The Second Round Offline Calibration of MDC in 2000

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Abstract

Here in this report, I will briefly describe the rsults of the second round offline calibration of MDC (J/ψ data):

- The Dead and Hot Channel checking
- dE/dx calibration (system calibration and Run by Run)
- T0 calibration
- General Checking of MDC

And made a short discussion while comparing with the past results.

1. Why should we do the second round offline calibration

The J/ψ data acquisition has been ended since May 15th, 2000. In this RUN period, we have been collected 3275(more or less) data runs. And the second round calibration work of MDC has been finished since the very beginning of April, 2000.

Actually the MDC offline calibration jobs (first round calibration) had almostly been finished by Prof. Zepu Mao before the quetion was promoted: when we scanned the momentum resolution of each RUN(run13700-15500 reconstructed in the first round), we found that it was not so good as we expected and fluctuated greatly, as shown in Fig(1). And the reason of it, as we think primarily, is the changing of online T0, as shown in Fig(1).

So according to the changing period of online T0, we carried out our second round calibration.

2. The Dead and Hot Channel checking

While in the first round reconstructing, all RUNs are using one calibration constant file (dch13763.offcon) to deal with the dead channel problem.

And here in the second round time, we finished this checking with 100 RUNs each time and so 32 constant files were produced. All the calibrated constant files are located in the Directory:

/bes/bes/share/const2/v102

The number of dead channels with RUN period can be seen from the Fig(2). And Fig(3) shows the detect effiviency of the wires.

3. dE/dx (system calibration and Run by Run calibration)

- system calibration: While in this step, we have produced five .dat files.
- RUN by RUN calibration: Fig(4) shows the result of the Run by RUN calibration of dEdx.

And here we have got the resolution of dE/dx is :
8.4 for B.B. Events

4. MDC T0 calibration

Since the online T0 is fluctuated periodly while we are collecting the datas, we tried to put the all RUNs into several groups in which the online T0s are stable relatively. And we did the T0 calibration to each group and produced correspond constant file. In this way, we got at last four calibrated constant files:

- dcc16764.offcons
- dcc14421.offcons
- dcc14500.offcons
- dcc15550.offcons

Fig(5) is the momentum distribution of BhaBha events and Fig(6) is the momentum distribution of Muon events, which give us the momentum resolution:

- $\delta p/p = 1.54\%\sqrt{(1+p^2)}$ for BhaBha events
- $\delta p/p = 1.54\%\sqrt{(1+p^2)}$ for Di-muon events

With all these four constant files, we have scanned all data RUNs, and the momentum reso;ution distribution is shown in Fig(7), in which it is very stable as we expected.

5. General Checking of MDC

In this checking process, all the distributions of θ, ϕ, space and Z for BhaBha events are shown from Fig(8) to Fig(12). And we have got the resolutions of polar angle, azimuthal angle, position in r-phi plane abd Z direction:

- σ_θ=43.1 mr
- σ_ϕ=27.3mr
- $\sigma_{r-\phi}$=172.9 um (151.9-238.3um)
- σ_Z=5.9mm

6. The Summary of our offline calibration

We have now finished our MDC calibration work, and while comparing the results of these two times (see Fig(13)), we can see that the second round calibrated result is very stable and the afects from the changing of online T0 is disappeared.

From all the calibration work above, we can make the conclusion that the MDC had been performing very stable while taking the datas in the last colliding period of BEPC. And her in the following table, the parameters of calibration are summaried.

MDC-Time	Performance
W-EFF	94 % (muon events)
$\sigma_{r-\phi}$	(151.9-238.3um)
Mom-Reso.	$\delta p/p = 1.54\%\sqrt{(1+p^2)}$ for BB
Mom-Reso.	$\delta p/p = 1.54\%\sqrt{(1+p^2)}$ for Di-muon
σ_Z	5.9 mm
σ_θ	43.1 mr
σ_ϕ	27.3 mr
dEdx-Reso.	8.4%

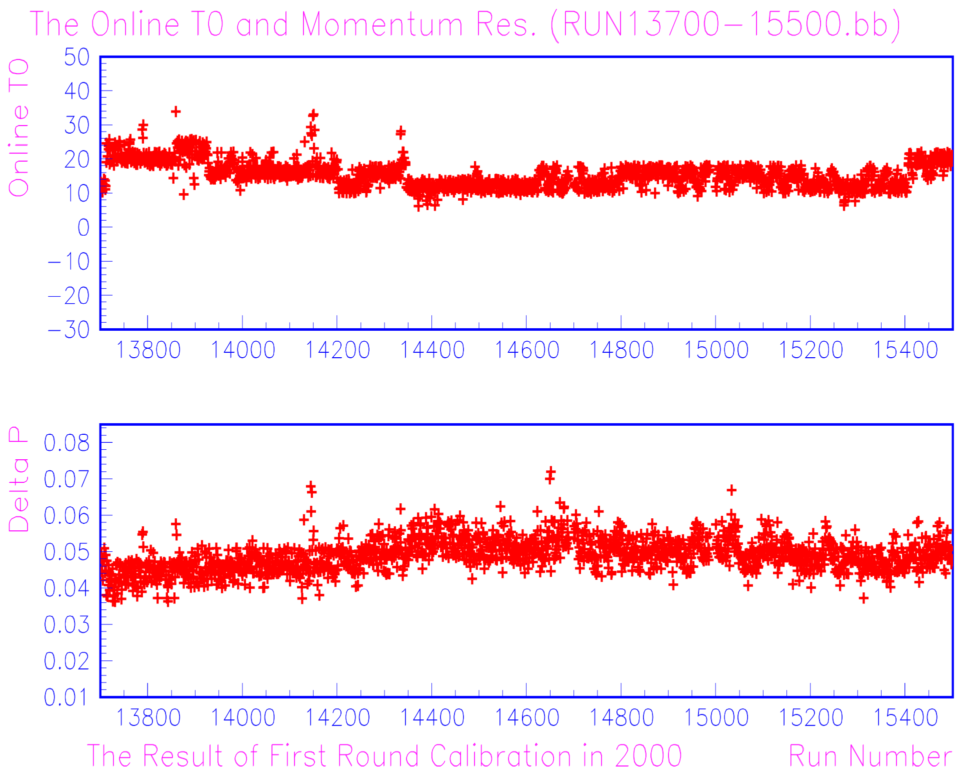
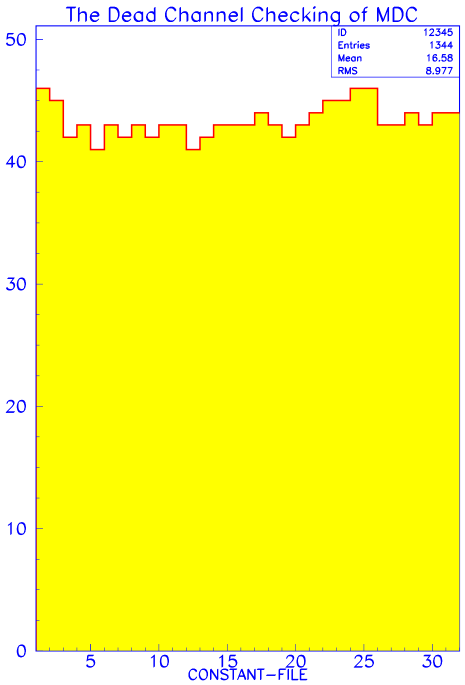


Figure 1: The Online T0 dis. and The momentum res.



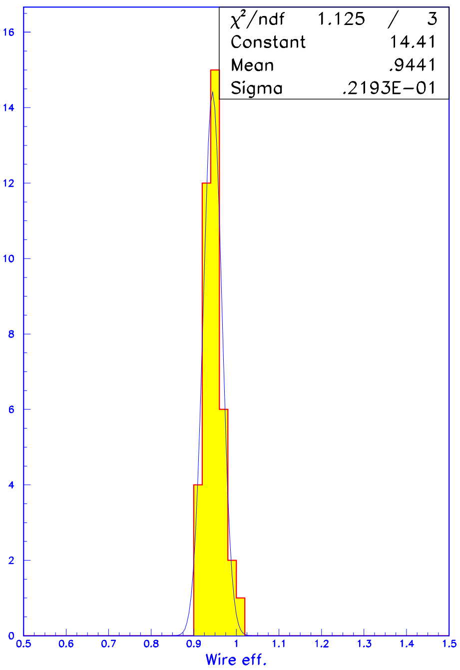


Figure 2: The checking of Dead channel of MDC. (Left)
Figure 3: The Wire Detecting Eff of MDC as a whole. (Right)

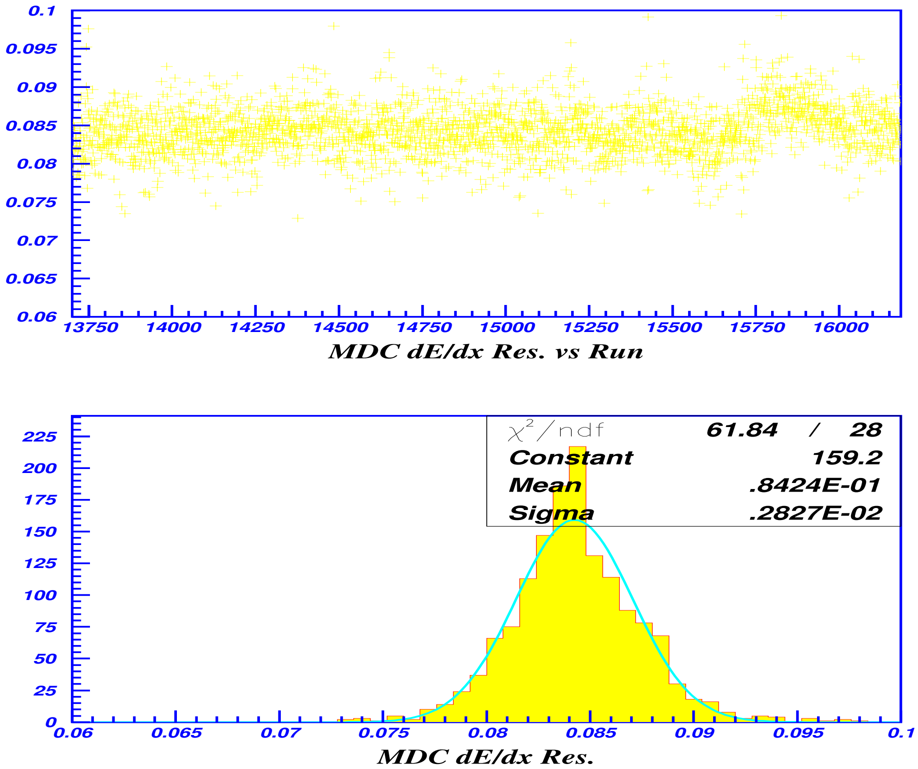
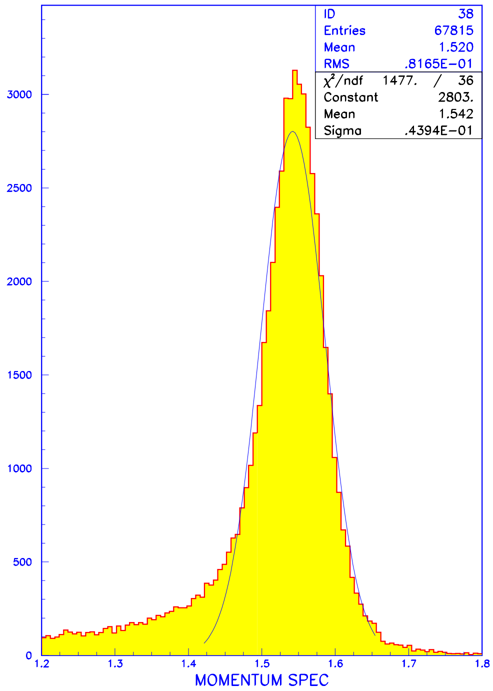


Figure 4: The calibration result of dE/dx



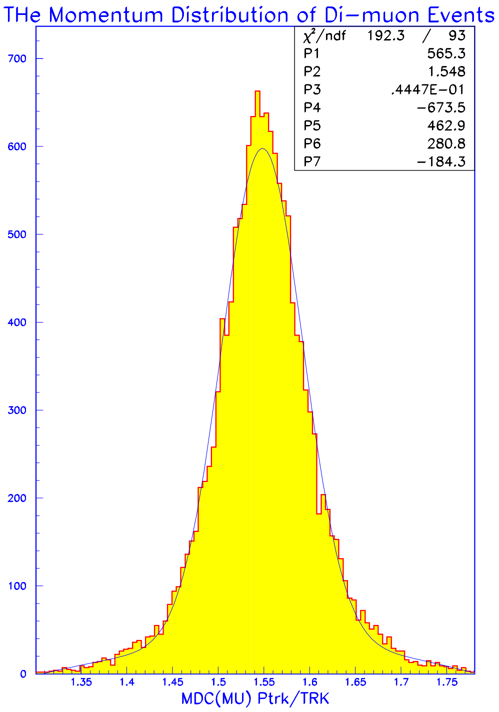


Figure 5: The momentum distribution of Bhabha Events. (Left)
Figure 6: The momentum distribution of Di-muons Events. (Right)

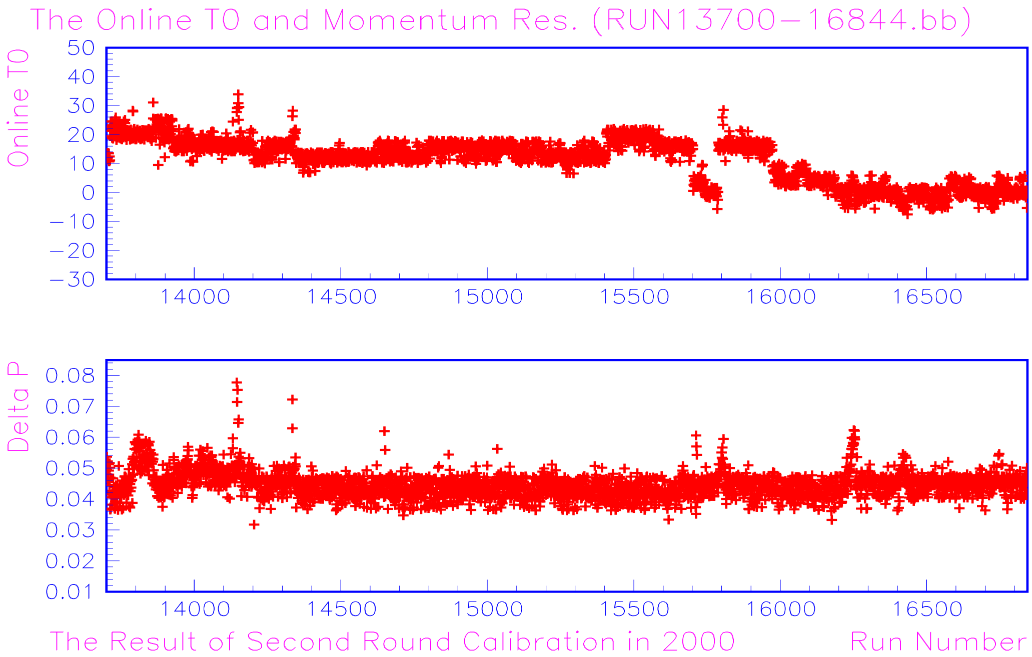
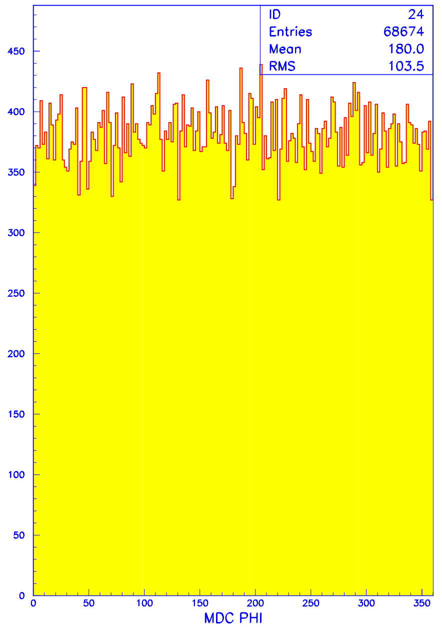


Figure 7: The δP distribution of Bhabha Events Run by Run



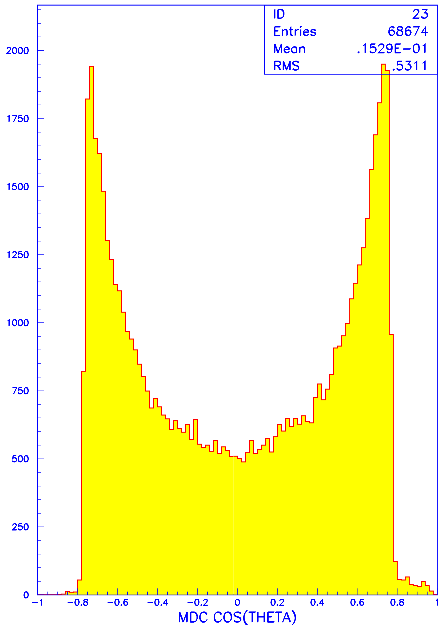
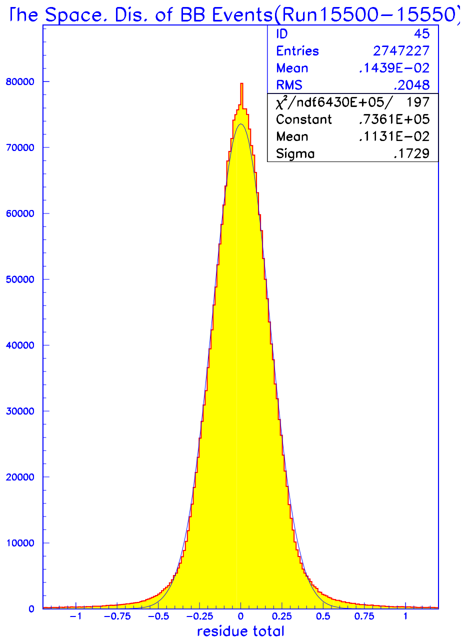


Figure 8: The ϕ distribution of BB Event. (Left)

Figure 9: The θ distribution of BB Event. (Right)



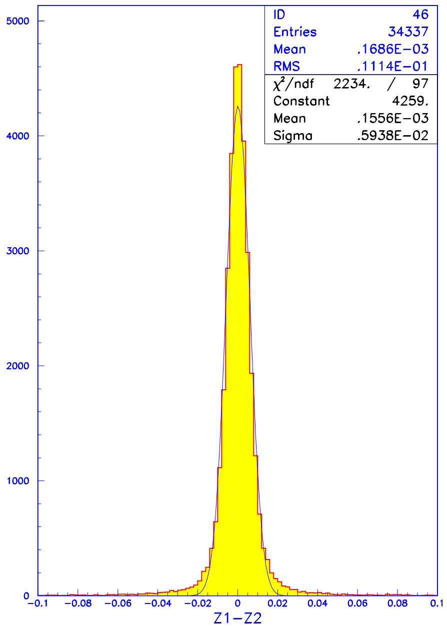


Figure 10: The space distribution (40 layers as a whloe). (Left)

Figure 11: The z distribution. (Right)

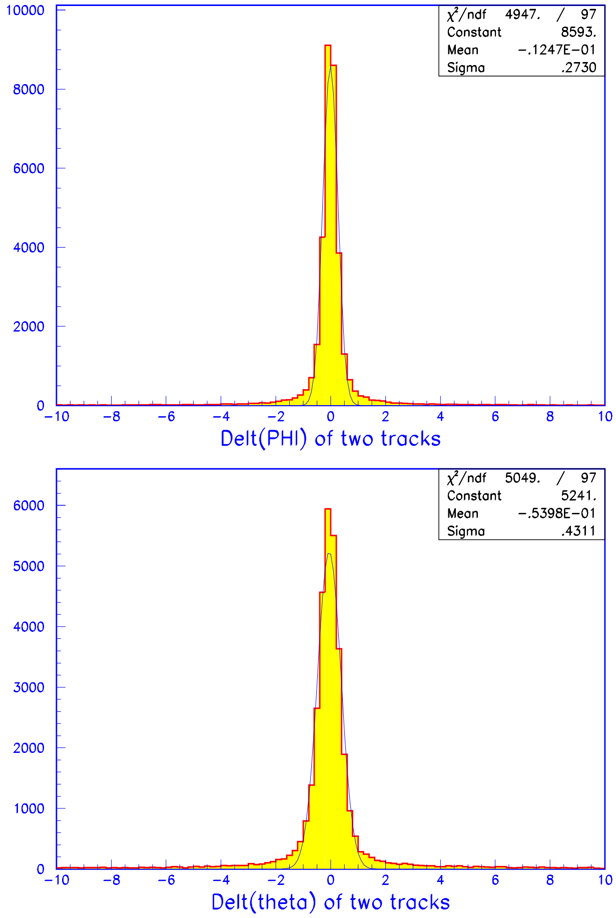


Figure 12: The resolution of θ and ϕ (Bhabha Event)

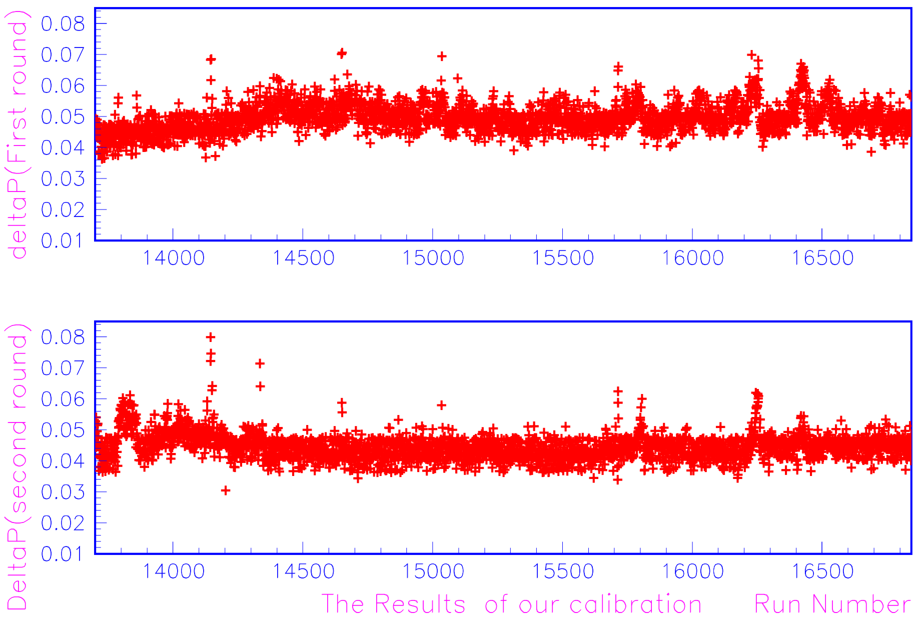


Figure 13: comparing the first round calbrated result with that of second round