Status of Monte Carlo Simulation on BES-II

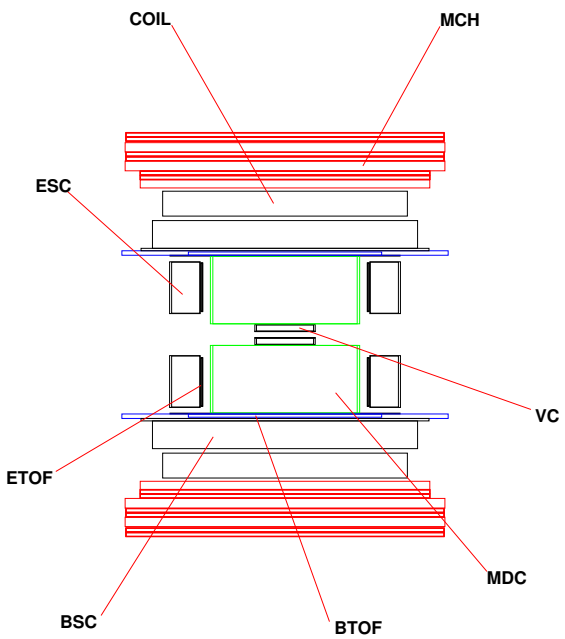
Cheng Baosen

Represent M.C. group, division 1, IHEP

Chen Jiangchuan, Cheng Baosen, Huang Yinzhi, Li Canguo, Li Qun†, Liu Huaimin, Wang Ping, Zhang Dahua, Zhang Jinlong, Zhang Lin, Zhu Yongsheng(leader)

† division 7(computer center), IHEP

Copied from Canguo's SimBES



☆ Comments

- ❑ Event samples through out this talk are selected from data with run ranged from 10355 to 10399
- ❑ Calibration constants in /u/u01/runcal/v100/const are used when doing reconstruction
- ❑ The solid line in histogram is for data while the dashed line for MC

☆ VC

- ❑ Review
  - ☞ Codes transplanted from MARK-III
  - ☞ Necessary modifications and supplements to match the SOBER frame
- ❑ Current status
  - ☞ Job hung up by the absence of results from data
  - ☞ Trace the track with specific direction and momentum
- ❑ Work to be done
  - ☞ With VC reconstruction results check the packing and record format of data, momentum, resolution etc

☆ NMDC

❑ Review

- ☞ Modifications due to more cells, more wires of NMDC
- ☞ Track generating codes unchanged

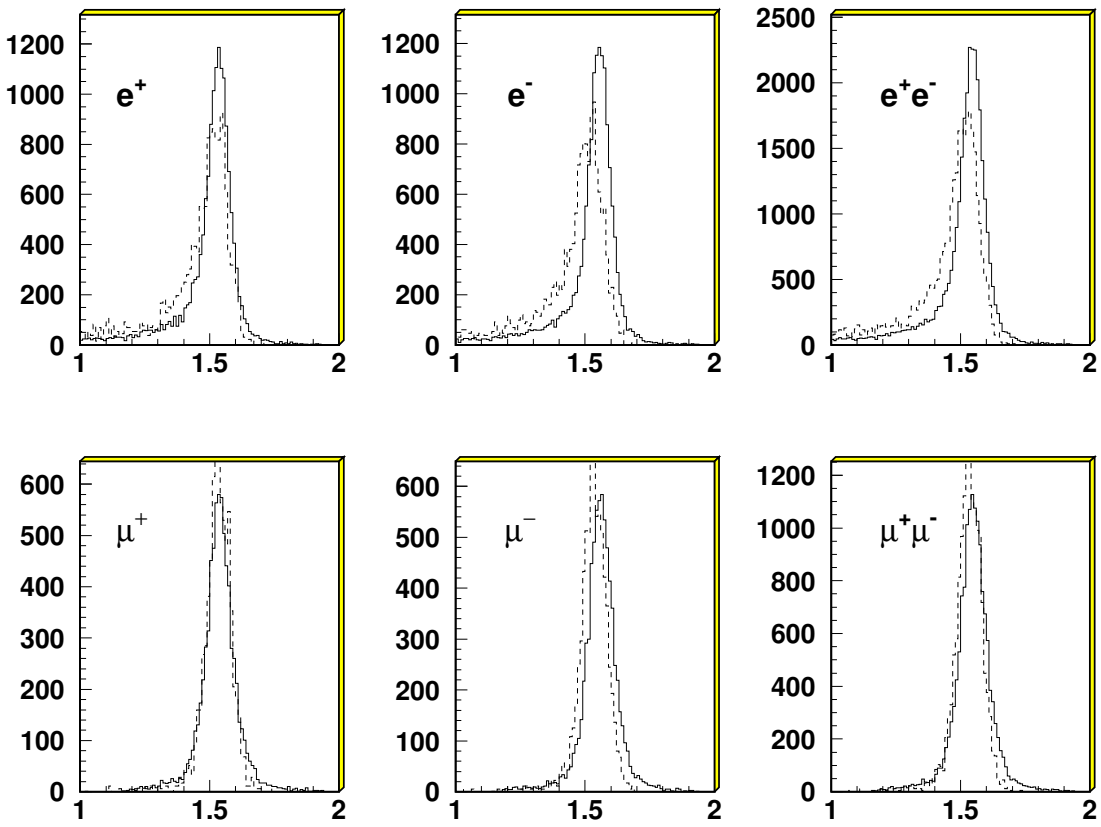
❑ Current status

- ☞ Efficiencies and dead channels are put into simulation
- ☞ Comparison of momentum between MC and data for the events $e^+e^- \to e^+e^-$ and $e^+e^- \to \mu^+\mu^-$ at Ecm=3.097GeV

❑ Work to be done

- ☞ Put the resolutions and efficiencies into the realization constant file

Momentum (GeV)



☆ TOF

❑ Review

- ☞ Performance improved, better resolutions
- ☞ Track generating codes unchanged

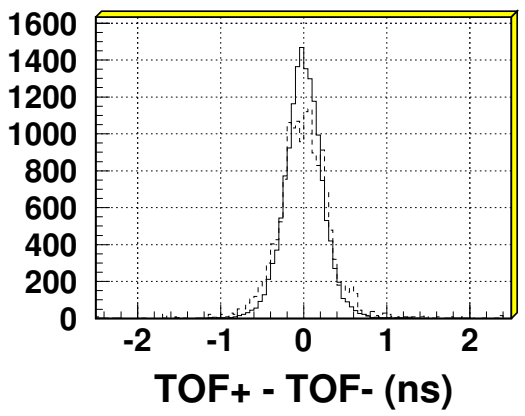
❑ Current status

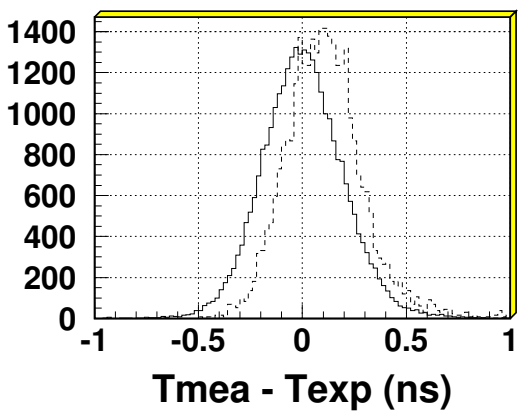
- ☞ Time difference of + and - tracks fit well between MC and data for the events of $e^+e^- \rightarrow e^+e^-$ and $e^+e^- \rightarrow \mu^+\mu^-$
- ✘ MC shift higher than data for the difference between the measured and the expected time

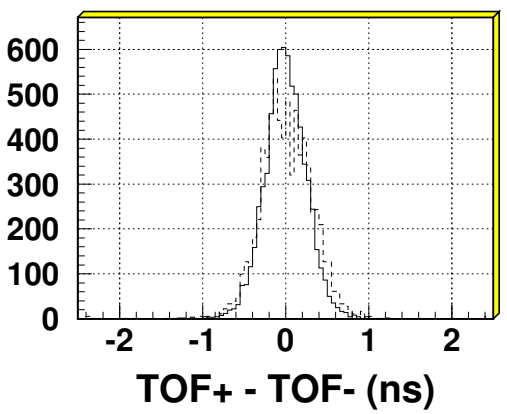
❑ Work to be done

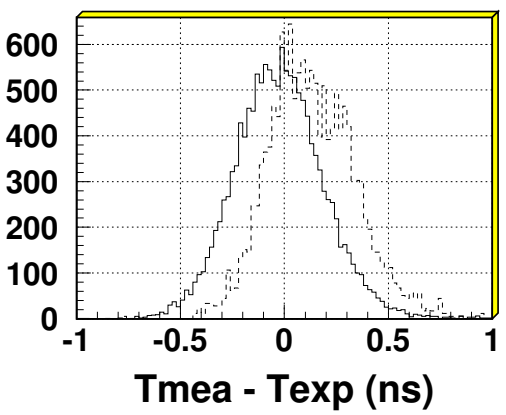
- ☞ Put the resolutions into the realization constant file
- ☞ Resolution job done by John Synodinos?
- ☞ Solve the problem above

Time differences for $e^+e^- \rightarrow e^+e^-$ (up) $e^+e^- \rightarrow \mu^+\mu^-$(down)









☆ BSC

❑ Review

- ☞ 0.4 Tesla field in BSC taken into account
- ☞ δ ray generated by μ simulated and corrected
- ☞ Generalized SQS spectrum applied to different data

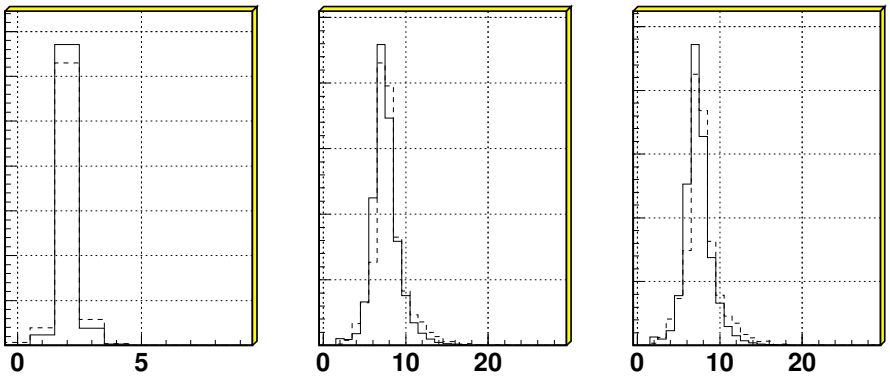
❑ Current status

- ☞ Clusters and hit cells in BSC compared between data and MC for $e^+e^- \to e^+e^-$ and $e^+e^- \to \mu^+\mu^-$ at Ecm=3.097GeV
- ☞ Positions matched with MDC project track compared MC narrower than data in $\forall$Z distribution

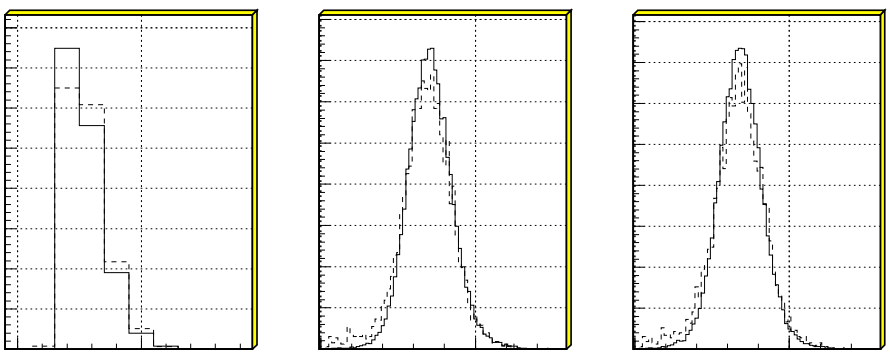
❑ Work to be done

- ☞ Apply a single Gauss distribution to SQS spectrum
- ☞ Fine tuning if necessary
- ☞ Turn to SimBES

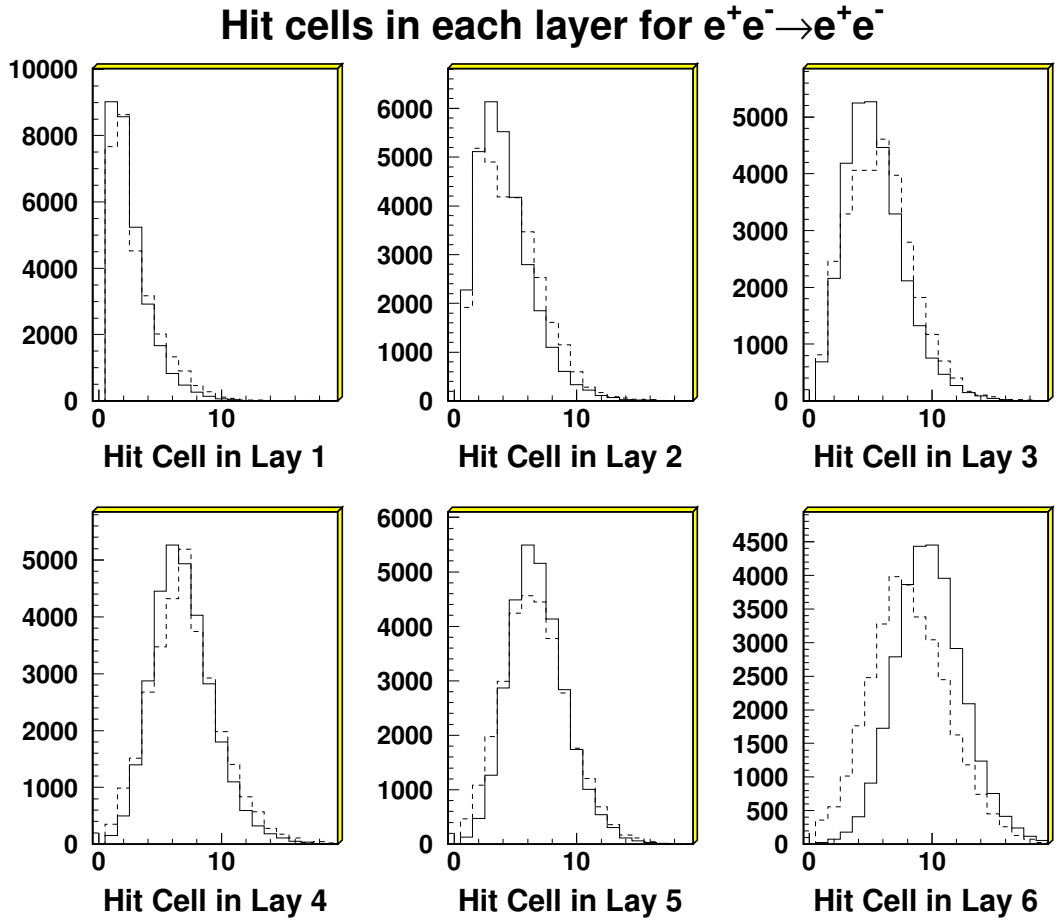
Clusters for $e^+e^- \to \mu^+\mu^-$(up) and $e^+e^- \to e^+e^-$ (down)

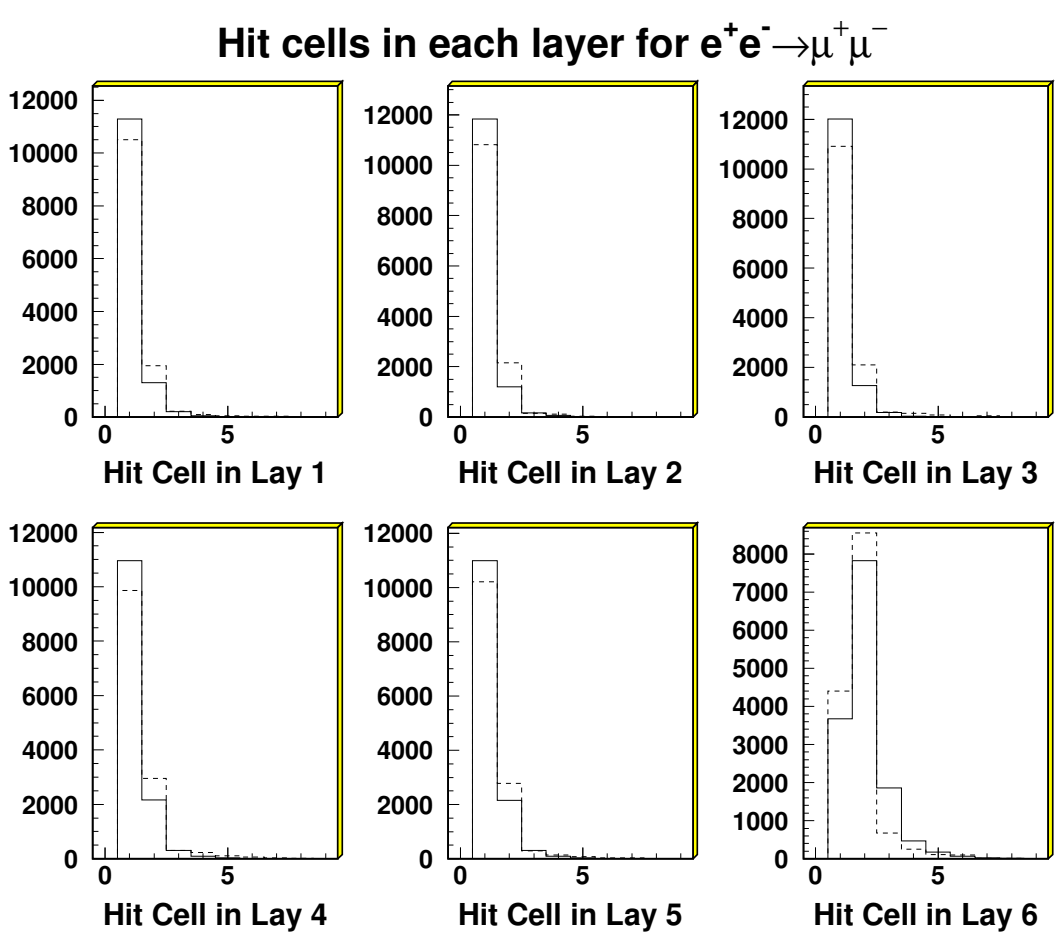


Number of clusters | Num of hits/cluster | Paired hits/cluster



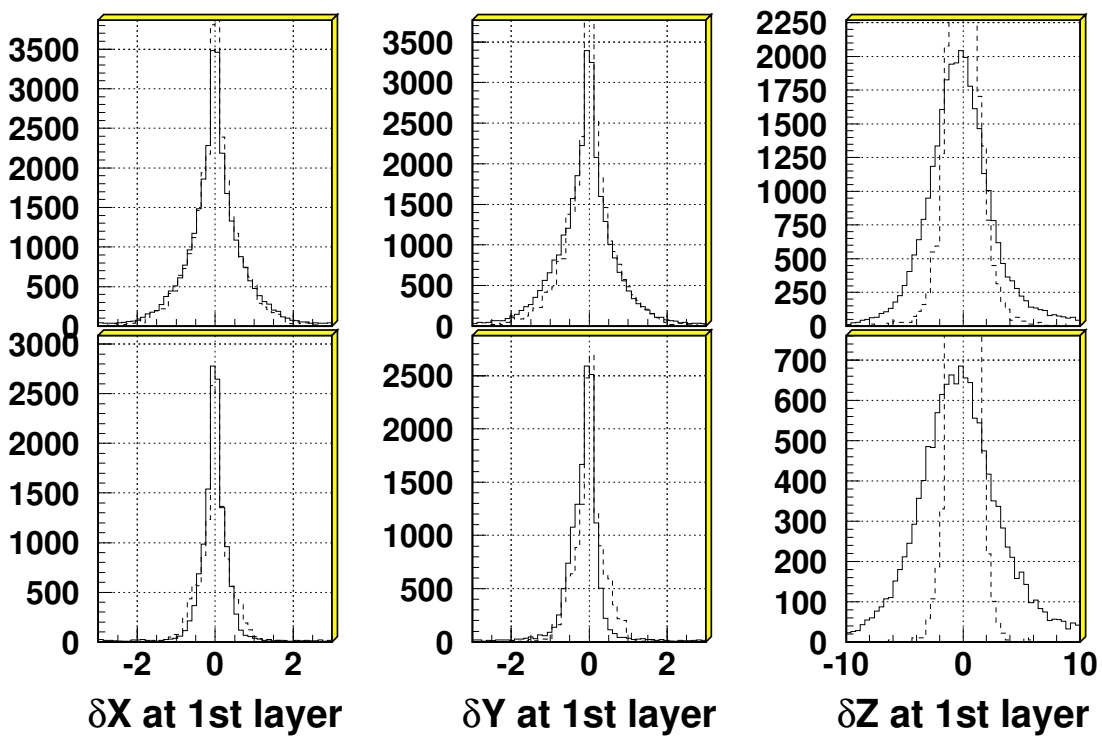
Number of clusters | Num of hits/cluster | Paired hits/cluster


Hit cells in each layer for $e^+e^-\to e^+e^-$
Hit Cell in Lay 1
Hit Cell in Lay 2
Hit Cell in Lay 3
Hit Cell in Lay 4
Hit Cell in Lay 5
Hit Cell in Lay 6


Hit cells in each layer for $e^+e^-\to \mu^+\mu^-$
Hit Cell in Lay 1
Hit Cell in Lay 2
Hit Cell in Lay 3
Hit Cell in Lay 4
Hit Cell in Lay 5
Hit Cell in Lay 6

Position matched between at BSC 1st layer and MDC projected

$e^+e^- \to e^+e^-$ (up) $e^+e^- \to \mu^+\mu^-$(down)



☆ ESC

❑ Review

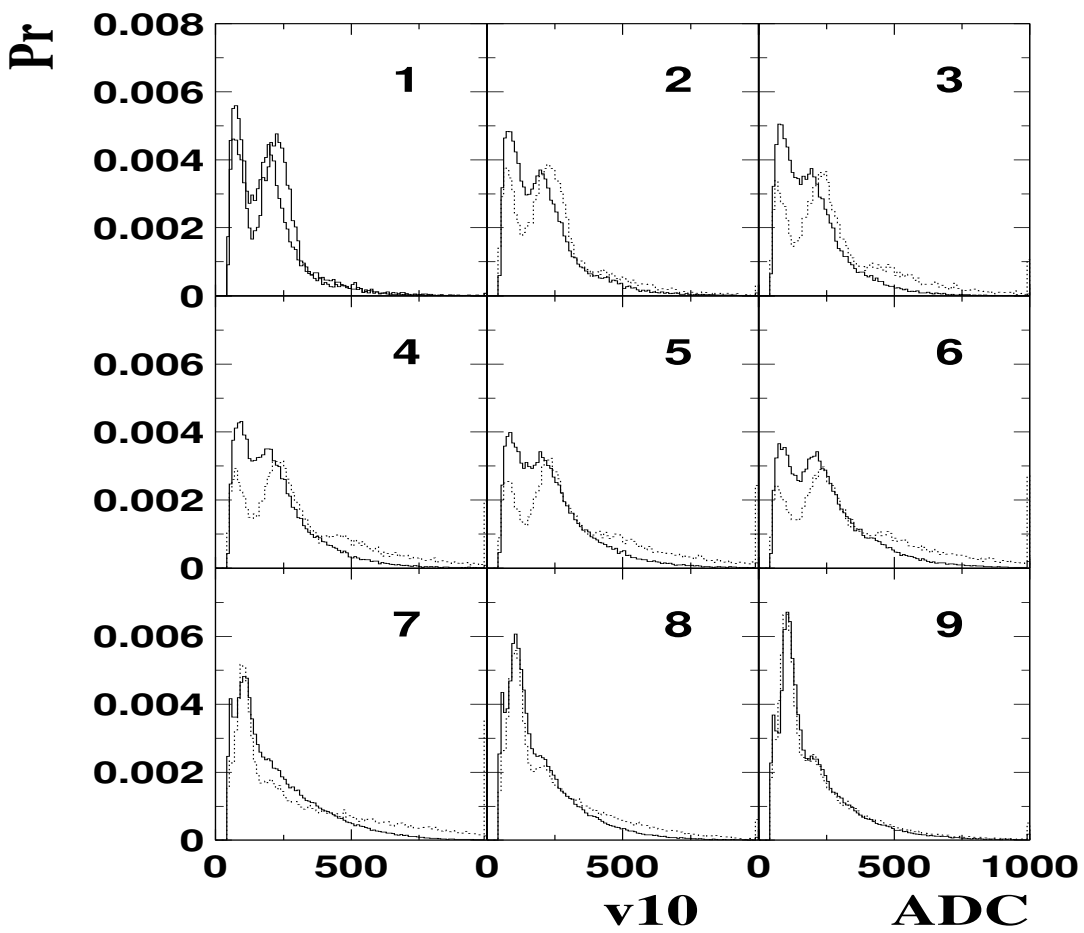
- ☞ Simulation on ESC established
- ☞ SQS spectrum extracted from the first 6 layers' single tube ADC output with two Gauss plus a long tail
- ☞ Dead space and magnetic field taken into account

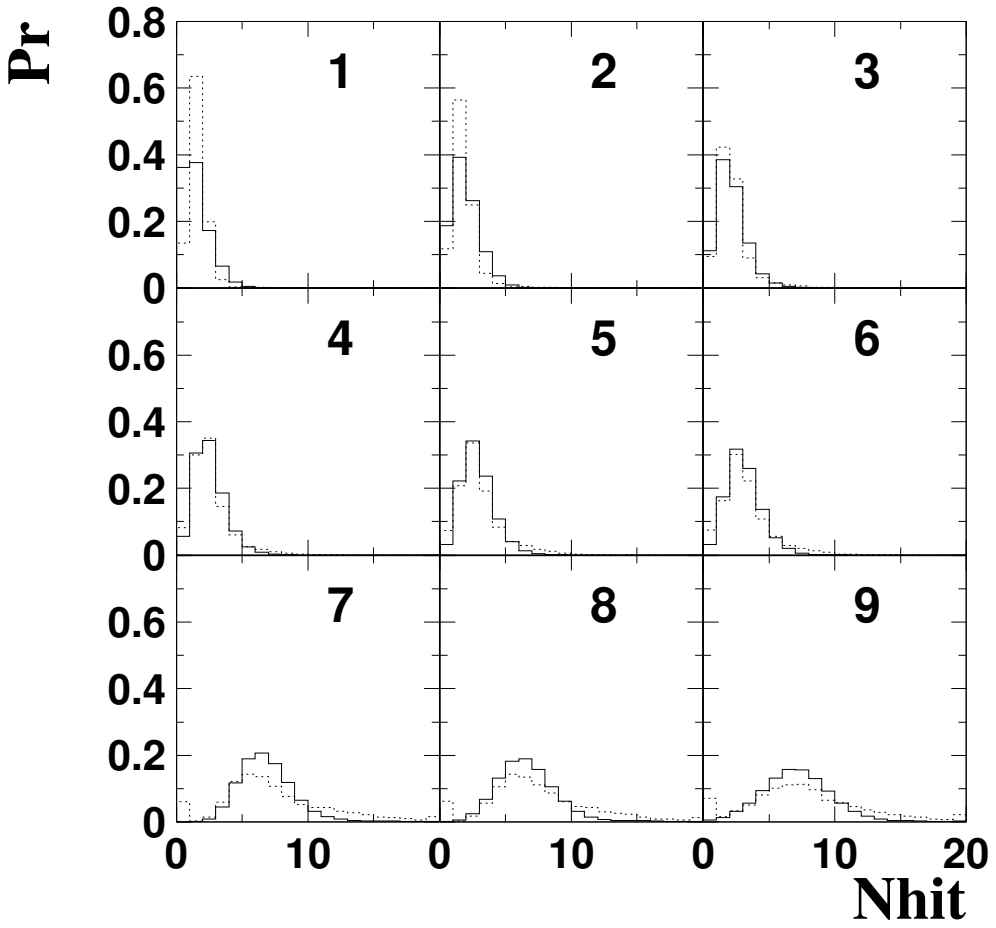
❑ Current status

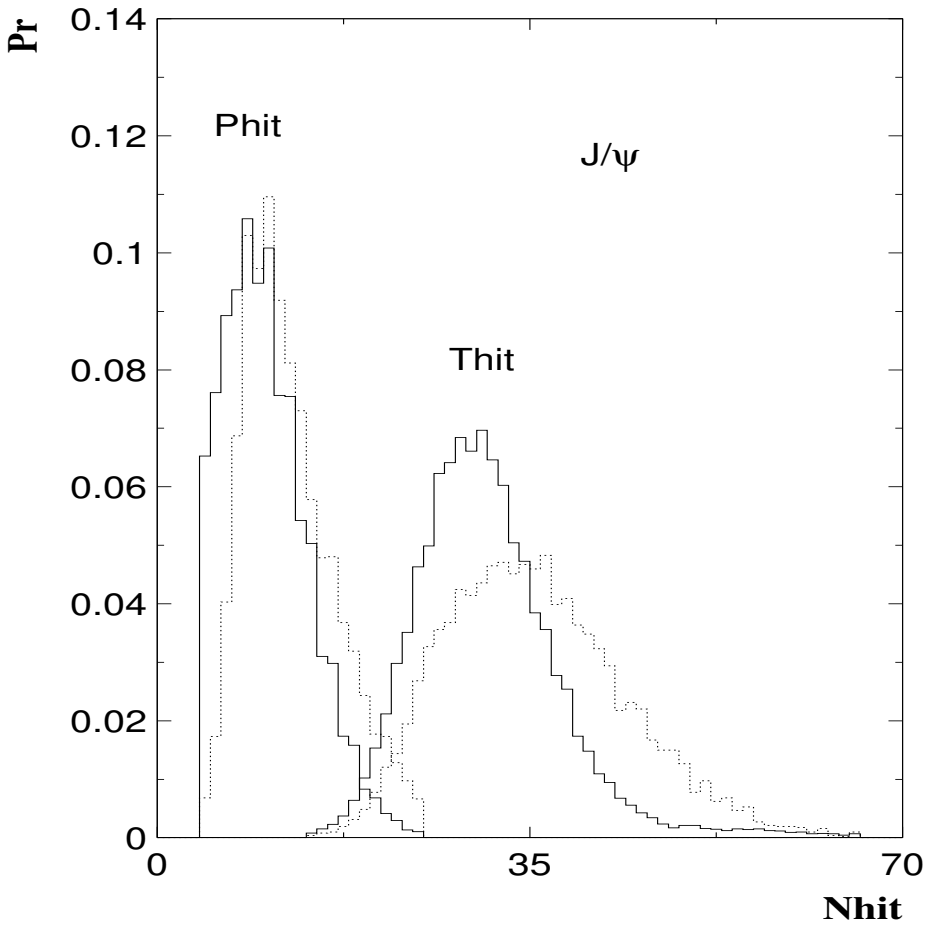
- ☞ ADC output, hit distribution and energy in ESC are compared between MC and data for the event of $e^+e^- \rightarrow e^+e^-$ at Ecm=3.097GeV

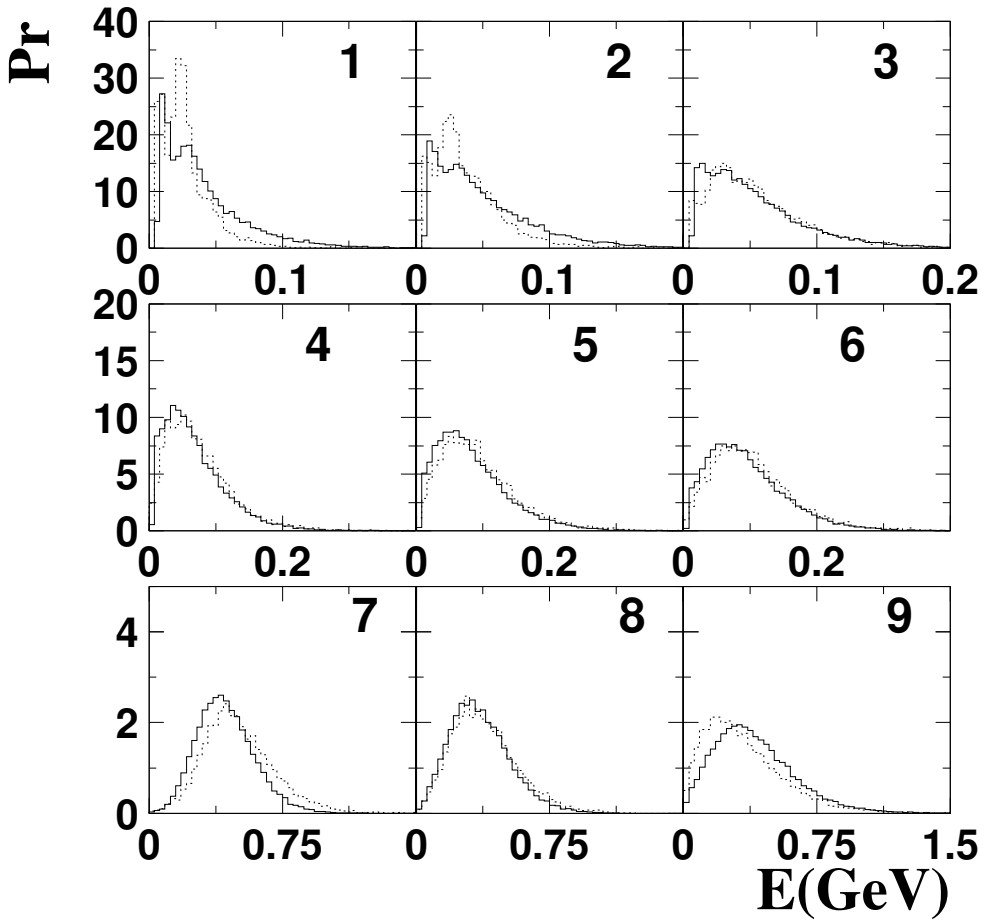
❑ Work to be done

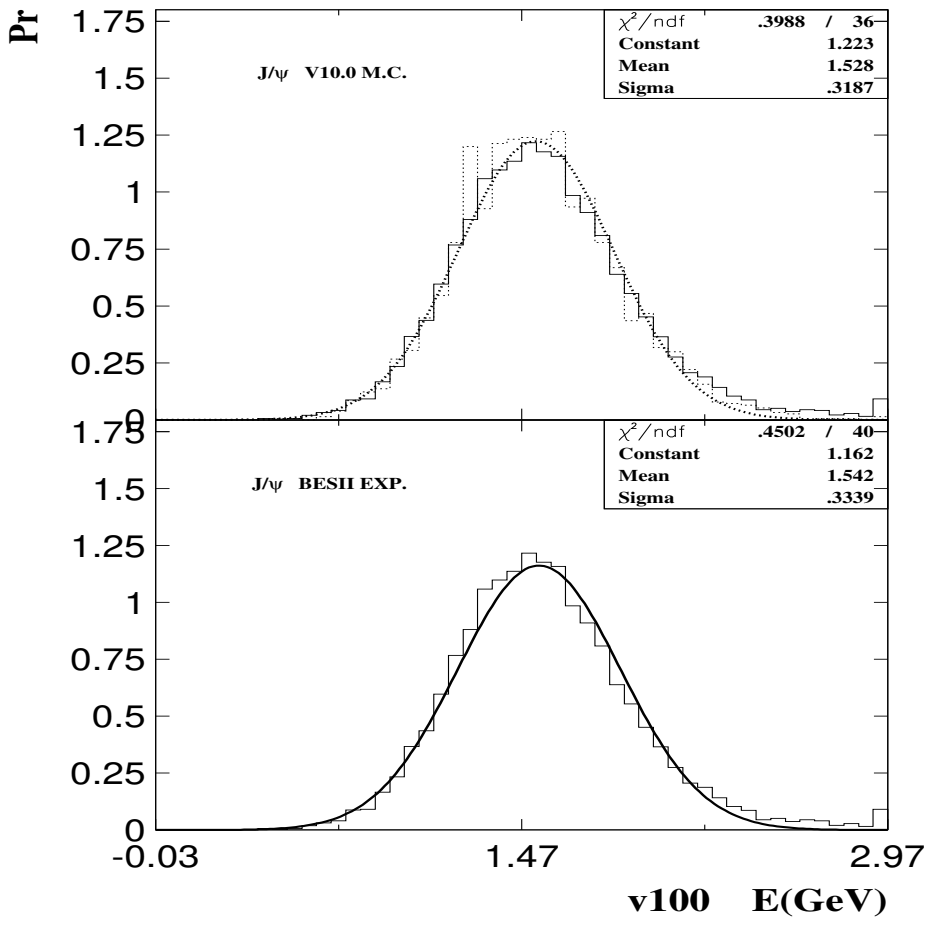
- ☞ Simplify the tunable parameters so far




Pr
1
2
3
4
5
6
7
8
9
0.8
0.6
0.4
0.2
0
0
10
20
Nhit


Pr
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Phit
J/ψ
Thit
0
35
70
Nhit


Pr
1
2
3
4
5
6
7
8
9
E(GeV)


Pr
J/ψ V10.0 M.C.
χ²/ndf .3988 / 36
Constant 1.223
Mean 1.528
Sigma .3187
J/ψ BESII EXP.
χ²/ndf .4502 / 40
Constant 1.162
Mean 1.542
Sigma .3339
-0.03
1.47
2.97
v100 E(GeV)

Status of Monte Carlo Simulation on BES-II

☆ MCH

❑ Review

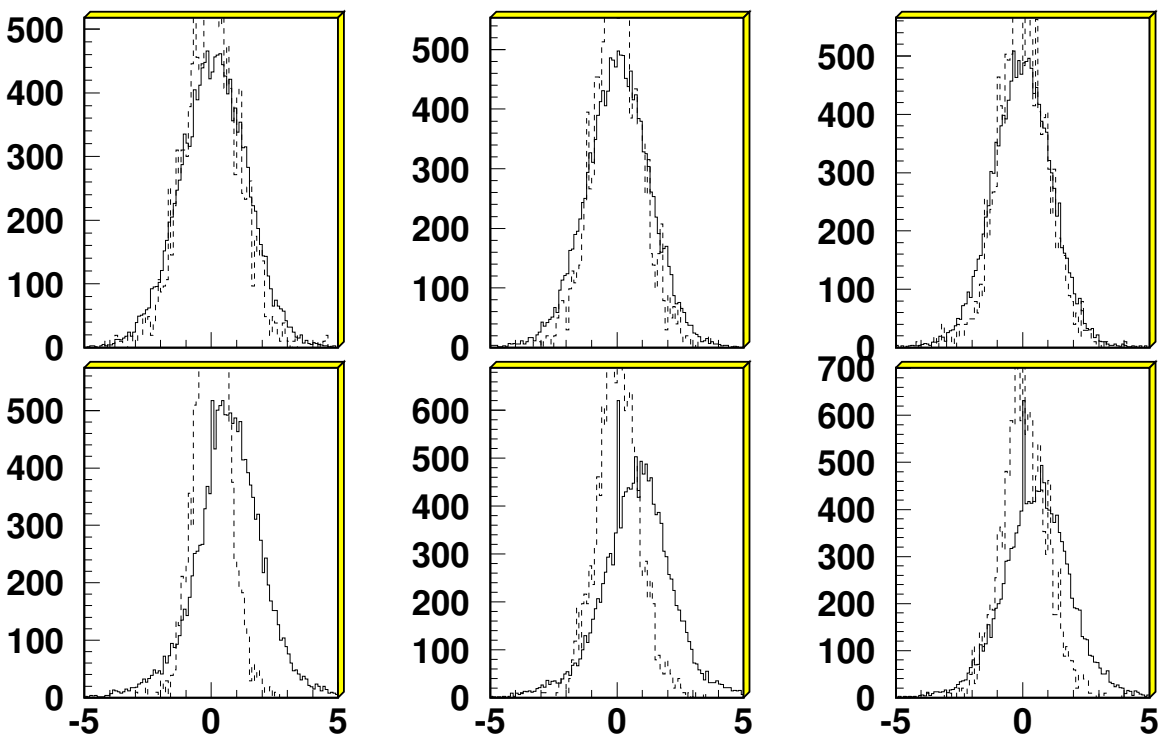
- ☞ Unchanged

❑ Current status

- ☞ Normalized residual in v-plane fit well
- ☞ Standard deviation between project track and closest hit in three muon chamber layers shift higher for data while around 0 for MC

❑ Work to be done

Normalized residual in v-plane and standard deviation between projected track and closest hit in three muon chamber layers



☆ Summary

- ❑ Both SOBER and DRUNK in V10.0 run smoothly and no crash problem found
- ❑ Some bugs in codes found and/or fixed
- ❑ The MC results of all sub-detectors but VC(the comparison having not been done) fit well with data while there are still some deviations existing
- ❑ More detailed jobs on MC simulation needed if data taken will be used in physics analysis