Study of the Trigger Status

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(http://hpws3.ihep.ac.cn/~lid/trg)

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1. Background Study

2. Trigger Efficiency

3. The Threshold for the Shower Counter

4. Summary

Background Study

(1) The triggered event distribution in different trigger channels

Five event types:

- Bhabha
- Hadron
- Dimuon
- Neutral events
- The not-selected events (background?)

(2) The distribution of the background

The not-selected event distribution in different trigger channels

(3) The relativity of different trigger channels

The subroutines for selecting events

Dr. Huang Guangshun provides several subroutines that were used to select different type events.

- To select the hadron events

Use the information from MDC and TOF

The main cut conditions: MFIT=2 or (-19), Vr≤0.02m, Vz≤0.15m, $|\cos\theta|\leq 0.84$, $2\leq Tof\leq 20ns$,……

- To select the Bhabha events

MDC dedx and Tof information is used.

The main cut conditions: $1.5Ebeam \leq (Pe^{+}+Pe^{-}) \leq 2.5Ebeam$, MFIT=2, Vr1+Vr2≤0.02m, |Vz1 + Vz2|≤0.20,

$|\cos\theta|\leq 0.84$,……

- To select the dimuon events

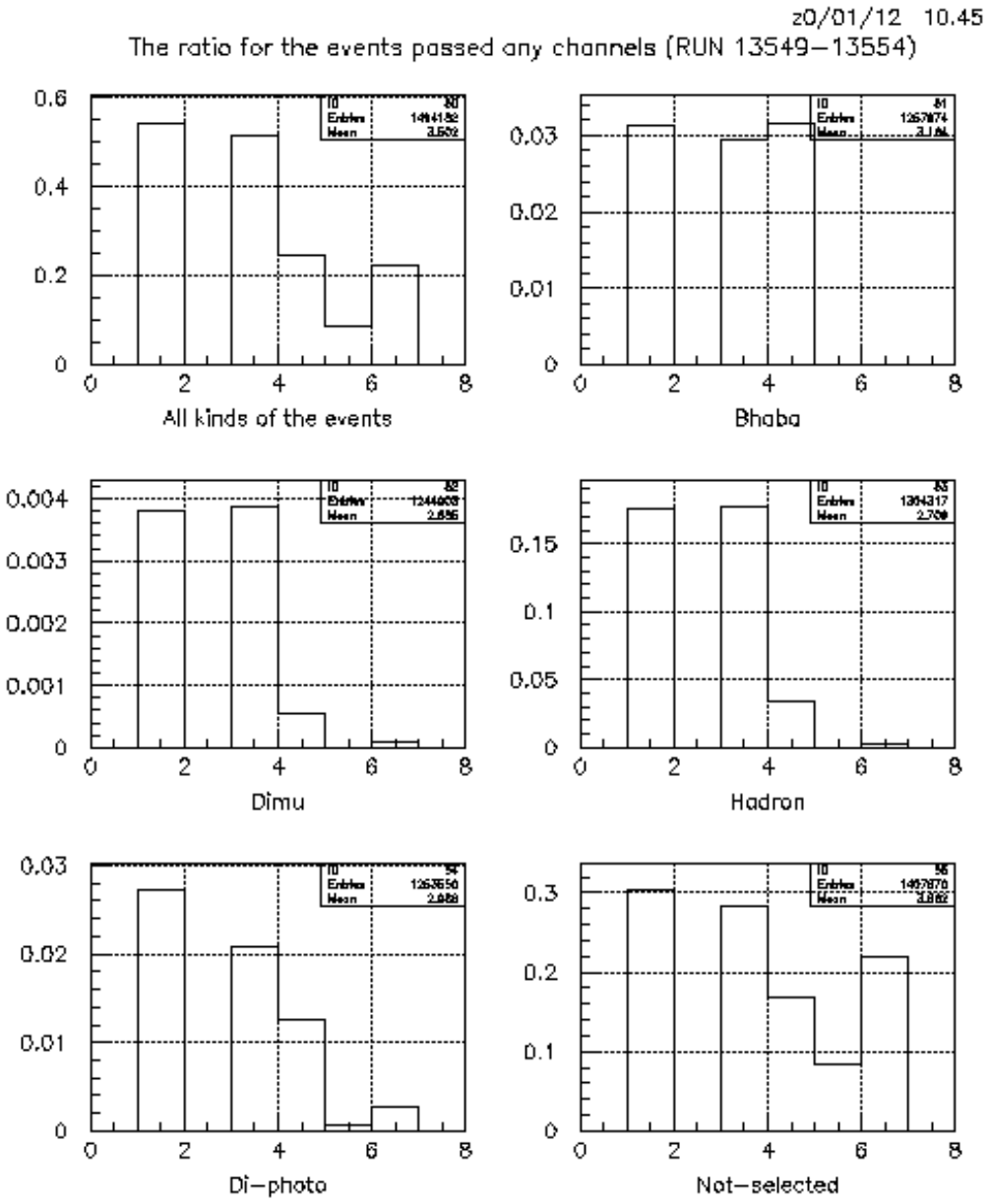
Use MU, MDC and TOF information

- To select the two gamma events

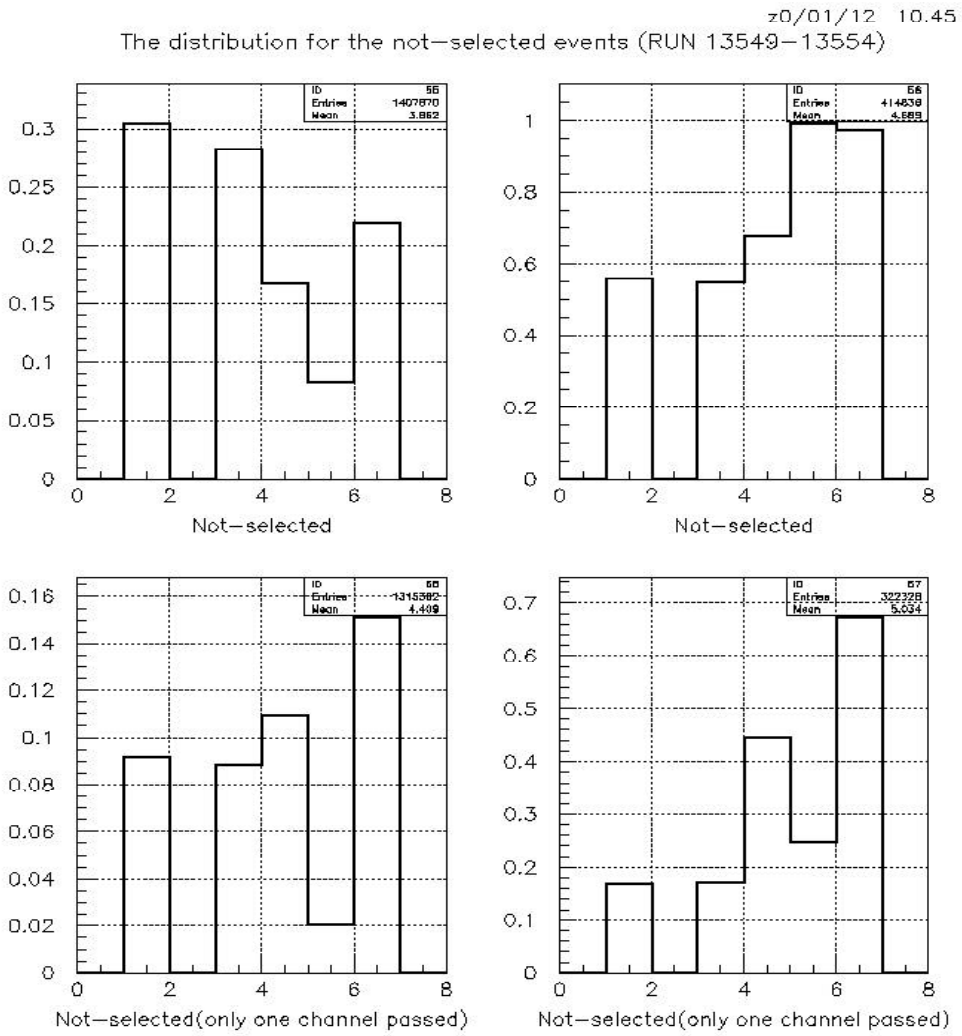
Use BSC information

TRIGGER CONDITION TABLE for J/psi

TYPE CONDTN	BHABHA	CHARGED	2-MU	CHAR2	NEUTRAL	ENEU	EBB	BB2
Active?	N	Y	N	Y	Y	Y	Y	N
TOF B-B	-	-	-	-	-	-	-	-
Ntof>=1	-	Y	Y	-	-	-	-	-
NTOF>=2	-	-	-	Y	-	-	-	Y
RADIAL.	-	-	-	-	Y	-	-	-
Nvc>=1.	-	Y	-	Y	-	-	-	-
Eradl	-	-	-	-	-	Y	-	Y
ETOF B-B	-	-	-	-	-	-	Y	-
ETOF>=1	-	-	-	-	-	-	-	-
Nvc>=2	-	-	-	-	-	-	-	-
Ntrk>=1	-	Y	-	-	-	-	-	-
Ntrk>=2	-	-	-	Y	-	-	-	-
Ntrk>=4	-	-	-	-	-	-	-	-
MUON-OR	-	-	Y	-	-	-	-	-
Etrk	-	-	-	-	-	-	-	Y
ESC-Etot	-	-	-	-	-	Y	Y	-
E tot.l	-	Y	-	-	-	-	-	-
E tot.h	-	-	-	-	Y	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-



(The event numbers passed through a trigger channel are divided by the total numbers of the events in these runs)



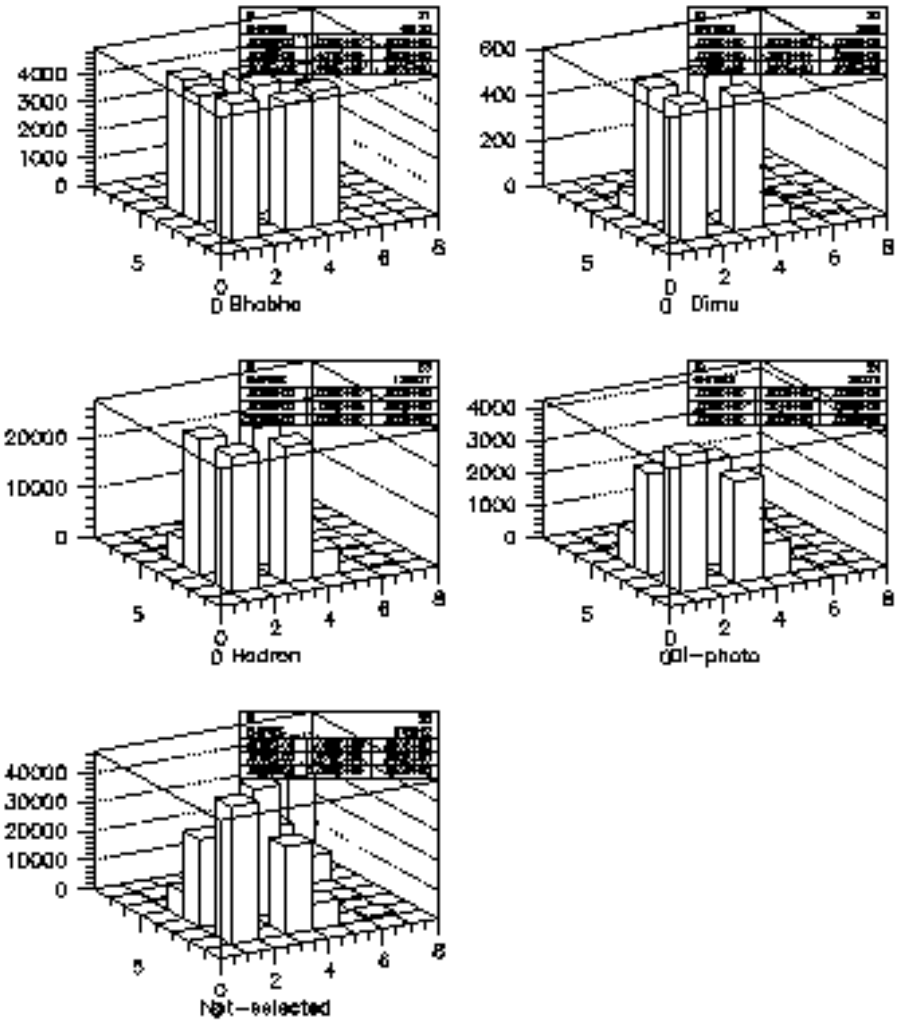
The two up figures: The Not-selected events could pass through any numbers of the trigger channels.

The two down figures: The Not-selected events passed through only one trigger channel.

The two left figures: The event numbers passed a trigger channel are divided by the total numbers of the events in these runs.

The two right figures: The event numbers passed a trigger channel are divided by the total numbers of the events that passed through this channel.

The relativities for the different trigger channels (RUN 13549–13554)



Trigger Efficiency

For determining the BSC threshold (Etot_l and Etot_h), some DATA RUNs were used to calculate the trigger efficiencies for Etot_l, Etot_h and RADIAL conditions. The CHAR2 channel was used to the efficiency.

Trigger efficiency for BSC

The CHAR2 channel was used in the calculation. No information from BSC is used in selecting the samples.

The trigger efficiency for RADIAL

RUN No.	Etot-l	Etot-h	Trigger efficiency					
			Bhabha		Hadron		Dimuon	
13544-13548	32	80	3880/4242	0.91446	4604/21139	0.21779	166/1423	0.11665
13549-13554	32	60	4787/5054	0.94717	5329/27600	0.1307	199/2105	0.09453
13575-13585	32	60	5941/6293	0.94406	8449/35263	0.23959	323/2690	0.12007
13664-13674	20	60	4058/4936	0.91329	7286/25745	0.28300	292/1986	0.14702

The trigger efficiency for Etot-l

RUN No.	Etot-l	Etot-h	Trigger efficiency					
			Bhabha		Hadron		Dimuon	
13544-13548	32	80	4227/4242	0.99646	21018/21139	0.99427	1252/1423	0.87983
13549-13554	32	60	5015/5054	0.99228	27253/27600	0.98742	1384/2105	0.65748
13575-13585	32	60	6268/6293	0.99602	34927/35263	0.99047	2092/2690	0.77769
13664-13674	20	60	4936/4936	1.000	25741/25745	0.99984	1895/1986	0.99949

The trigger efficiency for Etot-h

RUN No.	Etot-l	Etot-h	Trigger efficiency					
			Bhabha		Hadron		Dimuon	
13544-13548	32	80	3895/4242	0.91819	16020/21139	0.75784	19/1423	0.01335
13549-13554	32	60	4893/5054	0.96814	23278/27600	0.84340	49/2105	0.23277
13575-13585	32	60	6163/6293	0.97934	31345/35263	0.88889	90/2690	0.03345
13664-13674	20	60	4781/4936	0.96859	24310/25745	0.94426	219/1986	0.11027

Note: The high voltages for the shower counter were set higher values in Run13575 to Run13585 and Run13664 to Run13674.

BSC energy requirement: Ebsc>1.2Gev

The trigger efficiency for RADIAL

RUN No.	Etot-l	Etot-h	Trigger efficiency	
			Bhabha	
13544-13548	32	80	3785/3876	0.97652
13549-13554	32	60	4755/4858	0.97879
13575-13585	32	60	5898/6101	0.96672
13664-13674	20	60	4445/4673	0.96567

The trigger efficiency for Etot-l

RUN No.	Etot-l	Etot-h	Trigger efficiency	
			Bhabha	
13544-13548	32	80	3876/3876	1.0
13549-13554	32	60	4858/4858	1.0
13575-13585	32	60	6101/6101	1.0
13664-13674	20	60	4673/4673	1.0

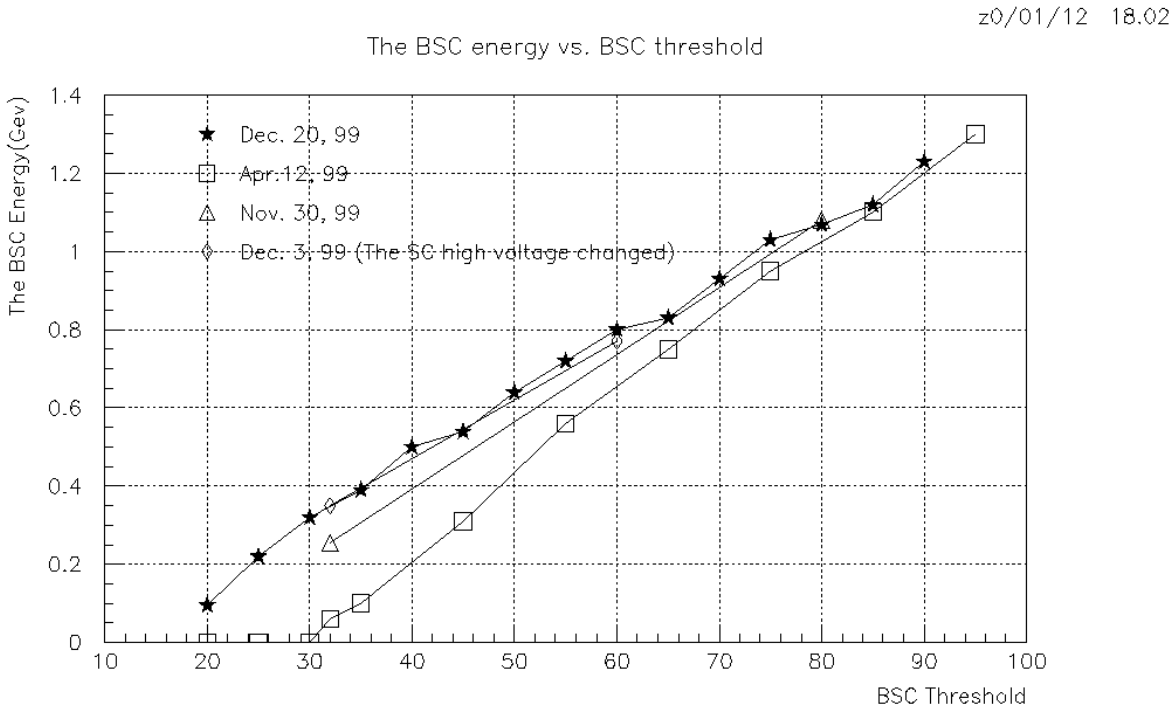
The trigger efficiency for Etot-h

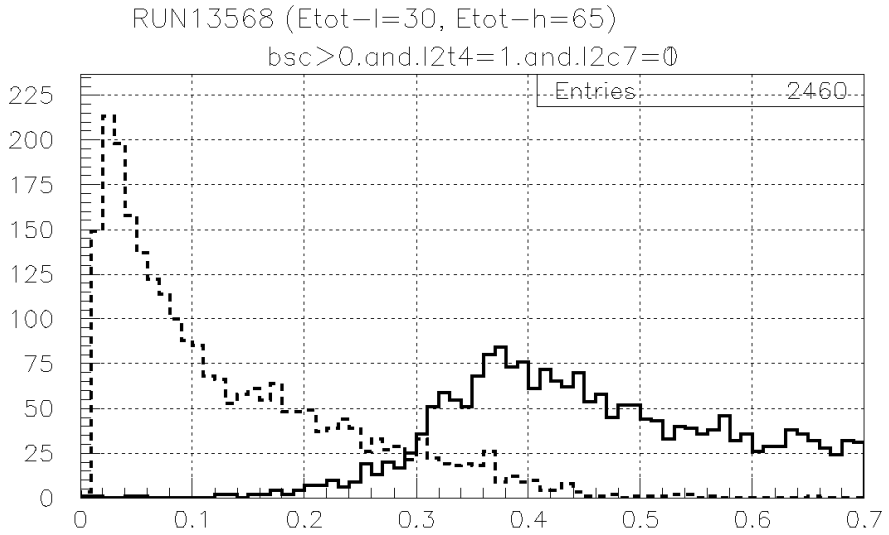
RUN No.	Etot-l	Etot-h	Trigger efficiency	
			Bhabha	
13544-13548	32	80	7870/3876	0.99845
13549-13554	32	60	4858/4858	1.0
13575-13585	32	60	6101/6101	1.0
13664-13674	20	60	4673/4673	1.0

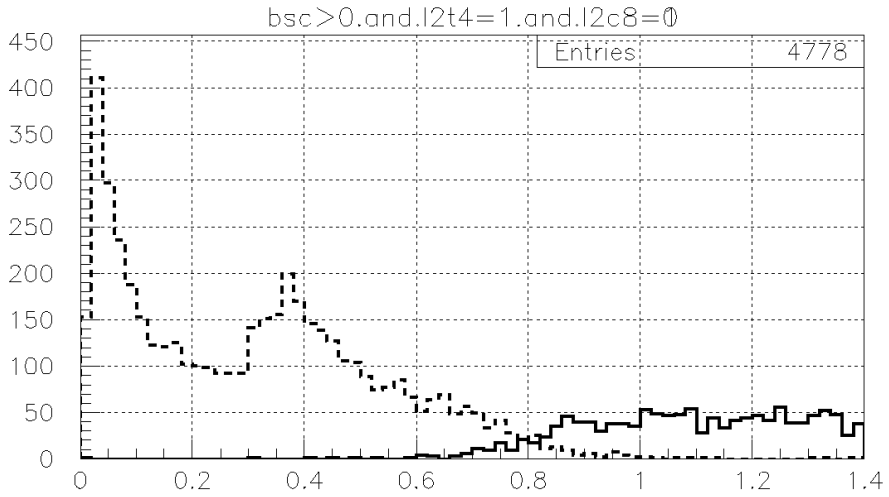
Note: The high voltage for the shower counter were set higher values in Run13575 to Run13585 and Run13664 to Run13674.

Threshold for the Shower Counter

The method to determine the corresponding energy for the condition of Etot_l and Etot_h




RUN13568 (Etot−l=30, Etot−h=65)
bsc>0.and.l2t4=1.and.l2c7=0
Entries 2460
225
200
175
150
125
100
75
50
25
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7


bsc>0.and.l2t4=1.and.l2c8=0
Entries 4778
450
400
350
300
250
200
150
100
50
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4

Summary

1. The propose of the Background Study is try to find a method to determine which trigger channel (channels) and/or trigger conditions introduce main part of the background. So the methods to reduce the background are expected to find.

2. The trigger efficiencies of RADIAL, Etot_l and Etot_h on different conditions are given. The results are useful for deciding the value of the Etot_l and Etot_h.

3. The corresponding energy for different BSC threshold value is calculated. This energy is changed when the conditions of the Shower Counter (such as high voltage, temperature,…) changed.

Acknowledgements

Thank Dr. Huang Guangshun for providing the subroutines that were used to select the events.

Thank the Calibration Group and the Data group for providing the reconstructed data timely.