## Status on tsim ECL study

B.G.Cheon / Y. Unno Hanyang university SuperBelle meeting (2009/03/17-19)

- 1. Belle ECL trigger condition
- 2. Different responses of tsim for gsim(Belle) and g4superb(sBelle)
- 3. Effect of beam background
- 4. Summary / Plan

# ECL trigger condition

#### Bhabha

- (Bhabha\*) && (ICN<4)</p>
- Bhabha<sup>\*</sup> =  $(E^i > E_{thr}^i)$ , i = 1-11

#### Pre-scaled Bhabha

- (pre-Bhabha\*) && (ICN < 4)</p>
- pre-Bhabha\* = scaled Bhabha\*

### Cosmic

- $(ICN_A > 0 \& ICN_D > 0) || (ICN_B > 0 \& ICN_C > 0)$
- (only barrel) || (only forward-endcap)

### Physics



- Etot \* = (Etot>1GeV) && !(Bhabha) && !(Cosmic)
- ICN\* = (ICN>3) && !(Cosmic)
- where, Etot and ICN are in Barrel and forward-endcap

	B1 Barrel B2 Backward Endcap	F3 Forward Endcap
Pattern	Components	Threshold(GeV)
1	F1+F2+B1+B2	5.0
2	F2+F3+B1+B2+C11+C12	5.5
3	F2	5.0
4	F3+C10+C11+C12	5.0
5	C1+C9+C10	5.0
6	C1+C2+C9	5.0
7	C2+C8+C9	5.0
8	C3+C7+C8	5.0
9	C4+C6+C7	5.0
10	C5+C6	5.0
11	C10	3.0



## Check tsim-ecl with Belle and sBelle



## Belle vs sBelle : Etot distribution



Clear discrepancies can be seen...why?...Amount of material? Any mistake?...Have to investigate...

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## Check with single track

To investigate the discrepancy between gsim and g4superb, responses from single tracks( $\gamma$  / e- /  $\mu$ - /  $\pi$ - / K+) are checked.

- Generate p=5GeV/c single track in CM isotrapically.
- Without beam background
- Check only Barrel region



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## Check with single track



• hadron interaction effect in g4superb-ecl is strange???

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## Check with single track



Note that there is no difference between w/ and w/o inner detector for gsim too.

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- Beam background will be ~20 times larger than now.
- Have to place top priority on evaluation of the effect for trigger with tsim.

Check tsim response for signal MC with "beam background".
by using current tsim-ecl and gsim
"beam background"(addbg) is real random-triggered data.
Used here is exp.51 data: 2006/04-06(peak L =~ 16x10<sup>33</sup>/cm<sup>2</sup>/sec)
(exp.51 beam bkg) x 1, 5, 10, 15, 20 are tested.







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physics

bhabha



Beam bkg effect with addbg is overestimated for trigger study?
Y.Iwasaki-san pointed out that shaping times are very different between for trigger and energy measurement in Shaper/QT.



If we can scale the result with addbg by 1/5 or 1/10 simply, Beam background effect at sBelle looks not so significant.
Anyway, need to check more detail, and correctly/carefully.

# Summary / Plan

- Summary
  - Discrepancy between gsim and g4superb seems due to strange hadron interaction in g4superb(?)
  - Beam bkg effect has been roughly checked with addbg. But more detail study is needed (correctly and carefully).

#### To do:

- Check beam background effect more, carefully.
- Check Bhabha event
- Test new Bhabha scheme(BN477)
- Prepare tsim-ecl for sBelle
- Check cosmic trigger with cosmic event(?!)
- Compare data and mc with current Belle
- Check performance with pure CsI in g4superb(?!)

# Back up slides

## @ last sBelle meeting



### Belle vs sBelle : Bhabha\*( $B^+ \rightarrow K^+ \pi^-$ )



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## Belle vs sBelle : Bhabha\*( $B^0 \rightarrow \pi^0 \pi^0$ )



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## Belle vs sBelle : Bhabha\*( $B^0 \rightarrow \rho^0 \gamma$ )



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### Belle vs sBelle : Bhabha\*( $B^+ \rightarrow \tau^+ \nu$ )



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## Belle vs sBelle : Bhabha\* $(\tau^+ \rightarrow \mu^+ \gamma)$



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### Belle vs sBelle : Bhabha\*( $e^+e^- \rightarrow \mu^+\mu^-\gamma$ )



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