$B^0 \rightarrow \pi^+\pi^-$

Kolja Prothmann
Christian Kiesling
Jeremy Dalseno

- Signal MC
  - Generation
  - Simulation
  - Reconstruction
- Skims

- using evtgen
- decay file:
  - B0 → $\pi^+\pi^-$
  - B0 → generic (b → c)

Added and final state radiation

```
#
# B0->pi+ pi-
#
#
Decay MyB0
1.000   pi+ pi-   PHOTOS SSS_CP alpha dm 1 1.0 0.0 1.0 0.0;
Enddecay
CDecay Myanti-B0
```

- 1M events
  - distributed according to the luminosity of the experiments (7-65)

- Standard simulation toolchain in BASF (gsim)
- Parameters
  - BELLE_LEVEL
  - ADDBG_DAT
  - bpsmear
  - GSIM_INPUT
- USE_GRAND_REPROCESS_DATA
  - use the new tracking

- Variables for CP-analysis:
  - ΔE
  - M_{bc}
  - $L_{BB/qq}$
  - $L_{K/\pi}(\pi^+)$
  - $L_{K/\pi}(\pi^-)$
  - Δt
  - q (B-tag)
  - 7 r-bins (l) (r is goodness of B-tag)

green: reconstructed/ histograms avail.

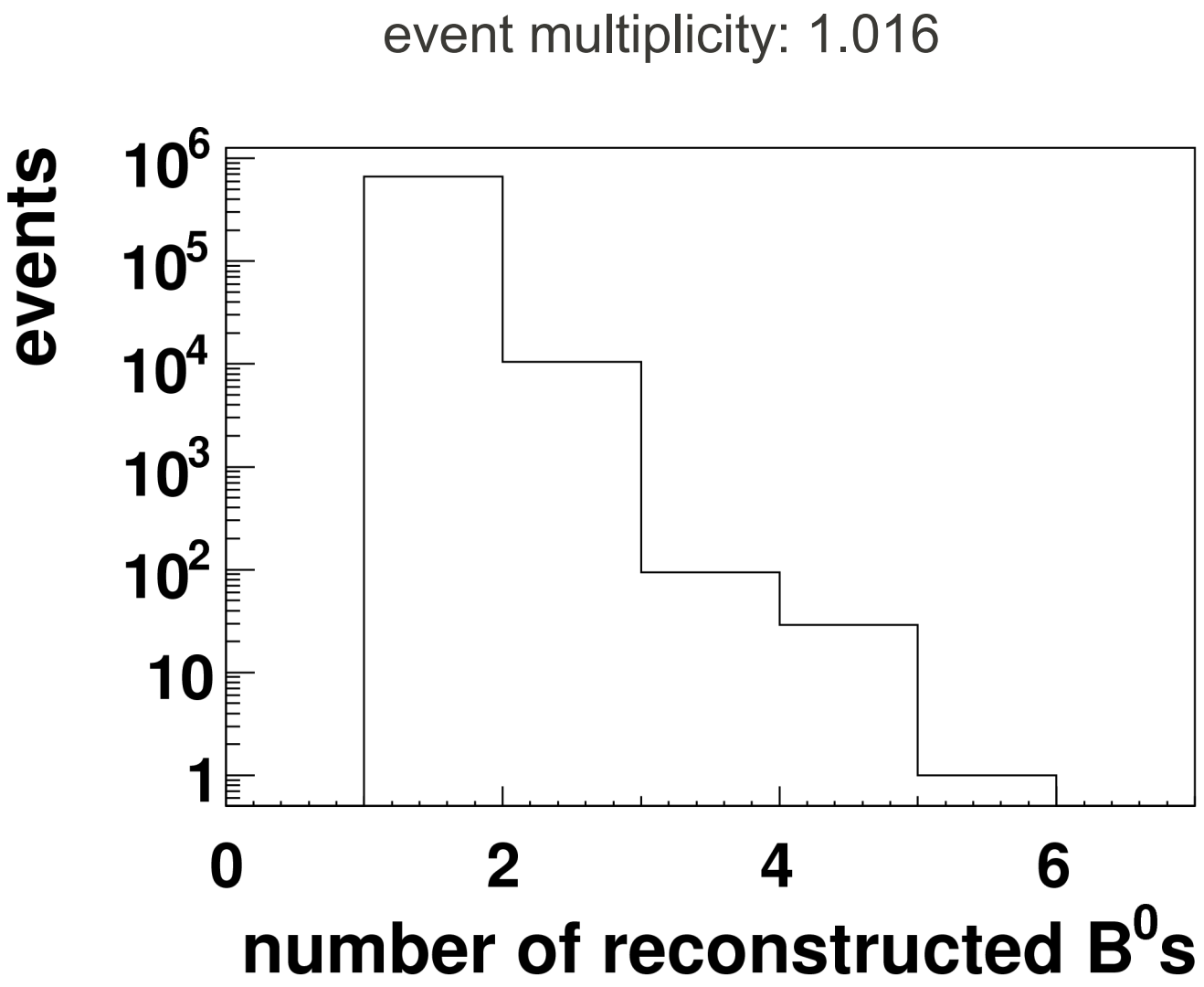
red: work in progress

- veto electrons (see Ishino-san)
  - eid.prob(3, -1, 5) < 0.9
  - no TOF information used
- veto protons
  - proton_pion_id < 0.9
  - no TOF information used
- B0 mass precut 4.0 < m(B0) < 6.0
- track selection criterion
  - dR < 0.4 cm && dZ < 4.0 cm
  - R-Φ-hits >= 1 and Z-hits >= 2
- analysis window
  - 5.2 < M_BC < 5.3
  - -0.15 < dE < 0.15

reconstruction efficiency:
(72% svd1 + svd2)

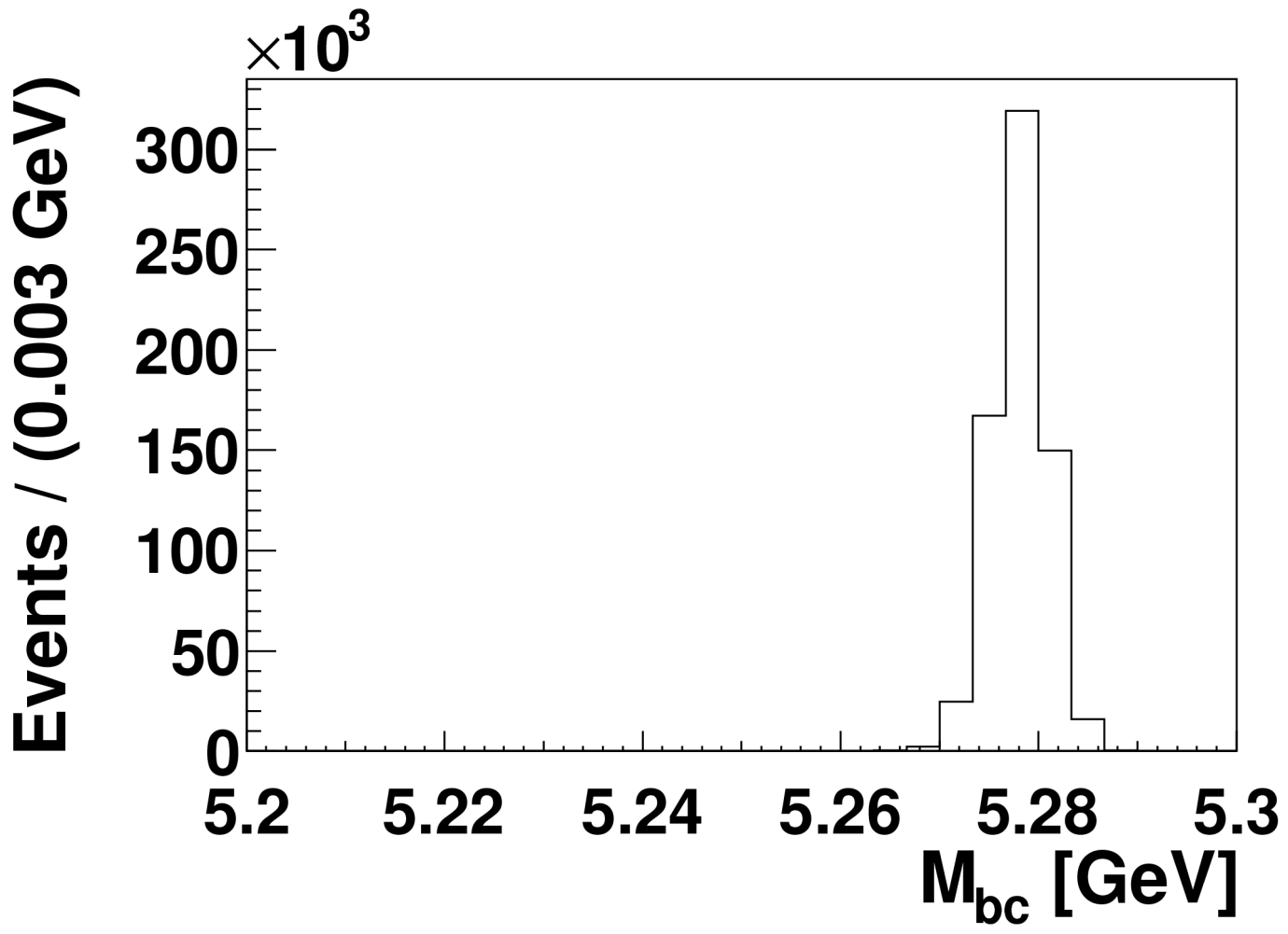
Crosscheck with Jeremy Dalseno: agreement within float precision for every event!!!

Signal MC all experiments

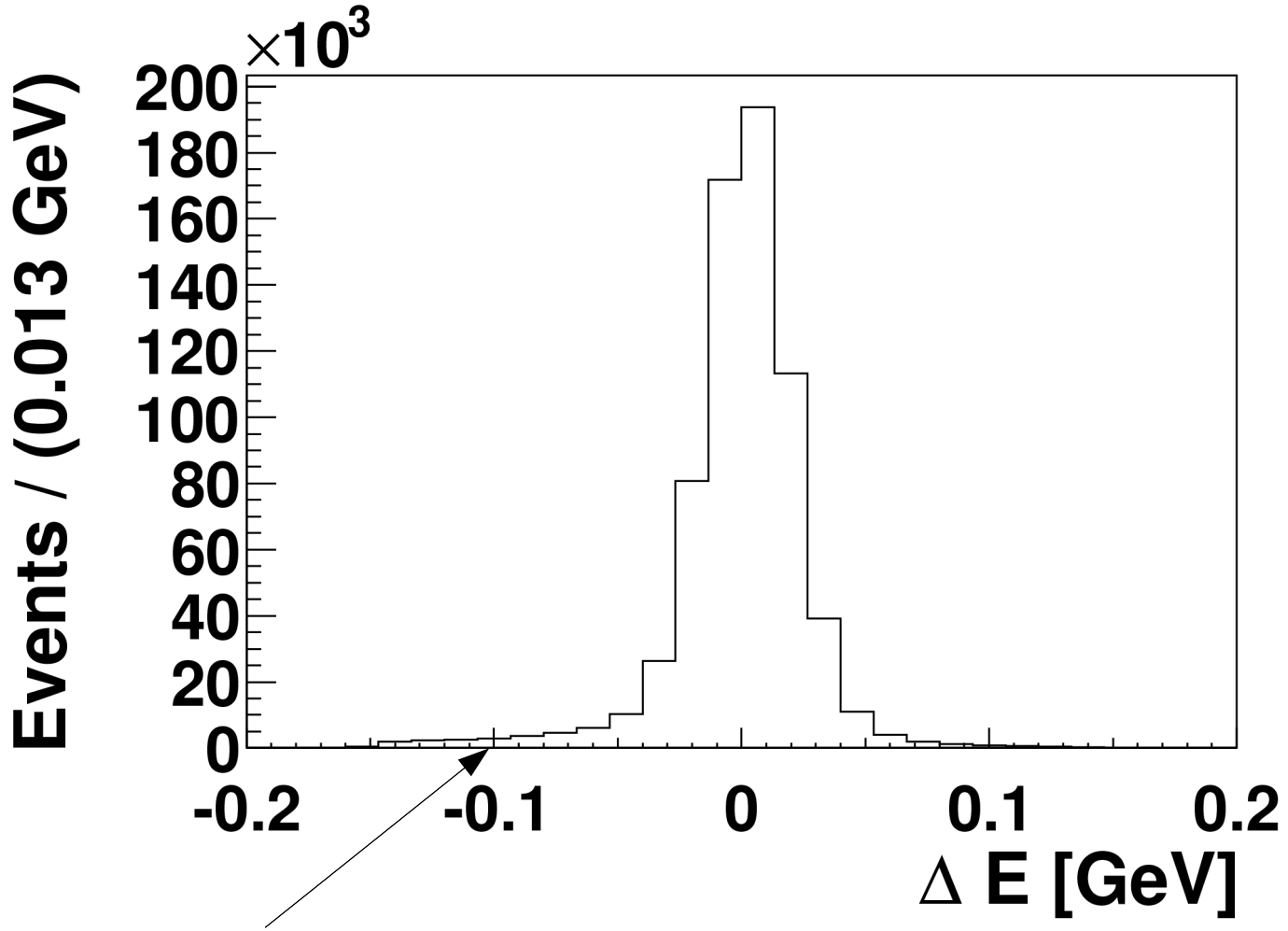


Best B selection: First one in the List!

Signal MC all experiments

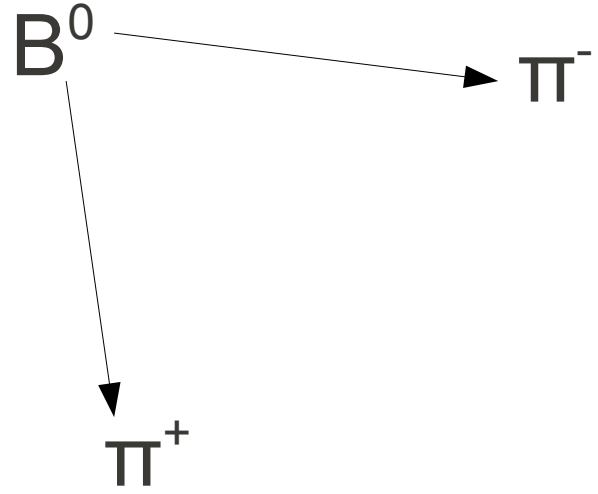


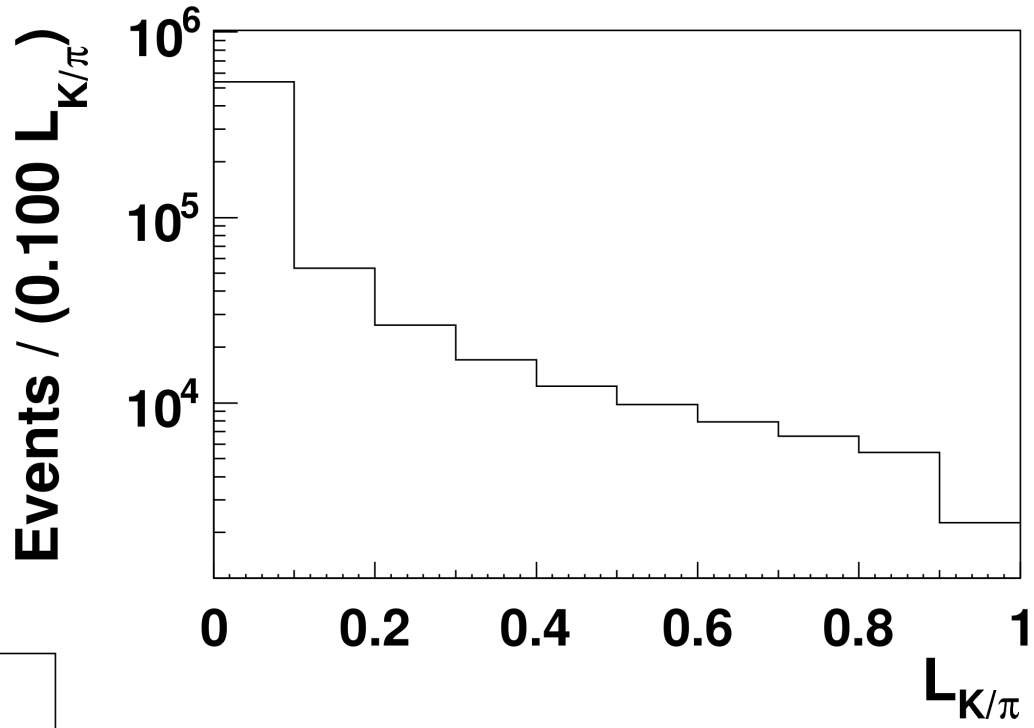
Signal MC all experiments

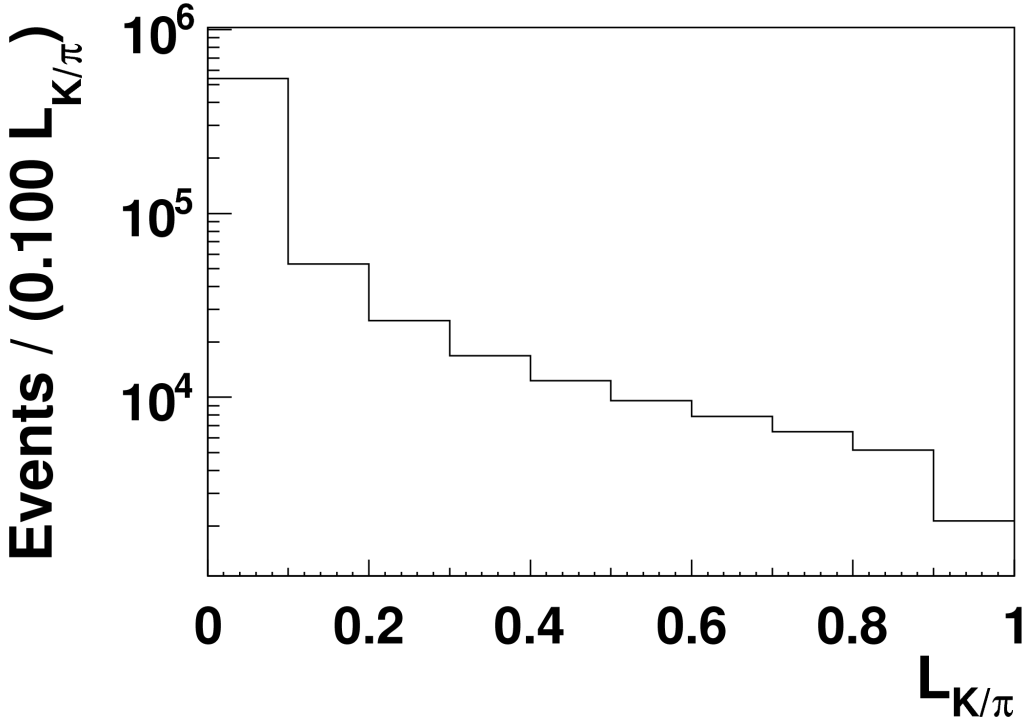


Radiative tails can be seen now

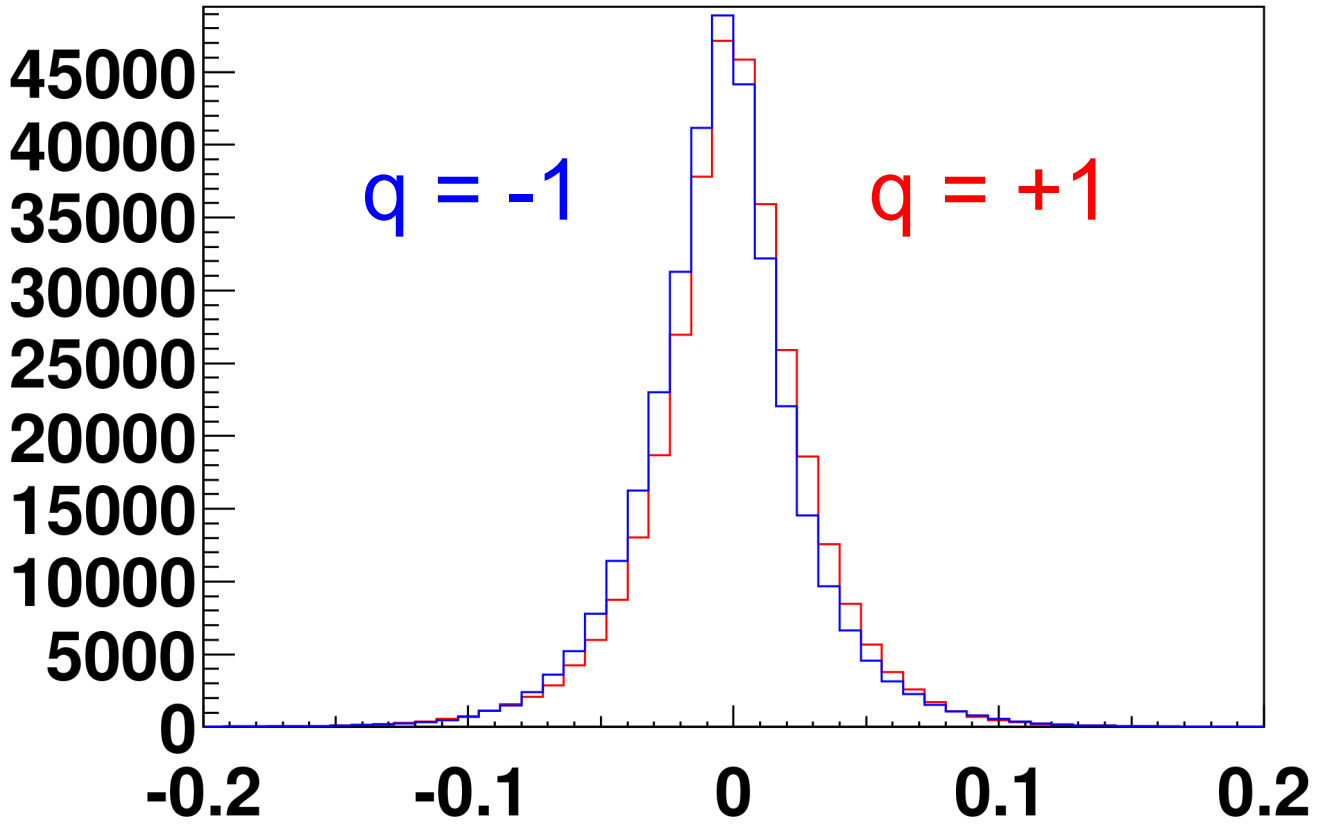
Signal MC all experiments



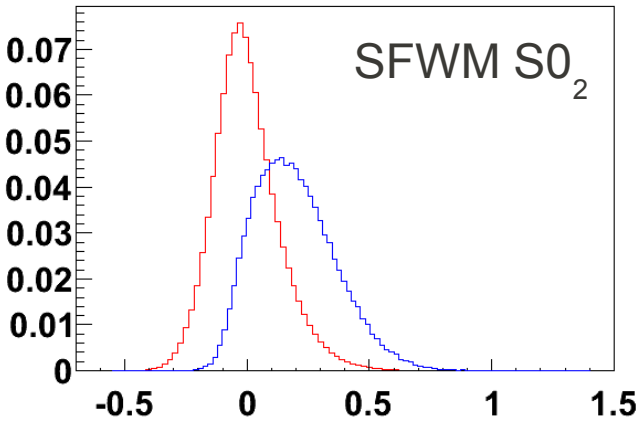


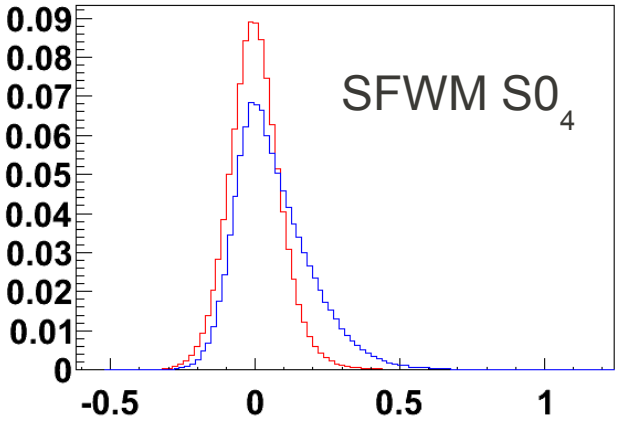


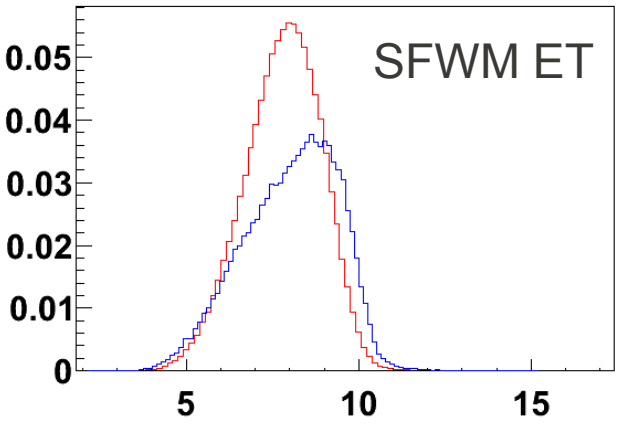
Signal MC all experiments



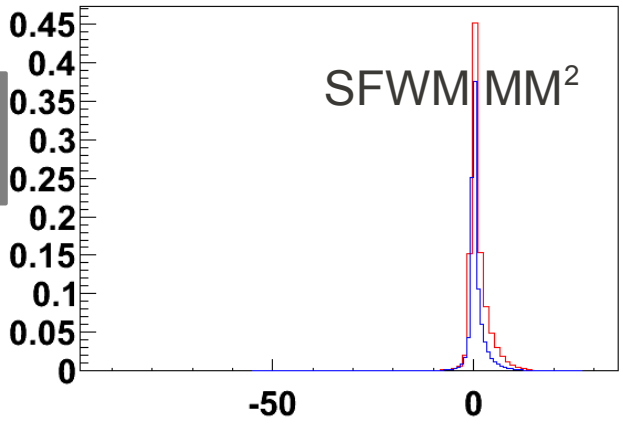
- Skim (hhskim)
  - On-resonance - finished
  - Off-resonance - finished
- Nakao-san rooKSFW discriminant
- Try out other methods:
  - TMVA: fisher discriminant
  - TMVA: neural network
  - TMVA: boosted decision tree







Off-resonance
Signal MC



Backup