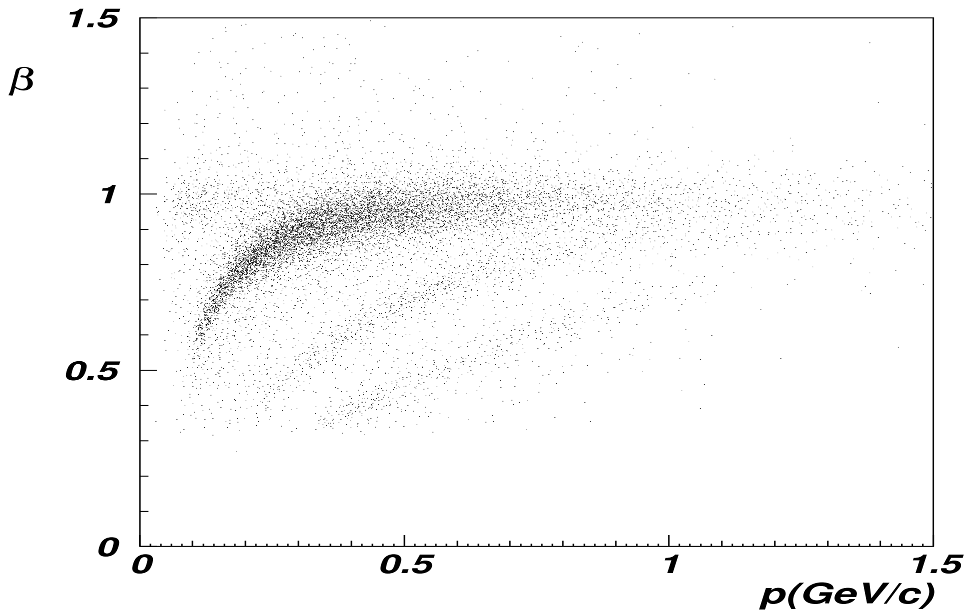
- Tof quality, time, Tof$_{exp}$ - Tof$_{cal}$, 'β vs p' $etc.$ (Bhabha Dimuon Hadron samples)



TOF resolution of bhabha events

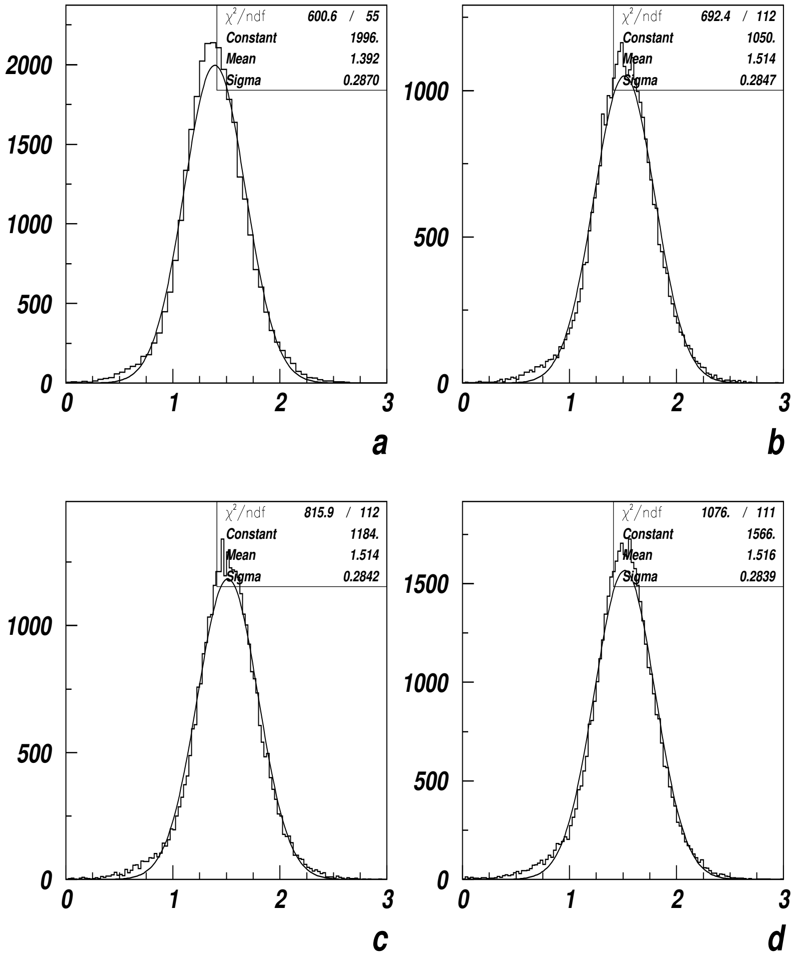
- For new J/ψ data, TOF time resolution (177ps) greatly better than BESI (369ps)


(TOF) β 测量值
径迹动量 GeV
1.5
1.25
1
0.75
0.5
0.25
0
0.5
1.5
e
π
K
P


β
1.5
1
0.5
0
0.5
1.5
p(GeV/c)

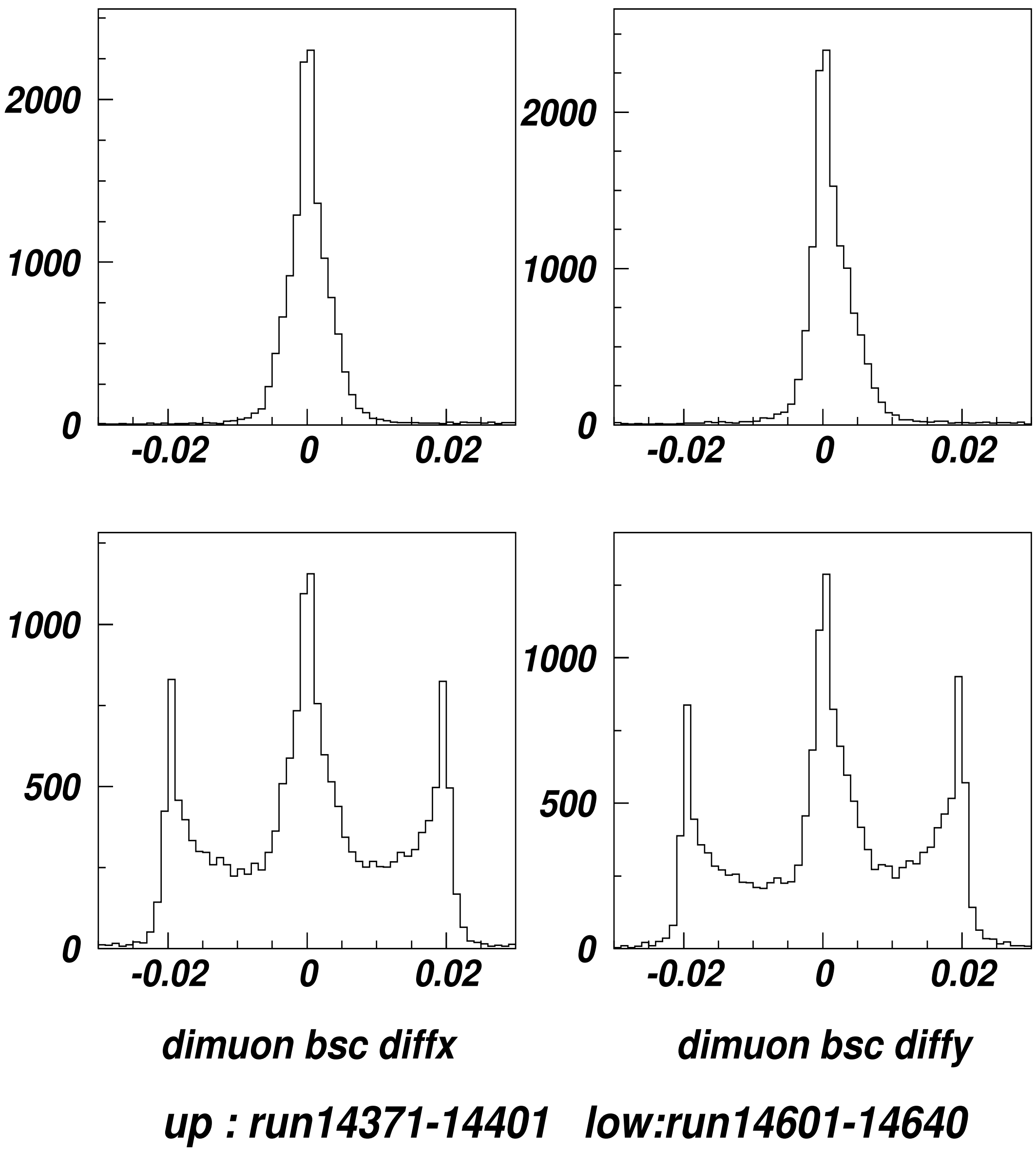
Shower Counter

- Deposited energy in BSC, $cos\theta$, ϕ, space resolution $etc.$ (Bhabha Dimuon Hadron samples)



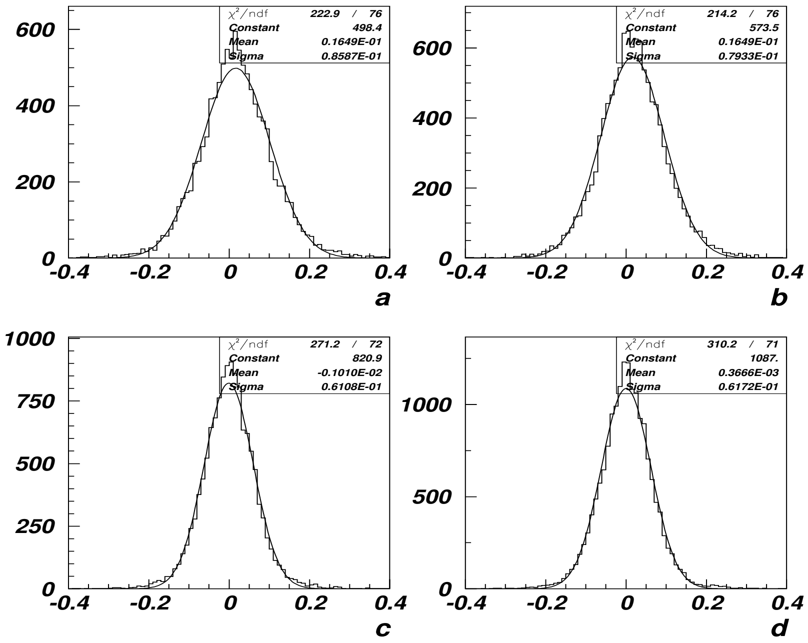
BSC deposited energy of bhabha events

- For new J/ψ data, Shower Counter (Barrel) 's performance is good and stable.


2000
1000
0
-0.02
0
0.02
2000
1000
0
-0.02
0
0.02
1000
500
0
-0.02
0
0.02
1000
500
0
-0.02
0
0.02
dimuon bsc diffx
dimuon bsc diffy
up : run14371-14401 low:run14601-14640

Muon Counter

- Space resolution, $r - \phi$ plane and Z residual $etc.$ (Dimuon sample)



MUID z of dimuon events

- For new J/ψ data, the main properties of Muon Counter are improved step by step.

Sub-detector ↓	BESI	13500-13547	13770-13800	14371-14401	14601-14640
Vertex (cm)					
σ_{x_0}	0.09	0.16	0.13	0.12	0.12
σ_{y_0}	0.10	0.16	0.13	0.12	0.12
σ_{z_0}	3.8	3.6	2.8	2.9	3.0
MDC $\alpha(\%)$					
$\sigma_p/p = \alpha\sqrt{1+p^2}$	2.0	2.5	1.7	2.0	1.9
dE/dx pulse height					
$\delta ph/ph(\%)$	7.9	11.4	8.3	8.3	8.1
Tof time					
resolution (ps)	369	313	177	183	191
BSC					
$\sigma_E/E = \alpha\%/\sqrt{E}$	25.0	24.3	23.1	23.1	23.1
σ_x	–	0.30	0.27	0.29	–
σ_y (cm)	–	0.27	0.28	0.28	–
σ_z	–	3.8	3.1	3.3	3.5
MUID					
σ_x	–	3.5	3.4	3.4	3.4
σ_y (cm)	–	3.5	3.3	3.5	3.5
σ_z	–	8.6	7.9	6.1	6.2
V residual	–	0.12 ± 1.32	0.13 ± 1.29	0.11 ± 1.33	0.10 ± 1.32
Z residual	–	0.29 ± 1.48	0.29 ± 1.38	-0.01 ± 1.06	0.10 ± 1.07

- For the new J/ψ data from run13500 to 14640, after a general data quality check from bhabha, dimuon and hadron events, we know that:
  - the stability of BESII data taking is satisfactory on the whole
  - the properties of main sub-detectors are better than BESI, especially the time resolution of TOF ($\sim 177ps$)
- At the same time, some questions such as the space resolution of BSC (run14601-14628), ϕ distribution of dimuon and xse, xsmu $etc.$ are still not very clear.
- Our results can be found under $http://www.gluon.ihep.ac.cn/\tilde{}jpsi$