INFN
Istituto Nazionale
di Fisica Nucleare

SuperB – FastSim report

Alessandro Rossi

INFN Istituto Nazionale di Fisica Nucleare

Main porpouse

- Understand if and how FastSim can be used to perform some "fast" studies for BelleII
- Collect some information on what had been done with SuperB FastSim
- Available samples
- Understand the time needed to perform some private or "global" production

All this information collected from Elisa presentations at various SuperB CM

What FastSim had been used for?

- Detector geometry optimization (2010/2011)
  - Impact on physics studies of Bwd EMC and Fwd PID
  - Impact on EMC resolution on material budget of DCH and FwdPID
- EMC resolution studies (2011/2012)
  - Different FwdEMC options
  - Different electronics (mainly Barrel shaping time)

First (?) Production

- 1st production had been done on February 2010
  - 3 geometries
    - BaBar
    - SuperB_v3 -> SVT_L0 + Fwd DCH + Bwd EMC
    - SuperB_v4 -> SVT_L0 + Fwd PID + Bwd EMC
  - Generic Samples:
    - BaBar : 50M evts with BKG
    - SuperB_v3 : 25M evts with BKG ; 530M w/o BKG
    - SuperB_v4 : 28M evts with BKG ; 830M w/o BKG
  - BKG = BhaBha and RadBhaBha
  - Signal MC samples (B->K*nunu)
    - ~1M for each channel
    - In principle also B->taunu and B->K*nunu with SL tag available

First (?) production : results

- Some bugs on FastSim code:
  - Semi-identical Breco candidate
  - Kaon PID not working
  - BKG windows too large
  - No π^0 mass constraint
- Eextra shift in signal MC due to RadBhaBha
  - Studies on this problem had been done after the development of some patches for the bugs
  - Tested Eextra with noBKG. 100% BKG and 25% BKG (more realistic since the signal windows problems)
- Start a selection for a Breco and B_SL cocktail for the next productions
  - More statistics of generic+BKG is needed for Eextra studies after selection
  - Simulate only the BKG comments which survive the selection

Second production

- September 2010
  - Ad hoc cocktail of Breco/BSL
  - Some bugs resolved (Double cand, π^0 mass, kaon pid)
  - Samples
    - B0B0bar vs Generic 377M
    - B+B- vs Generic 400M
    - B0->K*nunu vs generic 297M
    - B+->K*nunu vs Generic 315M
  - BUGS
    - No neutral energy smearing
      - Patch applied offline
    - Bwd EMC timing informations

Energy resolution studies (2011)

- Energy resolutions studies had been performed on September 2010 production
- Added some private productions:
  - Single particle (γ , π^0) – No BKG

Energy resolution studies (2012)

- Private productions:
  - Samples:
    - Had Breco No BKG : 1M evts
    - Had Breco 1xBKG : 1M evts
    - Had Breco 3xBKG : 0.48M evts
    - B->K*nunu : 2M for each BKG config
  - BKG from Full simulation (BKG frame)
  - It was impossible (time consuming) to produce 5xBKG
- γ and $\pi 0$ used for resolution and efficiency studies

Energy resolution studies (2012)

- May 2012 -> New BKG frames from FullSim
  - Differnces on resolution btw Fast and Full Sim also w/o BKG
    - Fixed on September 2012
- Time consuption with BKG frames (FastSim v0.3.1)
  - Seconds for simulating one event

	Signal MC	BBgen
No BKG	0.12	0.4
1x BKG	0.7	1.06
3x BKG	2.64	5.80
5x BKG	40 (!!)	

Conclusions

- A new production were being to be started at the beginning of 2013…
- In my opinion there are not available samples to perform a physics studies
- The possibility of a new production has to be understood
  - Is convenient?
  - Can be done at CNAF?