



Study of E_{extra} distributions in
 $B \rightarrow K \nu \nu$ against Hadronic Breco
(preliminary results)

Elisa Manoni

INFN Sez. Perugia

DGWG meeting,
March 30, 2010



Outline

- * Eextra shapes and background mixing as in February production
- * Eextra barrel vs Eextra forward
- * Eextra as a function of $E_{\gamma\min}$
- * Eextra with background scaling
- * Eextra after $B^+ \rightarrow K^+ \nu \bar{\nu}$ selection



Analysis strategy

- * February production tuples: background mixing switched on, will use:
 - $B^+ \rightarrow K^+ \nu \bar{\nu}$ signal MC
 - B^+B^- and $B^0\bar{B}^0$ ba generic MC
- * results shown at past meetings: E_{extra} computed at ntuple level, $E_{\gamma_{\text{min}}} = 30$ MeV
- * current study: compute E_{extra} at tuple level (gamma block)
 - remove gammas overlapping with Breco or Bisg
 - sum extra-gamma energy if $E_{\gamma_{\text{min}}} > E_{\gamma_{\text{min}}}$
- * background scaling (to $1/4$, according to Chih-hsiang)
 - use February production tuples
 - identify gammas from background by using `mctruth` infos
 - associate to each extra-gamma (in the barrel emc) a random number $\in [0,1]$
 - if `randnum` > 0.25 , reject the extra-gamma, otherwise use it to compute E_{extra}
- * selection applied (up to page 10): best Breco selection (smallest $|\Delta E|$)
- * nb : E_{extra} range for signal MC plots = $[0,4]$ GeV
 E_{extra} range for generic MC plots = $[0,7]$ GeV

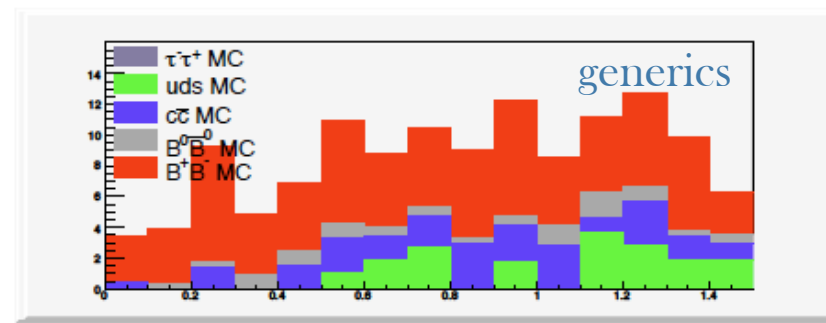
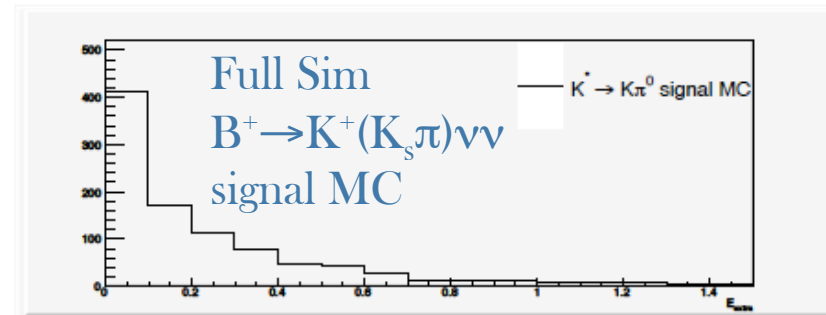
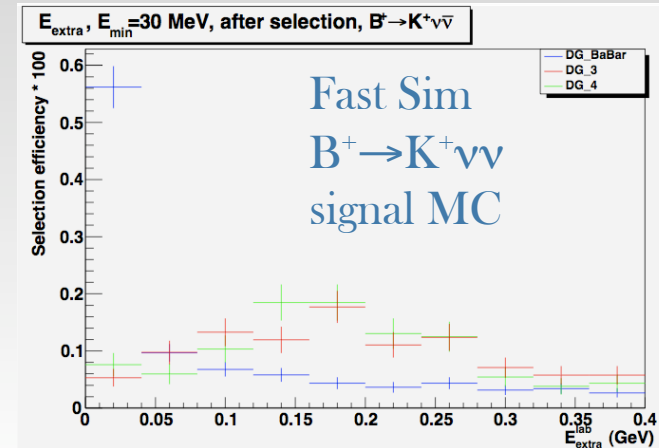


Extra shape and background mixing

February production analysis:

- * background (radiative Bhabha) dramatically increase the number of reconstructed neutrals \rightarrow in signal MC E_{extra} shifts at high values, losing the bin 0 discriminating power

- * in this production, not enough generic statistics with background in, to study the bkg E_{extra} shape (probably shifted \rightarrow need to enlarge the signal region to be more discriminant)

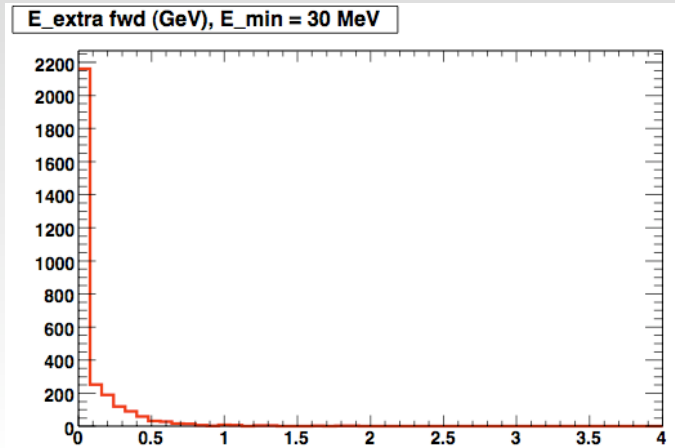




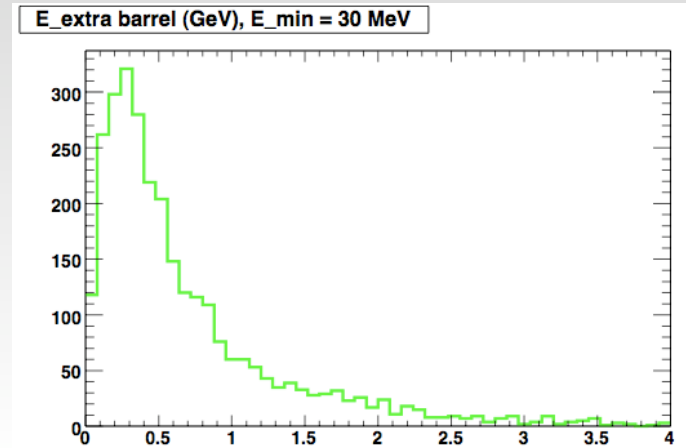
* 100% background

Extra barrel vs Extra forward

$B^+ \rightarrow K^+ \nu \nu$
signal MC

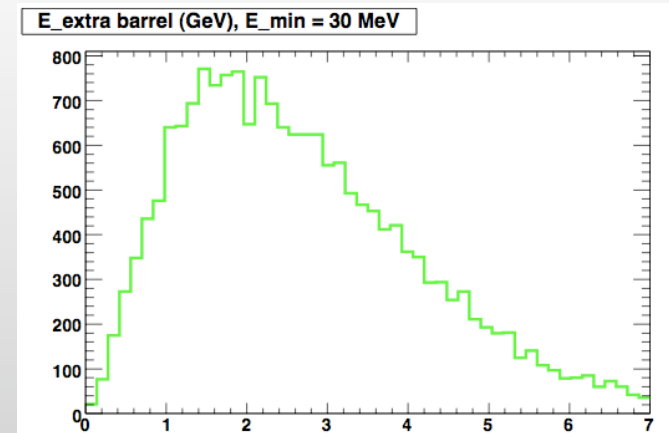
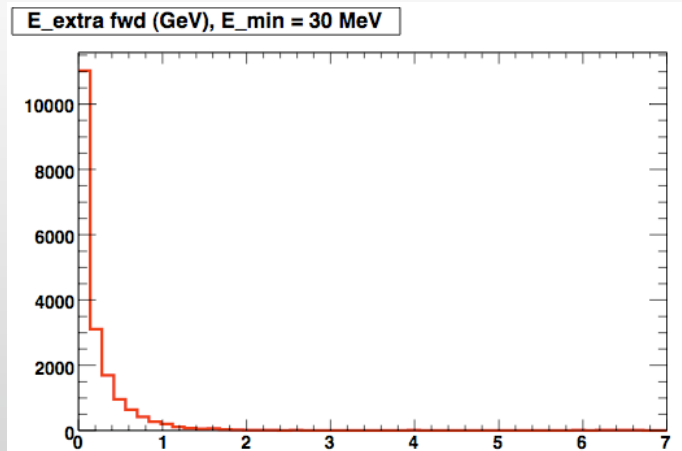


FWD EMC



BARREL EMC

$B^+ B^-$
generic MC





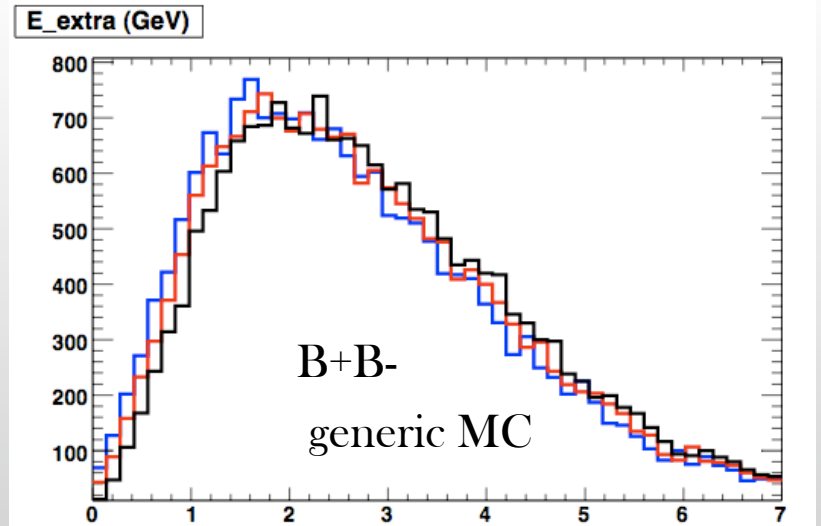
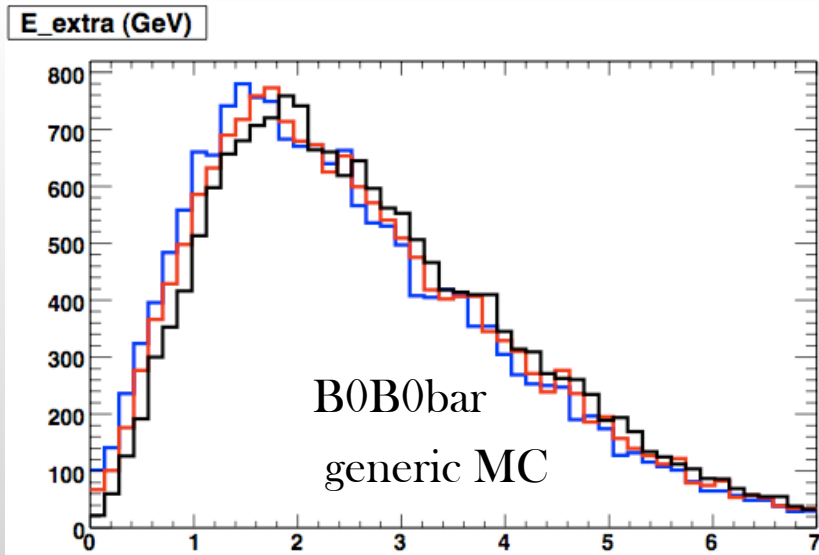
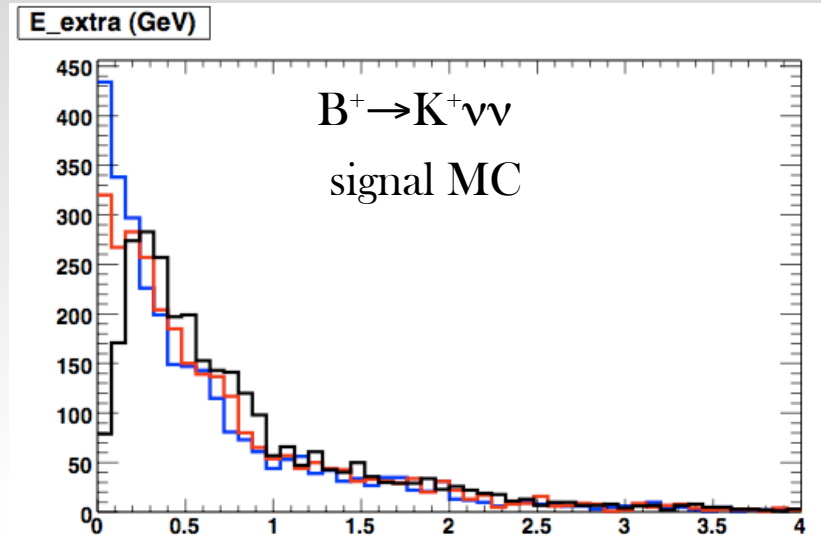
* 100% background

E_{extra} as a function of $E_{\gamma\text{min}}$

$E_{\gamma\text{min}} = 70 \text{ MeV}$

$E_{\gamma\text{min}} = 50 \text{ MeV}$

$E_{\gamma\text{min}} = 30 \text{ MeV}$





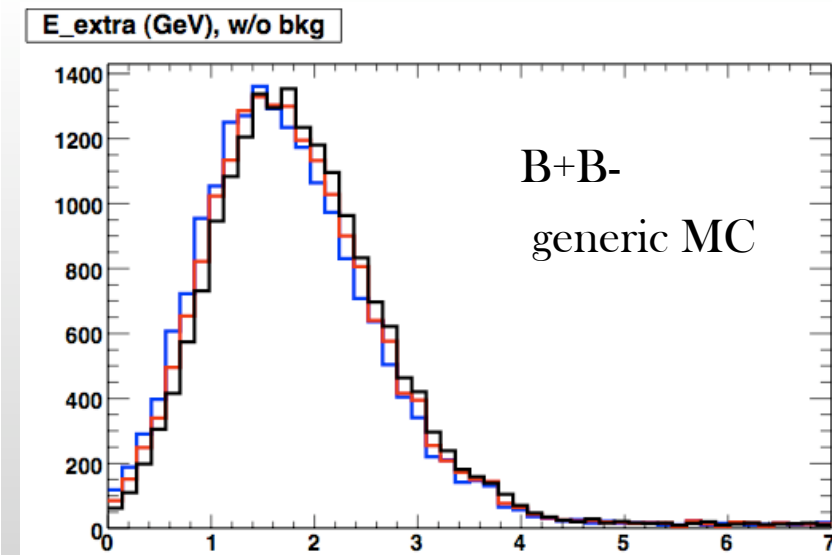
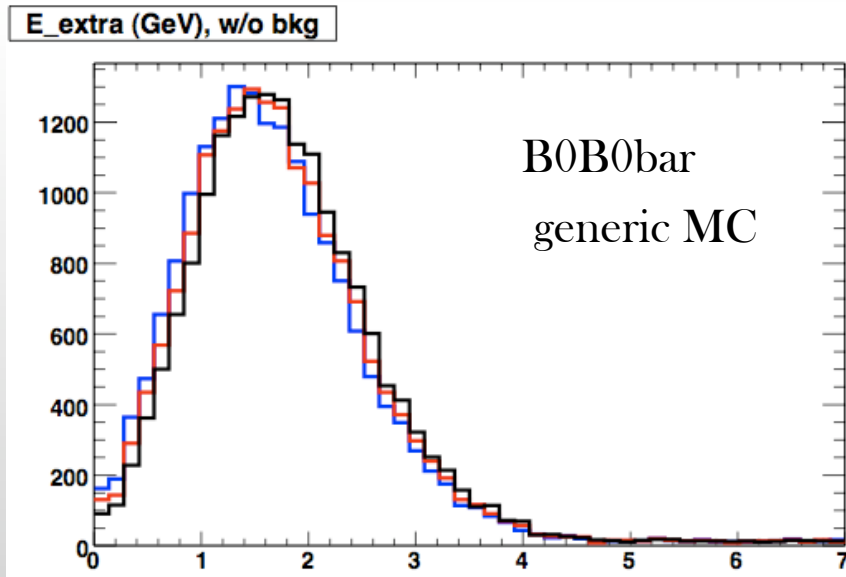
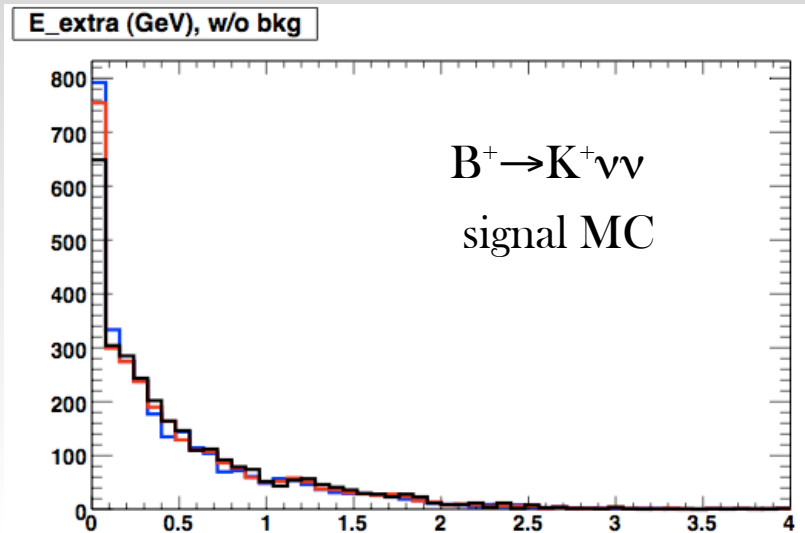
background scaling : -100%

* remove all extra-gammas
not matched

$$E_{\gamma\text{min}} = 70 \text{ MeV}$$

$$E_{\gamma\text{min}} = 50 \text{ MeV}$$

$$E_{\gamma\text{min}} = 30 \text{ MeV}$$





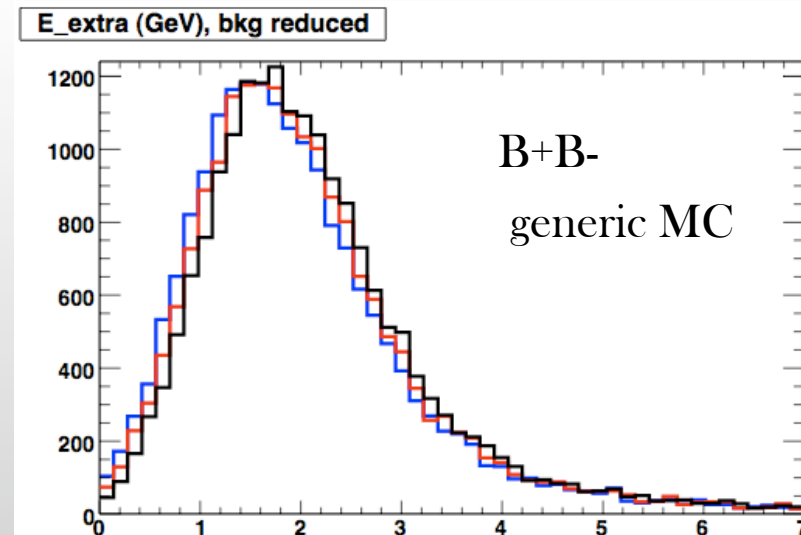
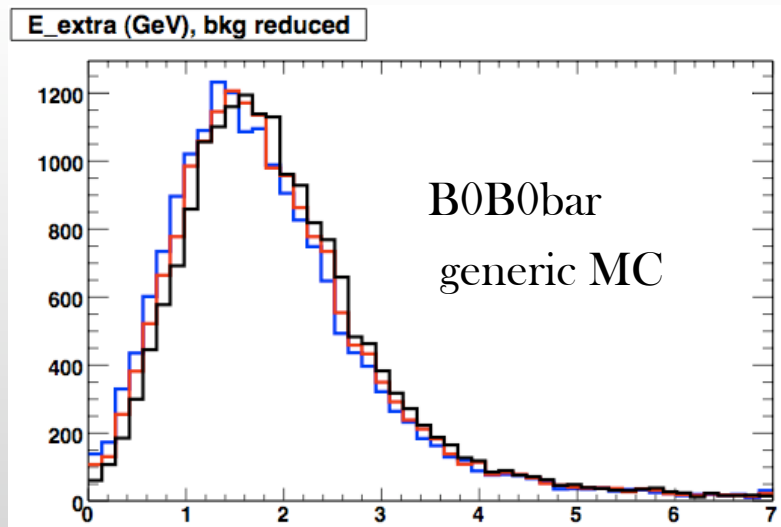
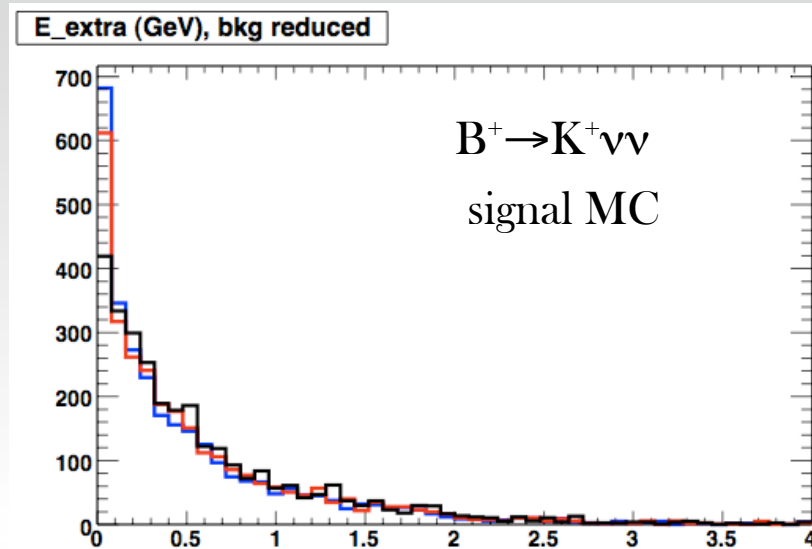
remove 1/4 extra-gammas not matched

background scaling : -75%

$$E_{\gamma\text{min}} = 70 \text{ MeV}$$

$$E_{\gamma\text{min}} = 50 \text{ MeV}$$

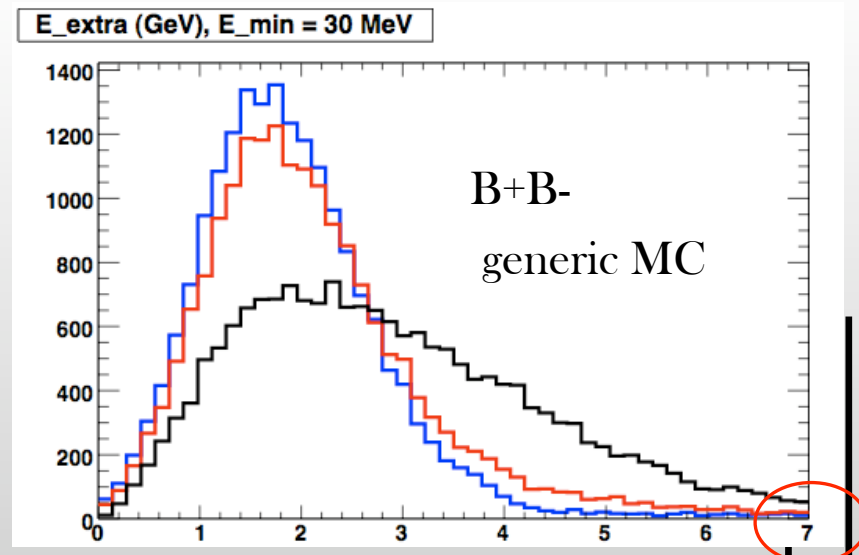
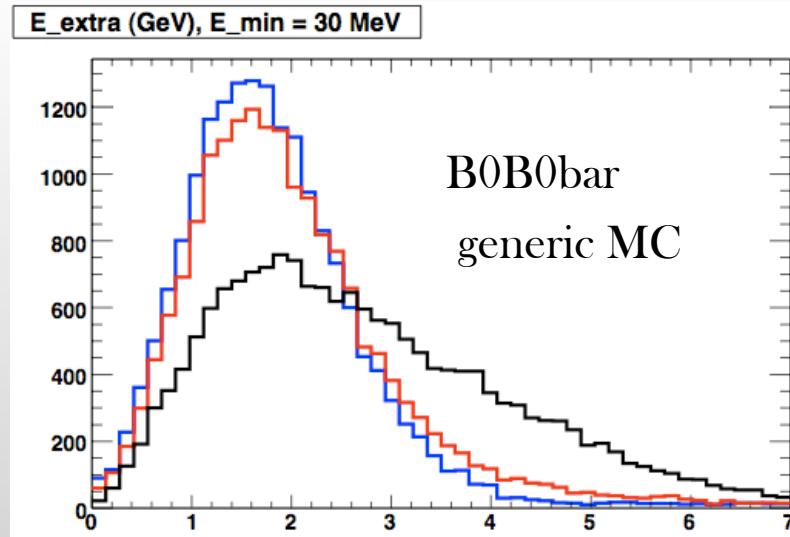
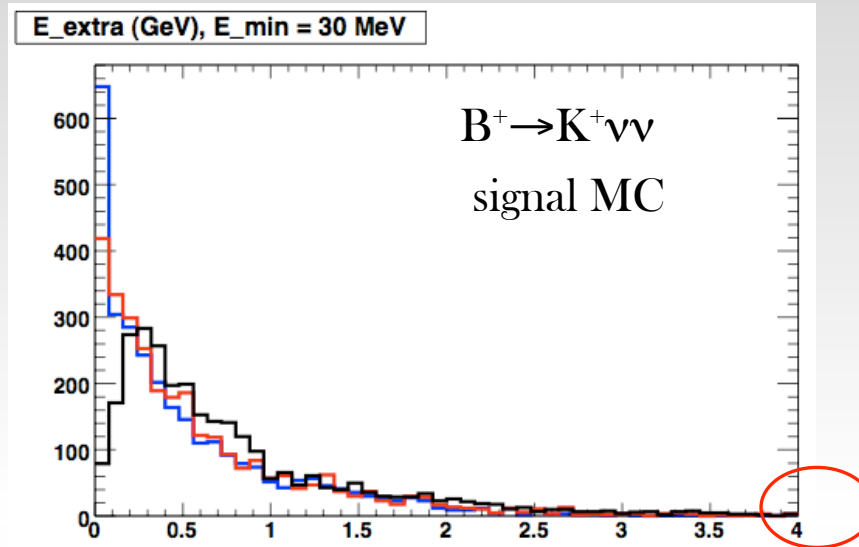
$$E_{\gamma\text{min}} = 30 \text{ MeV}$$





Comparing bkg scenarios: Eextra

w/o bkg
25% bkg
100% bkg





Comparing bkg scenarios: $\gamma \cos\theta_{\text{lab}}$

w/o bkg

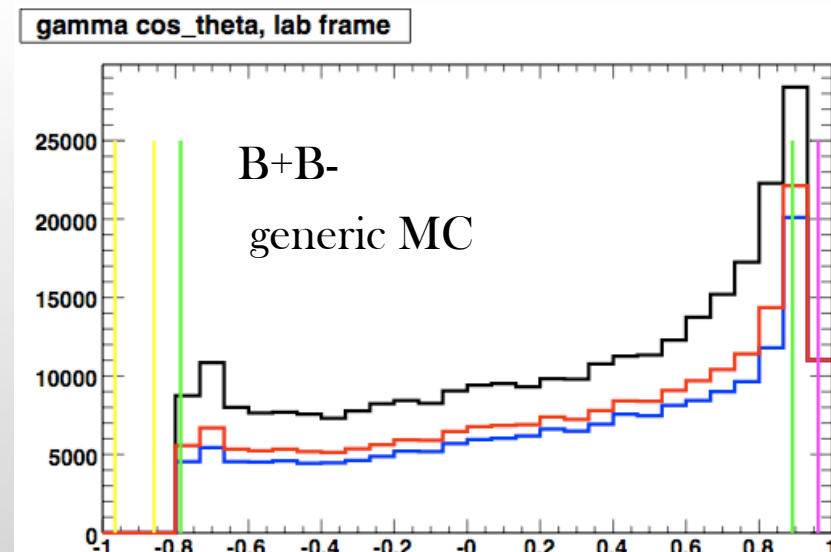
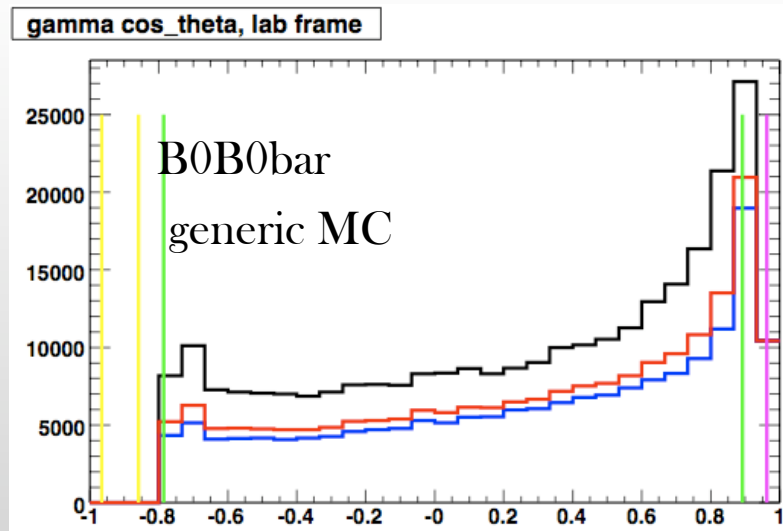
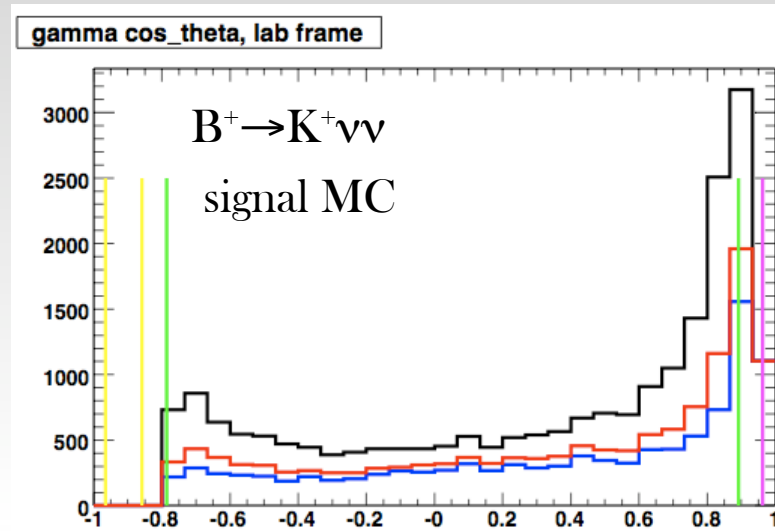
25% bkg

100% bkg

bwd region

barrel region

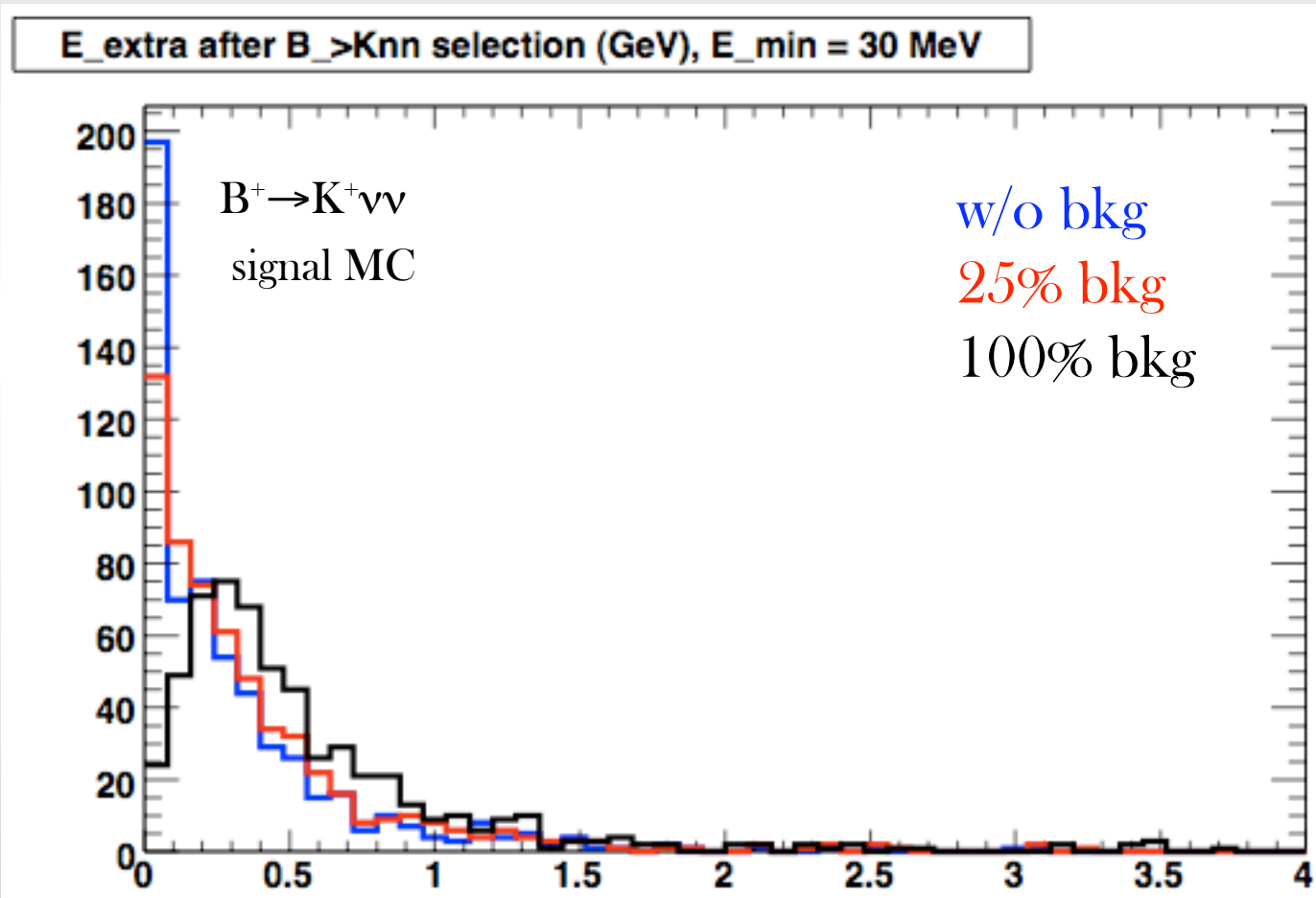
fwd region





Eextra after $B^+ \rightarrow K^+ \nu \nu$ selection

* cut and count selection a-la-BaBar, removing requirements on extra π^0 and Eextra





Conclusions

- * even with 100% background, fwd EMC has the expected shape for signal MC
- * $E_{\gamma\text{min}}$ change E_{extra} shape, cut at 70 MeV make signal MC shape peaky at 0 GeV even with 100% background
- * scaling the number of extra-gamma to 25% of the amount in the nutple, E_{extra} still has peaky shape in signal MC; both in signal and generics E_{extra} range is enlarged: need to properly define a new signal region wrt BaBar
- * further studies with full generic statistics generate with bkg



Back-up slides