Monte Carlo realization Files for J/ψ of BESII

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Abstract

It is presented how Monte Carlo dead channel and realization files dcl_021.sobecons and brl_021.sobecons for new J/ψ of BES II are produced, which are put in /bes/bes/share/const2/v102. The run numbers of new J/ψ data begin with 13500.

1 MDC and BSC dead channels

The dead wires for both MDC and BSC are found out by analyzing Bhabha events.
1) MDC:

A hit is defined as a signal of $5 < ADC < 4096$ and $5 < TDC < 4096$. If

$$nhit(i,l)/avnhit(l) < 0.01,$$

where nhit(i,l)=number of hits for wire(i) in layer(l) and
avnhit(l)=number of hits for layer(l)/number of wires in layer(l),
wire(i) is regarded as dead channel.If

$$nhit(i,l)/avnhit(l) > 5,$$

wire(i) is regarded as a hot channel.

Table 1

MDC dead channel distribution

Layer	1	2	3	4	5	6	7	8	9	10
D_W	1	2	4	3	4	2	2	5	12	7
H_W	0	0	0	0	0	0	0	0	0	0
All_W	192	192	256	224	272	320	368	416	464	512

Number of all dead channels/Number of all wires is 42/3216 = 1.3%.

2) BSC:

A hit is defined a signal of $ADC > 0$ for BSC. Both west end and east end of a wire in BSC can give signals. Let

$$ratiowest(i,l) = nhitwest(i,l)/avnhit(l)$$

where nhitwest(i,l) is number of signals come from the west end of wire(i) in layer(l), and avnhit(l)=0.5*(tothitwest(l)+tothiteast(l))/560, and tothitwest(l) is total number of signals come from the west ends of all wires in layer(l), tothiteast(l) is total number of signals come from the east ends of all wires in layer(l), 560 is number of wires for every layer, and

$$ratioeast(i,l) = nhiteast(i,l)/avnhit(l).$$

where nhiteast(i,l) is number of signals come from the east end of wire(i) in layer(l).

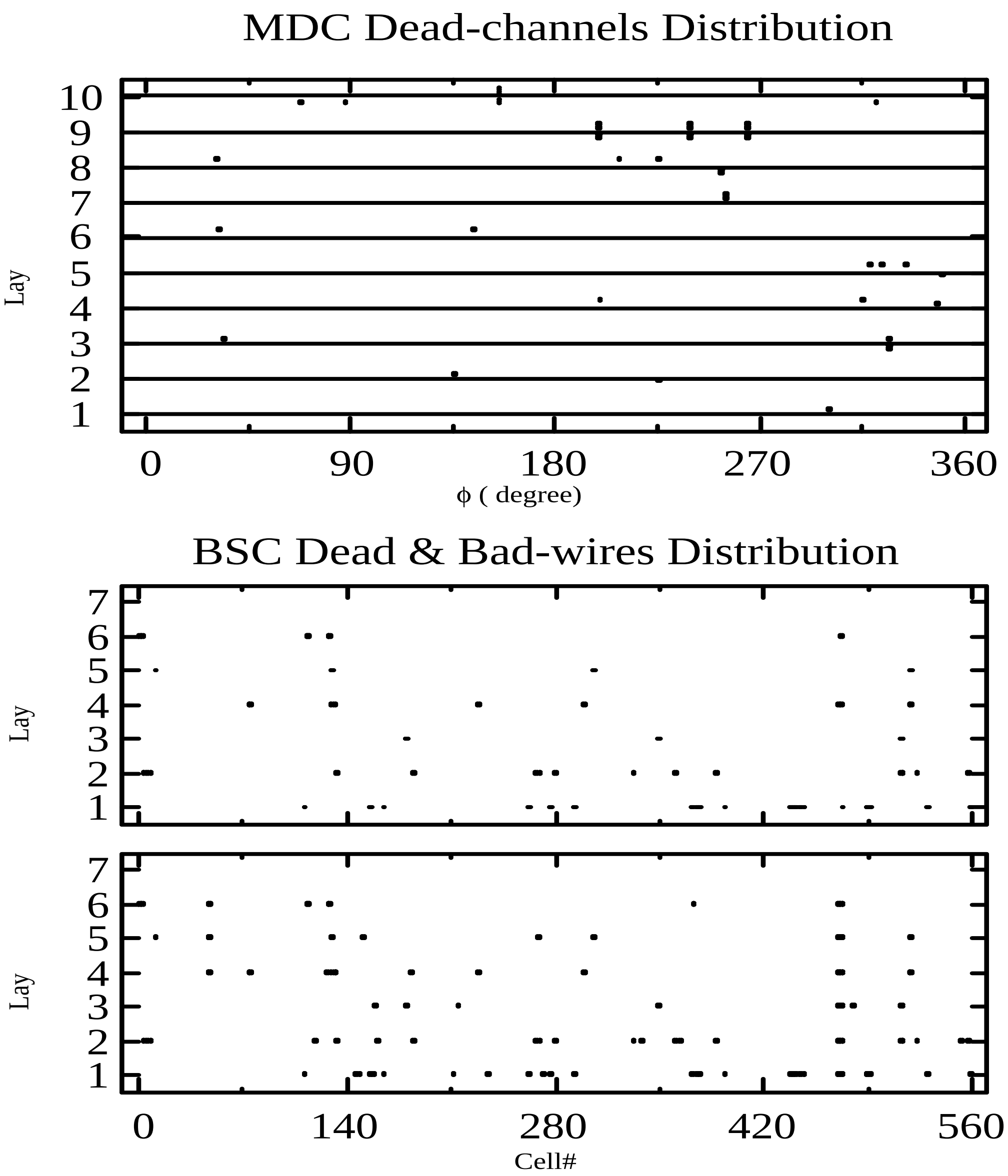
If $(ratiowest(i,l) < 0.01$ or $ratiowest(i) > 5)$ and $(ratioeast(i,l) < 0.01$ or $ratioeast(i) > 5)$, wire(i) is regarded as dead channel.

if $(ratiowest(i,l) < 0.01$ or $ratiowest(i) > 5)$ or $(ratioeast(i,l) < 0.01$ or $ratioeast(i) > 5)$, wire(i) is regarded as bad channel.

Table 2

BSC dead and wires distribution

Layer	1	2	3	4	5	6
D_W	21	15	4	10	5	7
B_W	32	24	11	17	13	13
All_W	560	560	560	560	560	560



L	D-W	H-W	ALL
10	7	0	512
9	12	0	464
8	5	0	416
7	2	0	368
6	2	0	320
5	4	0	272
4	3	0	224
3	4	0	256
2	2	0	192
1	1	0	192
Tot:	42	0	3216

Lay	D-wire
6	7
5	5
4	10
3	4
2	15
1	21
Total:	62

Lay	B-wire
6	13
5	13
4	17
3	11
2	24
1	32
Total:	110

Fig. 1.

2 Realization

1) Vertex position distribution:

Vertex position distribution is obtained by analyzing hadron events. x=trk(vrtsub(2,1)+5), y=trk(vrtsub(2,1)+6), z=trk(vrtsub(2,1)+7).

Table 3

Vertex position and standard error ($\times 10^{-2}$ m)

x	y	z	σ_x	σ_y	σ_z
0.2734	-0.2065	0.1774	0.2492	0.2319	2.952

2) TOF resolution:

TOF resolutions for 48 counters are obtained by analyzing bhabha events. The resolution is defined as the standard error for the distrbution of

$$res(i) = tof_{mes}(i) - tof_{exp}(i), \qquad i = 1, 2, \cdots, 48.$$

Table 4

TOF resolution (ns)

counter	1	2	3	4	5	6	7	8
reso	178.9	201.4	171.4	177.9	174.6	189.7	192.3	190.5
counter	9	10	11	12	13	14	15	16
reso	171.3	157.1	179.0	186.6	185.1	185.0	203.1	187.4
counter	17	18	19	20	21	22	23	24
reso	213.6	173.5	186.6	158.0	198.0	171.7	204.7	170.2
counter	25	26	27	28	29	30	31	32
reso	185.8	169.5	177.0	155.5	168.2	211.3	169.2	156.7
counter	33	34	35	36	37	38	39	40
reso	167.6	188.2	179.2	201.3	177.2	187.8	173.8	200.9
conuter	41	42	43	44	45	46	47	48
reso	181.8	168.1	200.6	165.6	189.3	172.9	195.7	189.3

3) Hit efficiencies for the layers of MDC

The efficiencies are obtained by analysing bhabha events.

$$eff(i) = nhit_{mea}(i)/nhit_{exp}(i), \qquad i = 1, \cdots, 40.$$

where $nhit_{mea}(i)$ is measured number of hit times of layer(i) for the analysed bhabha events, $nhit_{exp}(i)$ is expected number of hit times based on the polar angles of the bhabha events.

Table 5

Hit efficiency of MDC

counter	1	2	3	4	5	6	7	8
eff	0.9843	0.9811	0.9611	0.9620	0.9875	0.9681	0.9720	0.9603
counter	9	10	11	12	13	14	15	16
eff	0.9668	0.9669	0.9537	0.9731	0.9893	0.9908	0.9703	0.9484
counter	17	18	19	20	21	22	23	24
eff	0.9863	0.9461	0.9645	0.9266	0.9735	0.9816	0.9786	0.9606
counter	25	26	27	28	29	30	31	32
eff	0.9902	0.9808	0.9707	0.9633	0.9647	0.9800	0.9791	0.9297
counter	33	34	35	36	37	38	39	40
eff.	0.9428	0.9412	0.9353	0.9414	0.9153	0.9472	0.9474	0.8953

4) Position resolution of MDC

Position resolution of MDC is defined as the standard error of the distrbution of

$$d_i^m - d_i(\alpha), \qquad i = 1, \cdots, 40,$$

where d_i is measured drift distance between the firing point and the wire(i) and $d_i(\alpha)$ is theoretical distance from the wire(i) to the corresponding point in the theoretical trajectory which depends on the parameter α ($\alpha_1 = \phi$, $\alpha_2 = k$, $\alpha = tg\lambda$, $\alpha_4 = \zeta$, $\alpha_5 = \eta$.). The parameter α does not include the information of wire(i). In practice, in order to save time, we calculate the resolutions of five wires(n,n+8,n+16,n+24,n+32,n=1,2,$\cdots$8.) for one time, so the parameter α does not inlcude the information from the five wires.

Table 6

Resolution of MDC

counter	1	2	3	4	5	6	7	8
res.	0.3023	0.2878	0.2874	0.2956	0.2879	0.2785	0.2758	0.3178
counter	9	10	11	12	13	14	15	16
res.	0.2687	0.2456	0.2537	0.2860	0.2391	0.2363	0.2487	0.2514E
counter	17	18	19	20	21	22	23	24
res.	0.2483	0.2443	0.2533	0.2669	0.2374	0.2342	0.2422	0.2571
counter	25	26	27	28	29	30	31	32
res.	0.2429	0.2428	0.2525	0.2611	0.2243	0.2292	0.2255	0.2499
counter	33	34	35	36	37	38	39	40
res.	0.2569	0.2428	0.2551	0.2795	0.2467	0.2578	0.2592	0.2672