FastSim - BaBar FullSim comparison with HAD Breco

Elisa Manoni - INFN PG

2nd Superb Collaboration Meeting – LNF

Physics Session, December 14th 2011

Strategy and samples

- Preliminary study to validate FastSim V0.3.0
- Produce $B \to K^* \nu\nu$ signal MC sample (against HAD Breco) in the BaBar beam and detector configuration with all machine backgrounds
- Compare with BaBar Full Simulation
  - Event reconstruction done with SuperB FastSim PacHadRecoilUser and FullSim BTauNuSemiExclUser packages
- Event counting
  - $B^+ \to K^{*+} \nu\nu$: 2M (FastSim), 7.8M (FullSim)
  - $B^0 \to K^{*0} \nu\nu$: 2M (FastSim), 6.3M (FullSim)
- Compare selection variables distributions

Breco side variables

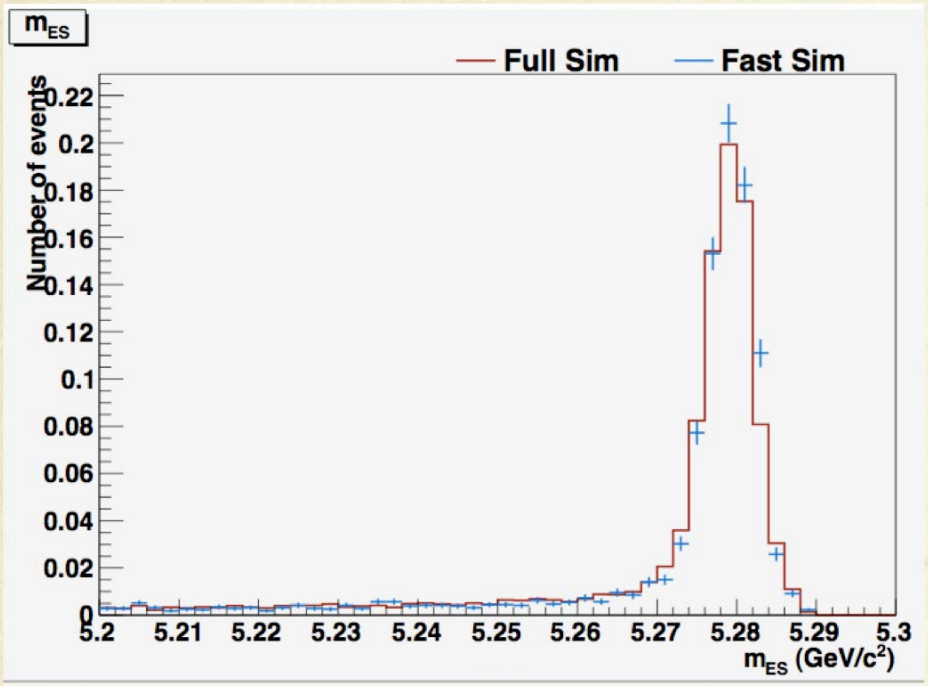
at least 1 Breco

purity > 50%

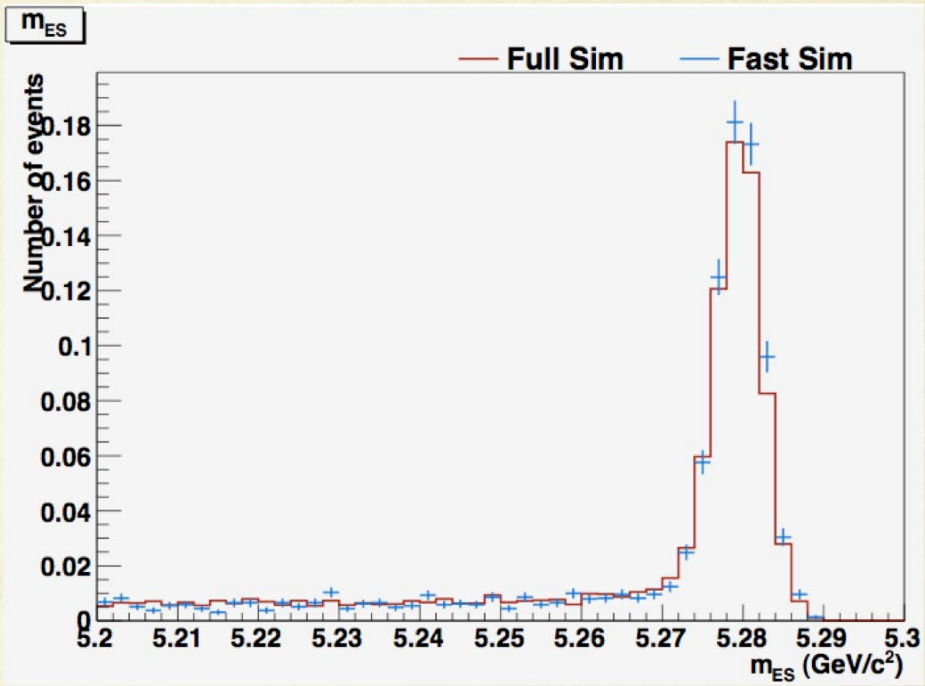
tight K in Breco side

mES

$B^+ \rightarrow K^{*+}\nu\nu$

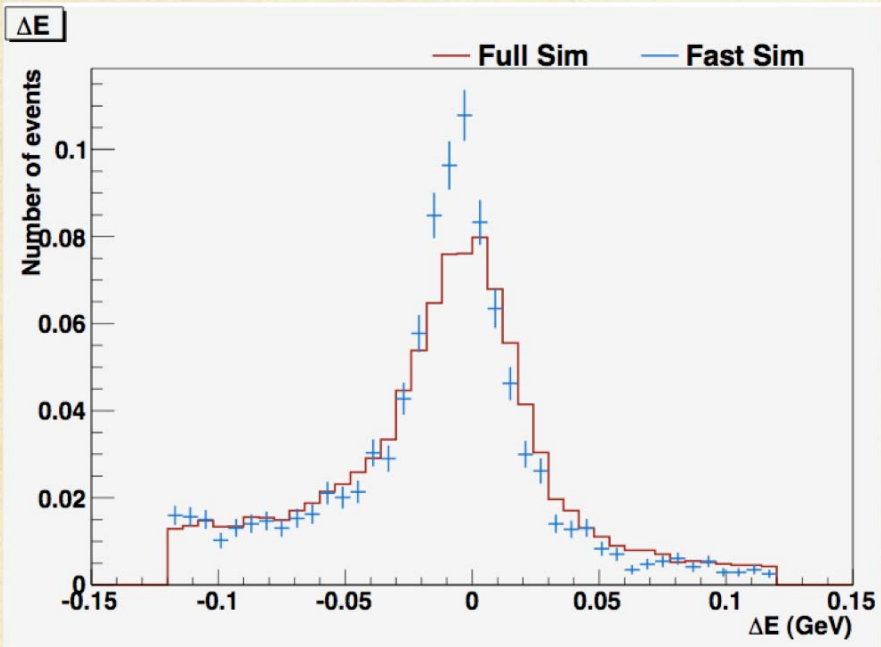


$B^0 \rightarrow K^{*0}\nu\nu$

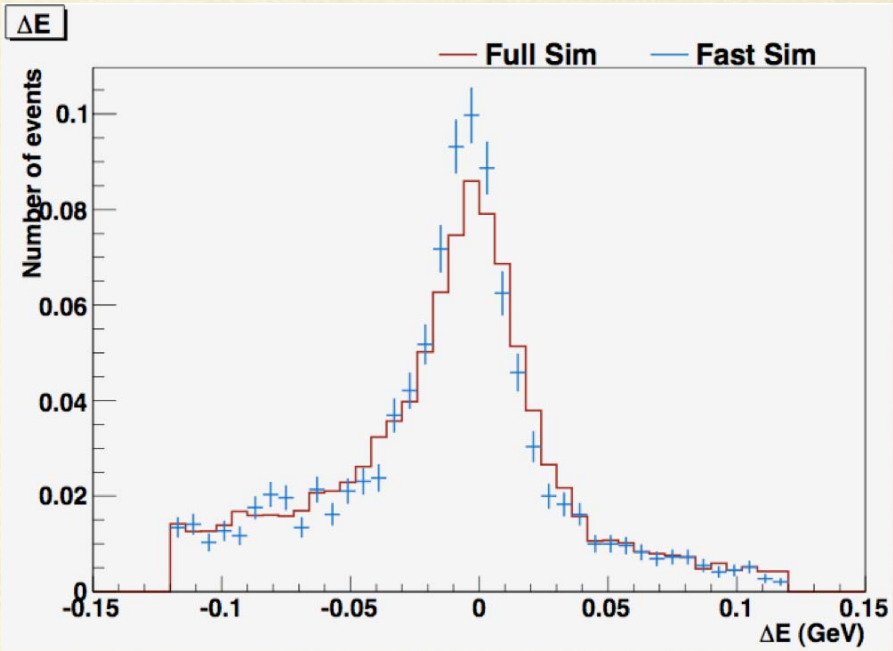


deltaE

$B^+ \rightarrow K^{*+}\nu\nu$



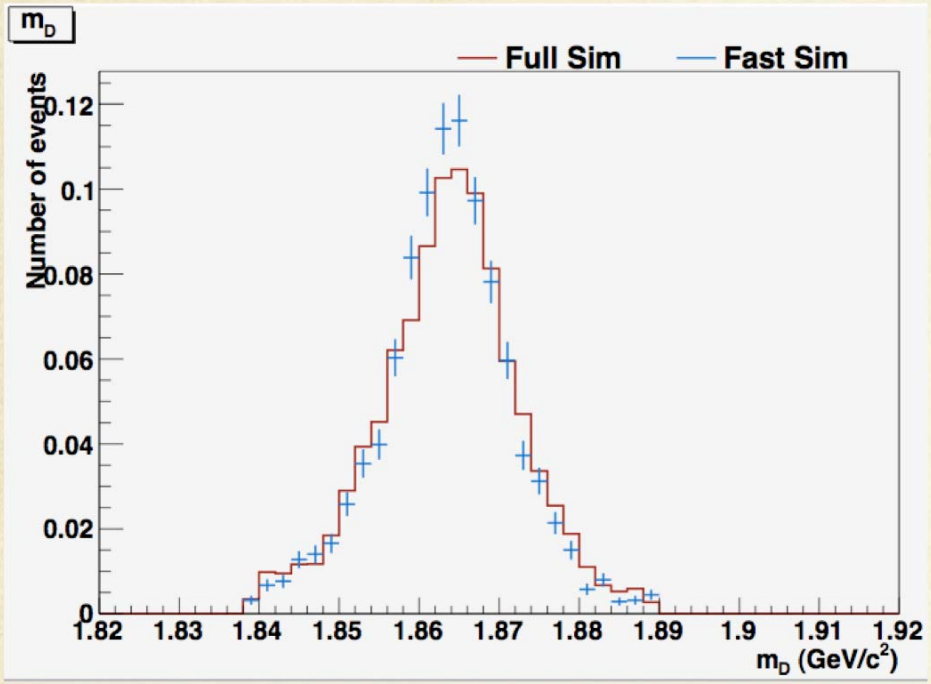
$B^0 \rightarrow K^{*0}\nu\nu$



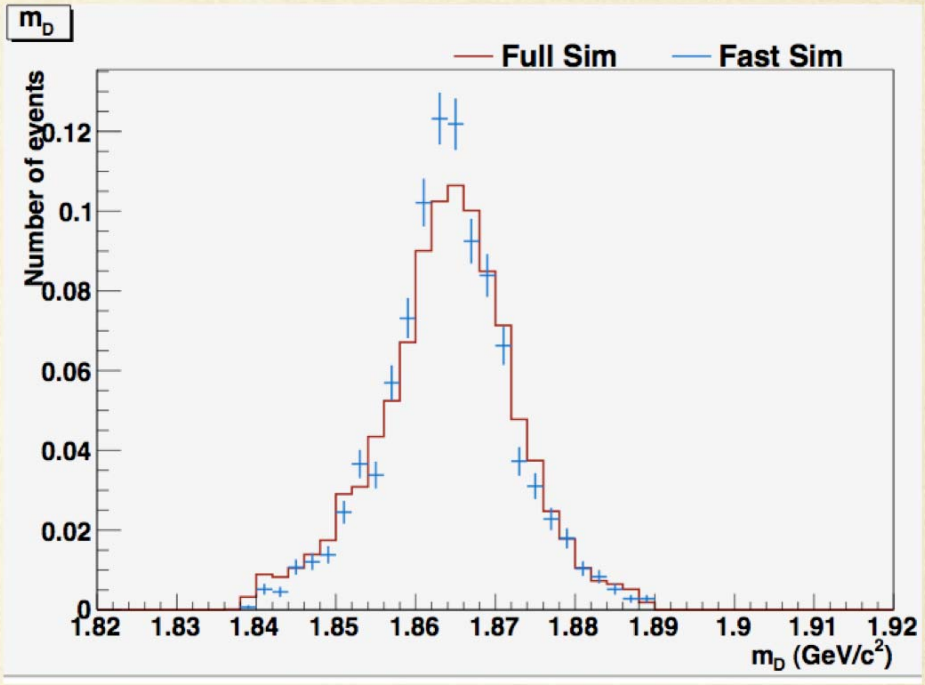
- FastSim distribution narrower wrt FullSim

mD

$B^+ \rightarrow K^{*+}\nu\nu$



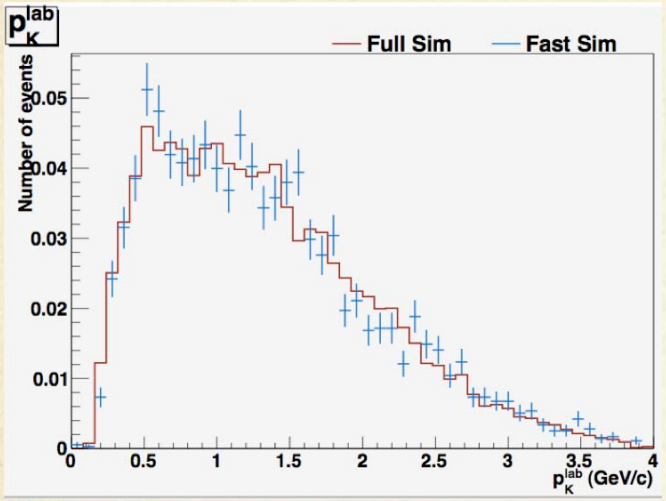
$B^0 \rightarrow K^{*0}\nu\nu$

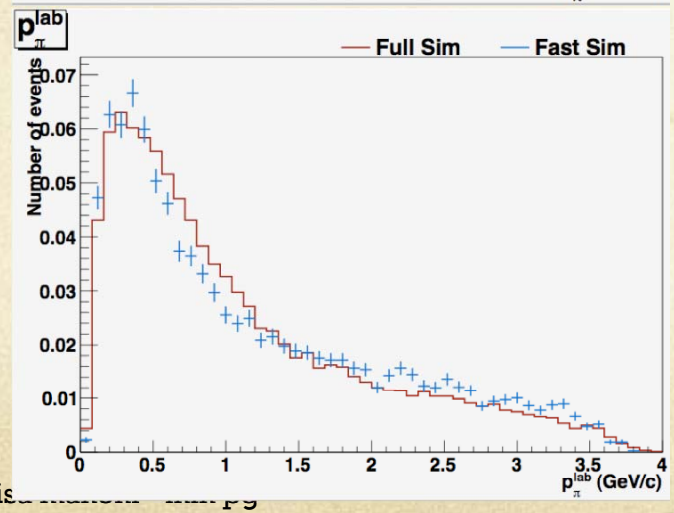


- FastSim distribution slightly narrower wrt FullSim

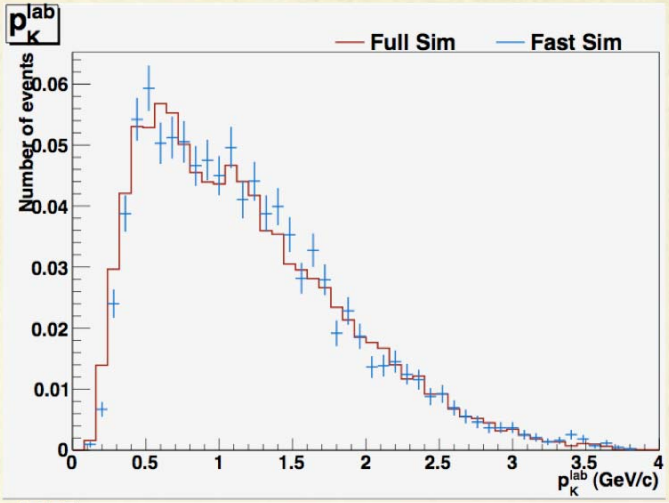
p_K and p_π

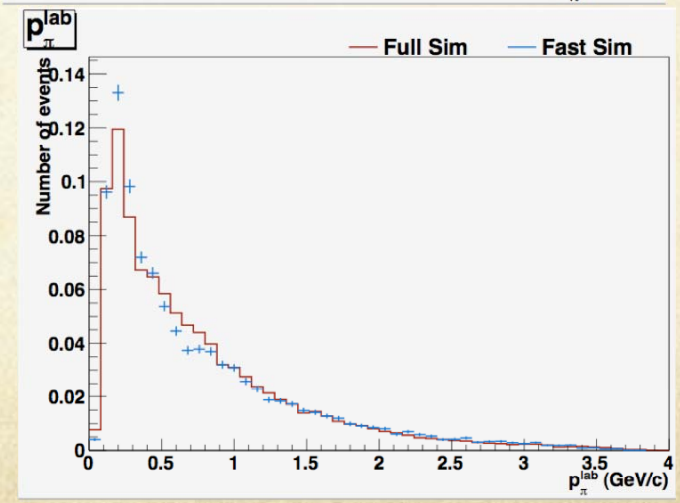
$B^+ \to K^{*+}\nu\nu$





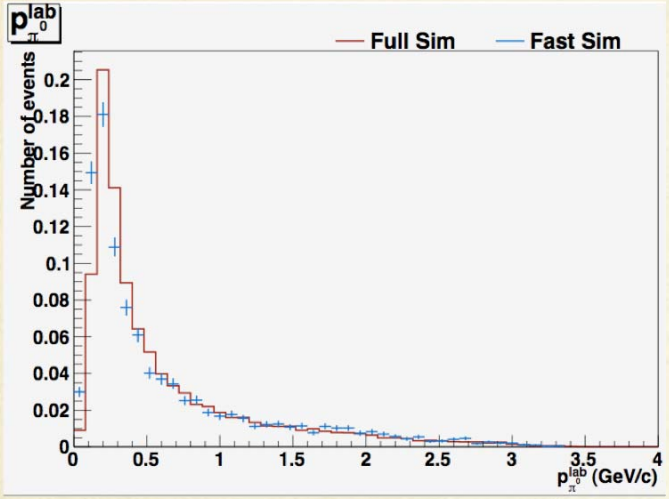
$B^0 \to K^{*0}\nu\nu$



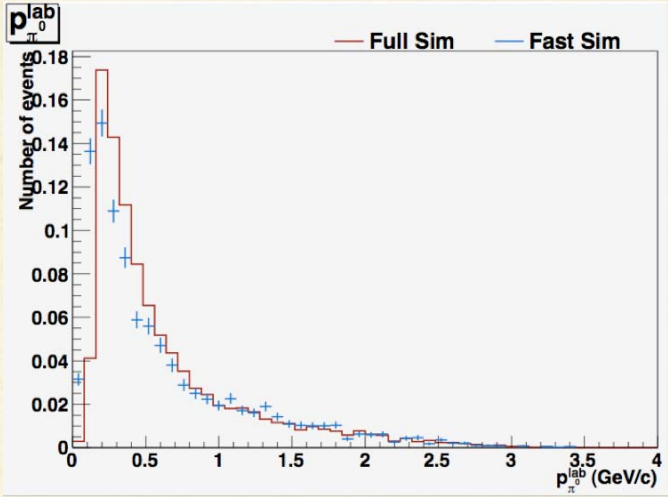


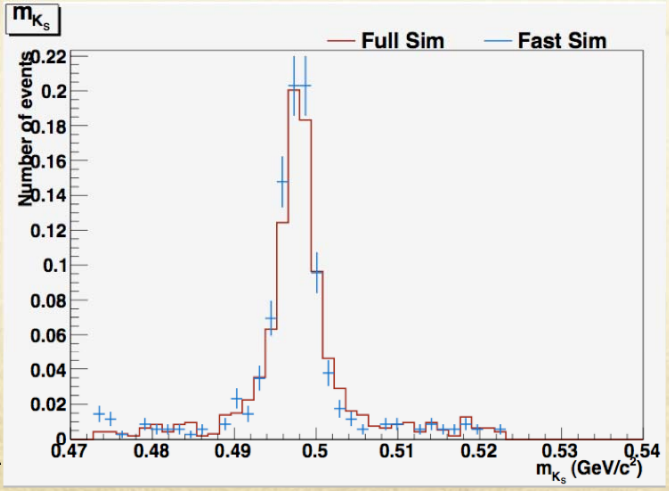
$p_{\pi 0}$ and m_{KS}

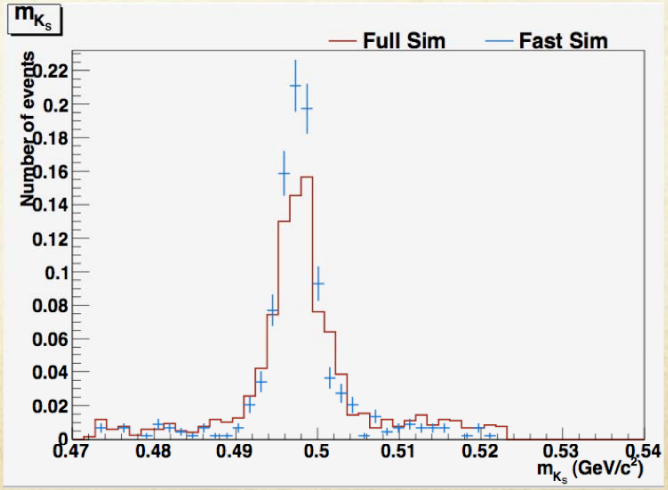
$B^+ \to K^{*+}\nu\nu$



$B^0 \to K^{*0}\nu\nu$

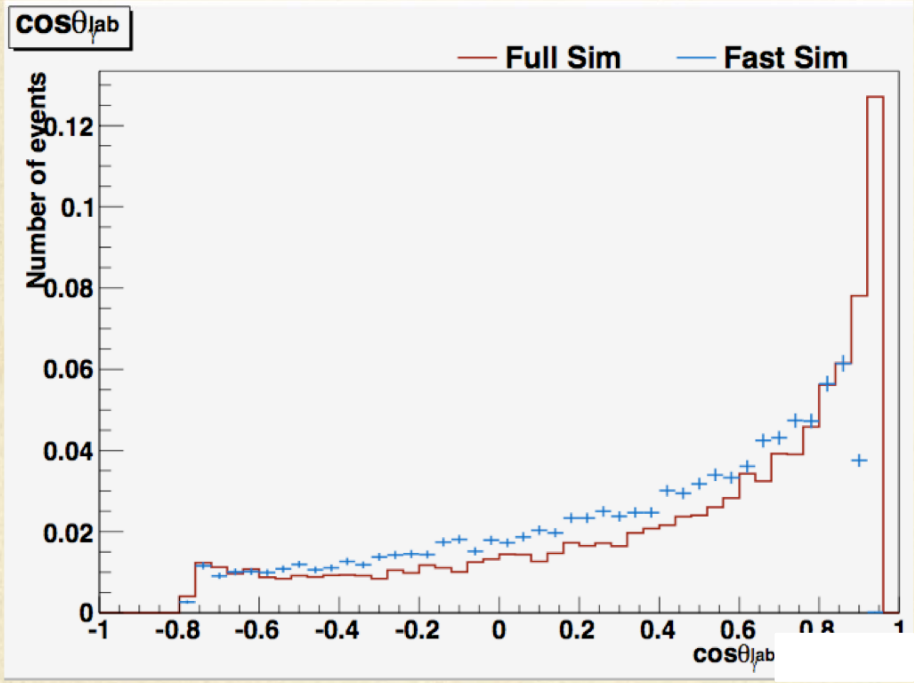


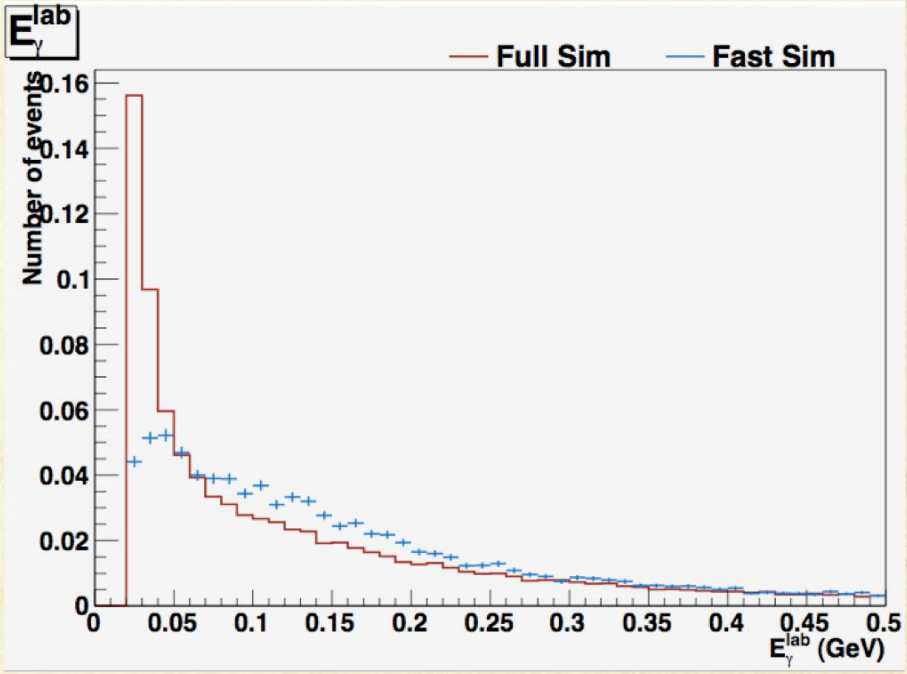




γ Energy and cosθ

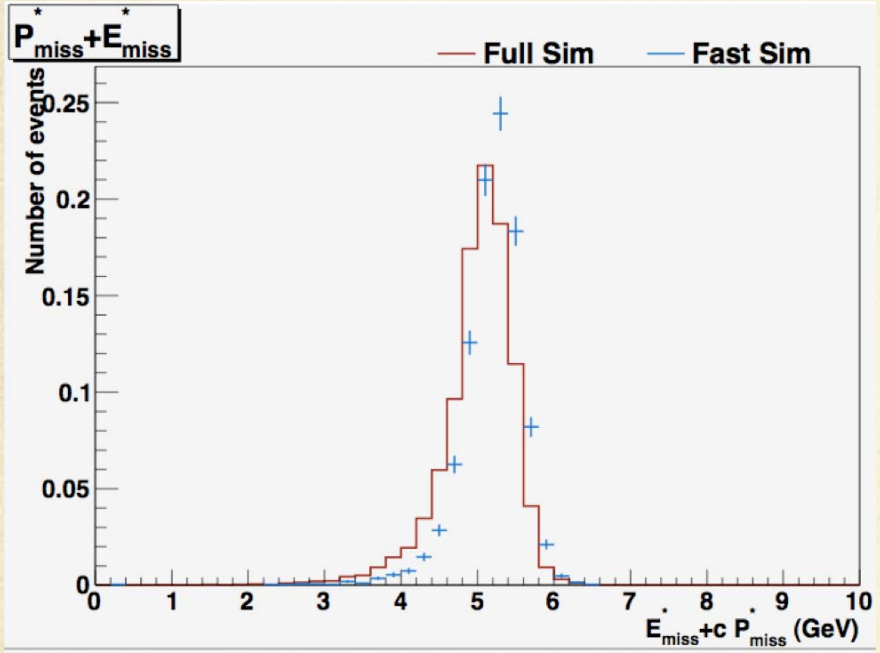
$B^+ \rightarrow K^{*+} \nu\nu$



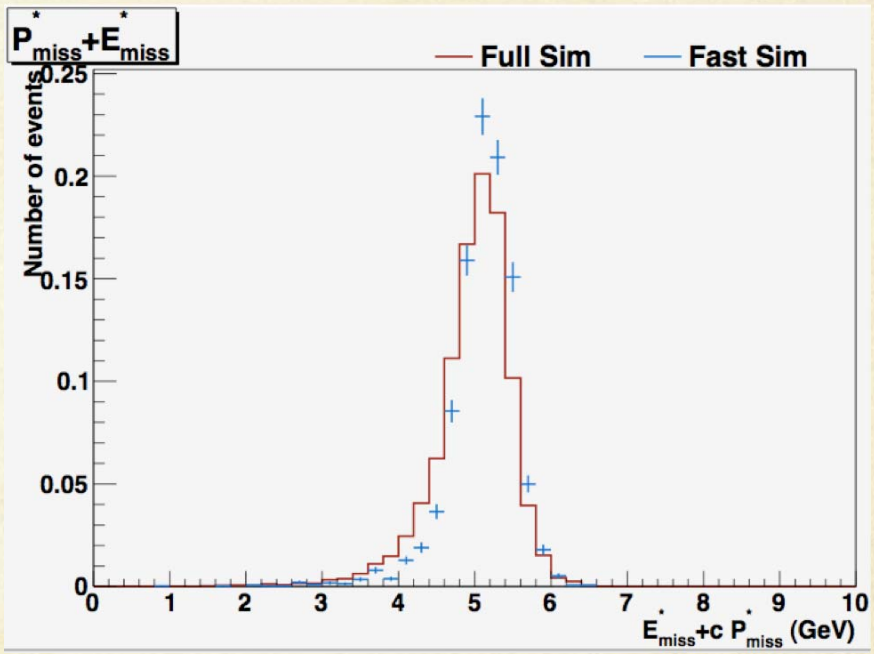


$E_{miss} + p_{miss}$

$B^+ \rightarrow K^{*+}\nu\nu$



$B^0 \rightarrow K^{*0}\nu\nu$



Bsig side variables

m_{ES} >5.27 GeV/c^2 && m_{ES} < 5.288 GeV/c^2

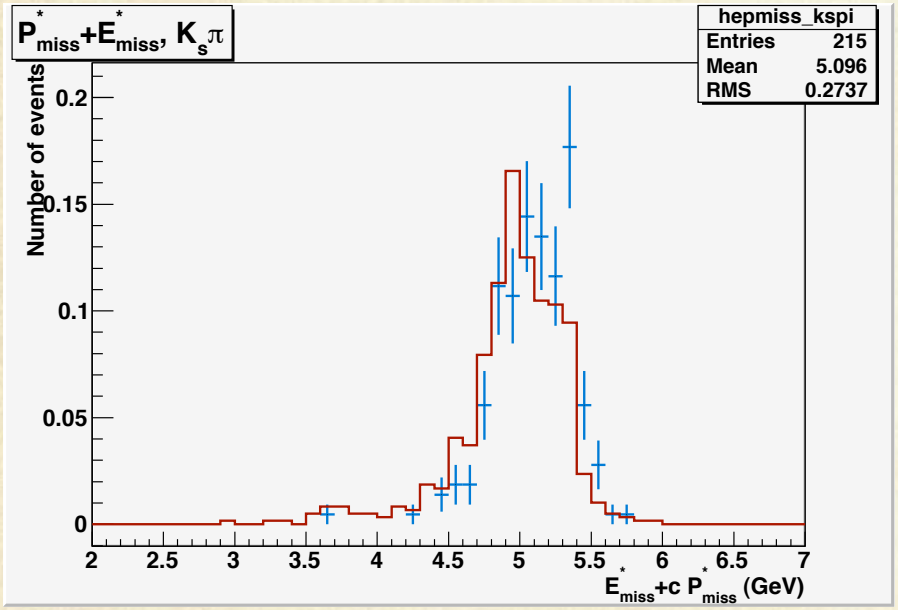
$|\Delta E|$ <0.05 GeV

tight K in B_{sig} side

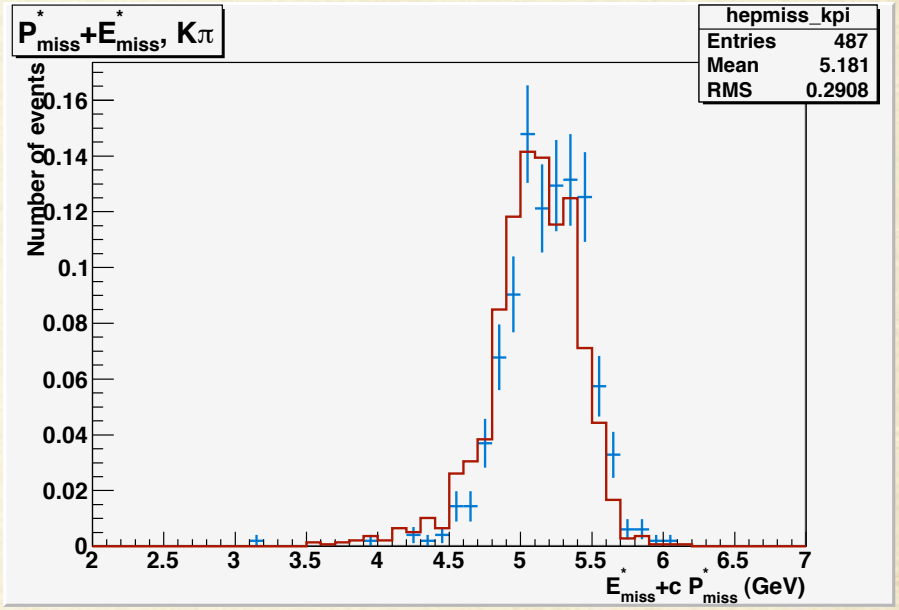
B_{reco} – B_{sig} charge correlation

$E_{miss} + p_{miss}$

$B^+ \rightarrow K^{*+}\nu\nu$

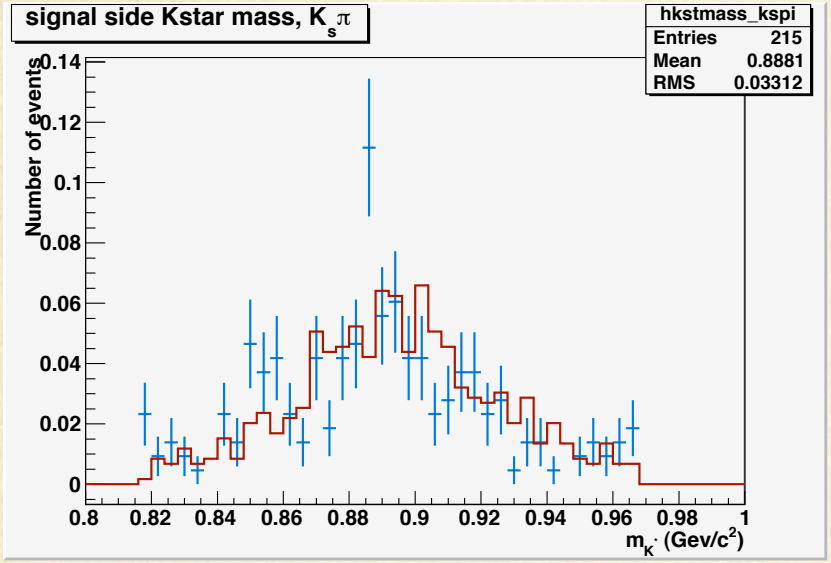


$B^0 \rightarrow K^{*0}\nu\nu$

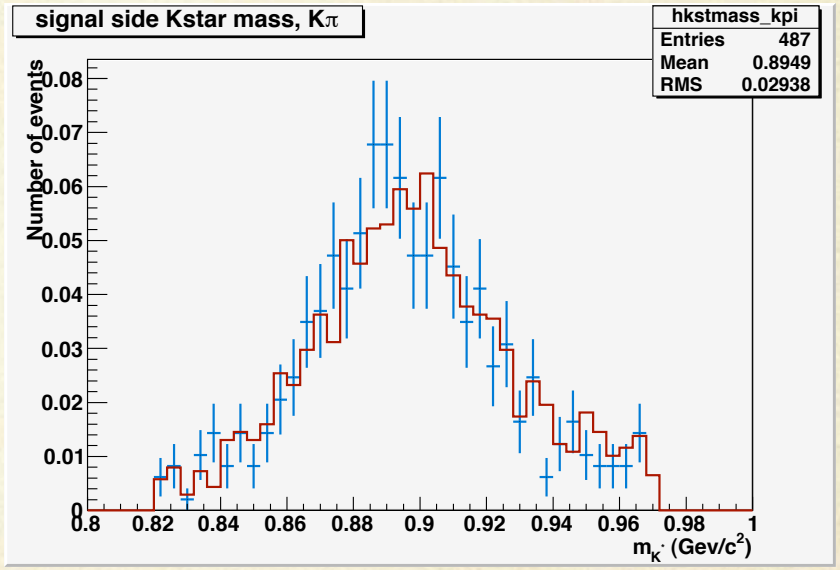


K* mass

$B^+ \rightarrow K^{*+}\nu\nu$



$B^0 \rightarrow K^{*0}\nu\nu$



Conclusions

- FastSim V0.3.0 w some bug fixes validated
- $B \to K^* \nu\nu$ signal MC sample in DG_BaBar configuration with all machine bkg produced
- Recosntruction performed with HAD recoil package
- FastSim sample compared toBaBar Full Sim
- Some disagreement in
  - ΔE, m_D distributions: FastSim shapes narrower wrt FullSim ones
  - Photon reconstruction: probably due to machine bkg
  - Missing energy: need further investigazion
- Next steps: mode-by-mode study on generic BB, efficiency comparison