

EM Regeneration Analysis Update

- Review
- Conventional Monte Carlo
- Monte Carlo with EM-Regeneration Effect
- New data crunch
- Next Steps

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March 12th, 2005.

EM Regeneration Running Conditions

Near the end of KTEV 99, we performed a few special runs in which the last sweeping magnet before the decay volume (NM3S) was alternately turned OFF and ON.

In the ON setting, NM3S was turned to its maximum value.

The MA and REG were out of the beam.

TRD was IN

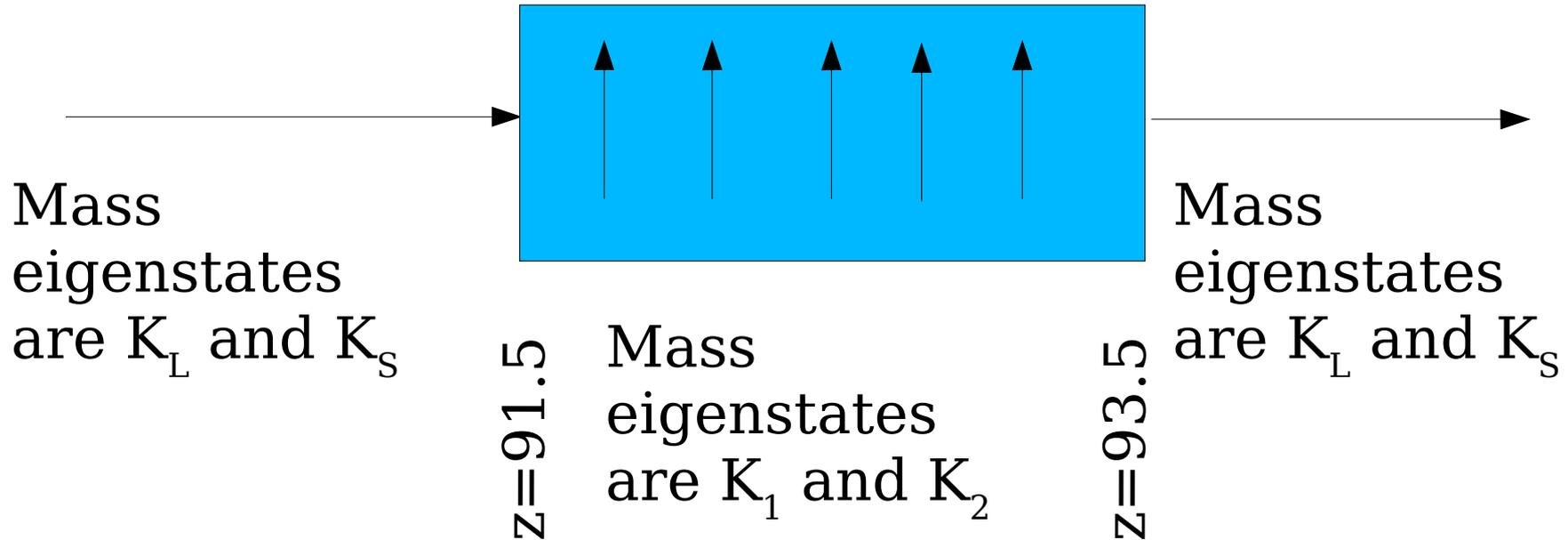
E799 Final Collimators (i.e. Big Beams)

E832 Trigger Definitions

Selected $2\pi^0$ from trigger bit 4: 4 HCC clusters

The idea is to see if an EM field restores CP symmetry

Transverse B-field of NM3S



So we try to see what would happen if the target K^0 ($\overline{K^0}$) briefly time-evolved differently within NM3S.

We assume $\Gamma_L = \Gamma_2$ and $\Gamma_S = \Gamma_1$

Monte Carlo Update

Encounter some difficulties due to strange running conditions

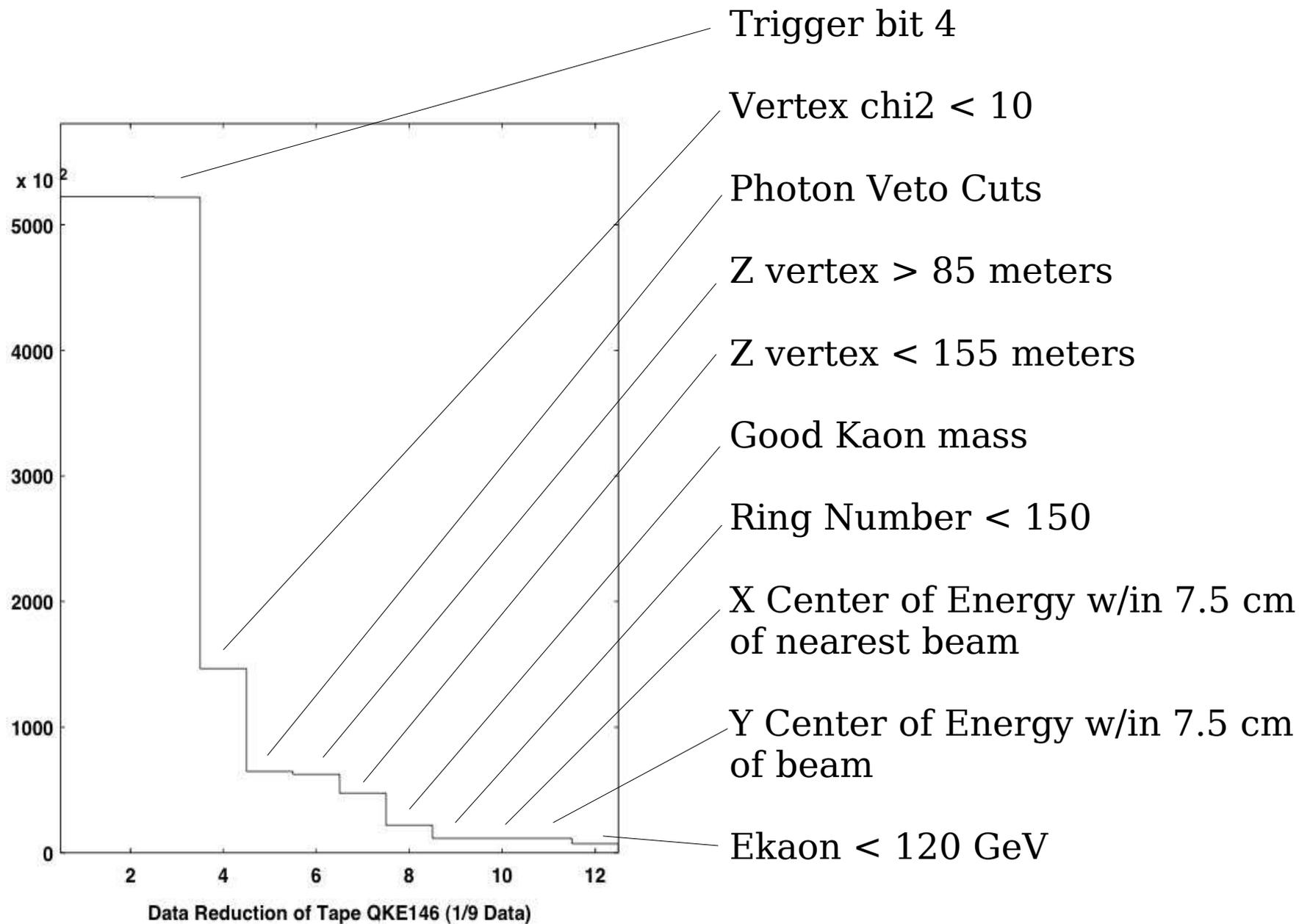
MC with no EM-Regen effect:

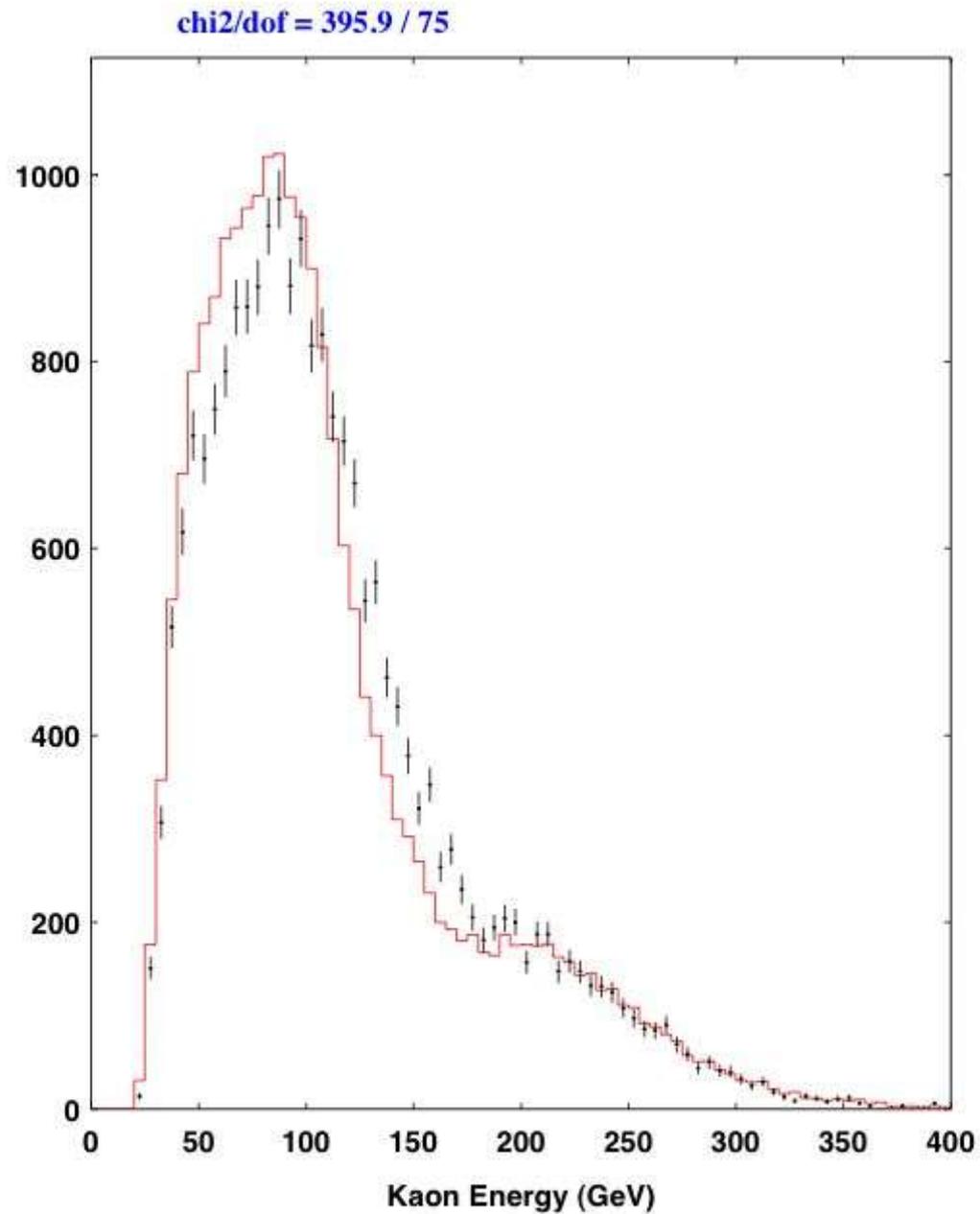
- E799 Monte Carlo (to get the right sized beam)
- E799 Trigger 13 (ET min-bias)
- **Having difficulties generating decays upstream of final collimator.**

MC with EM-Regen effect:

- Same as above
- Depends on B^*, E^* (* Kaon rest frame)
- Modified wavefunction evolution (routine "kev799")
- Decays inside NM3S not yet implemented.

Approximate Data Yield: 65K $2\pi^0$



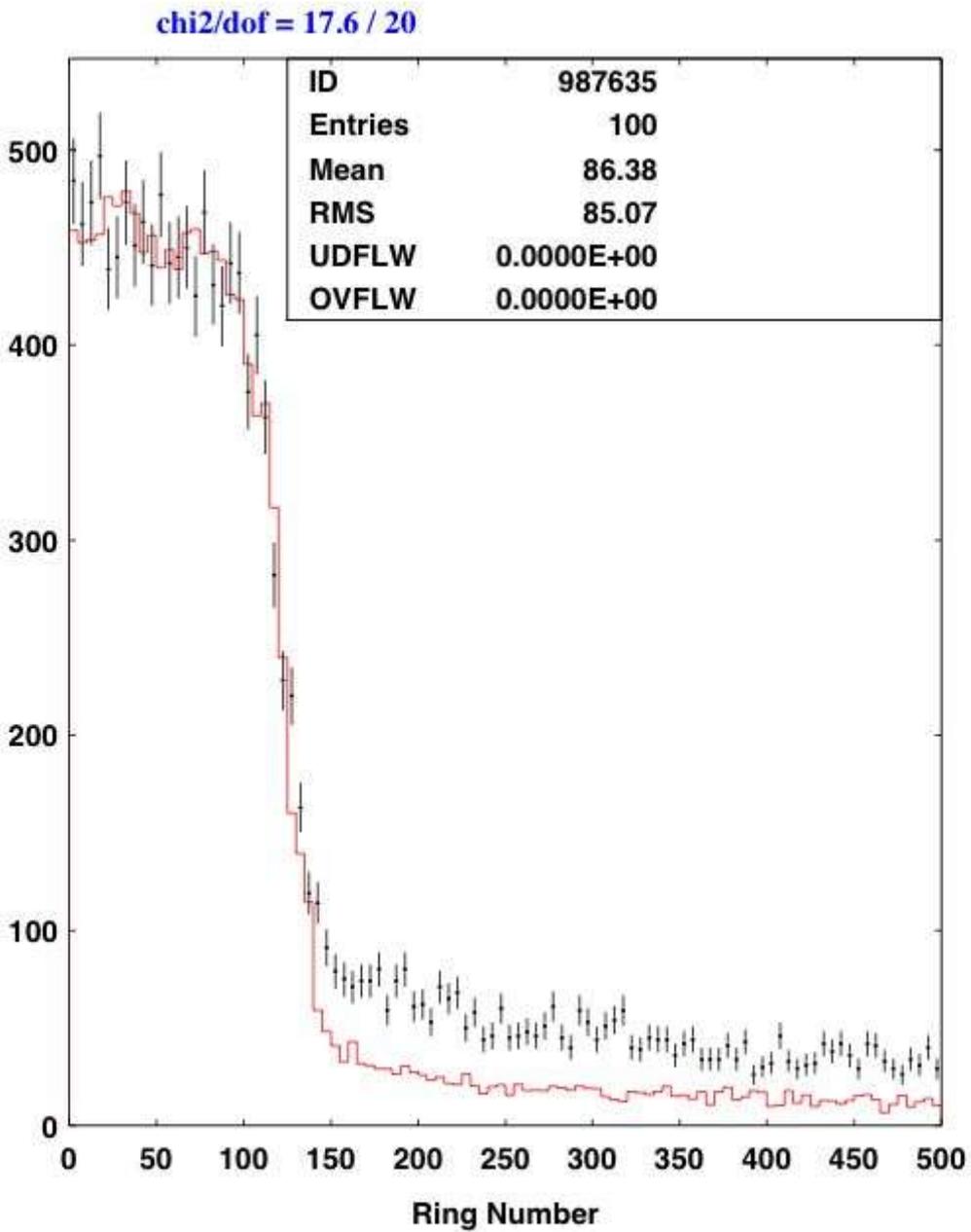


Normal MC

versus

1/9 Data

(ON and OFF Combined)



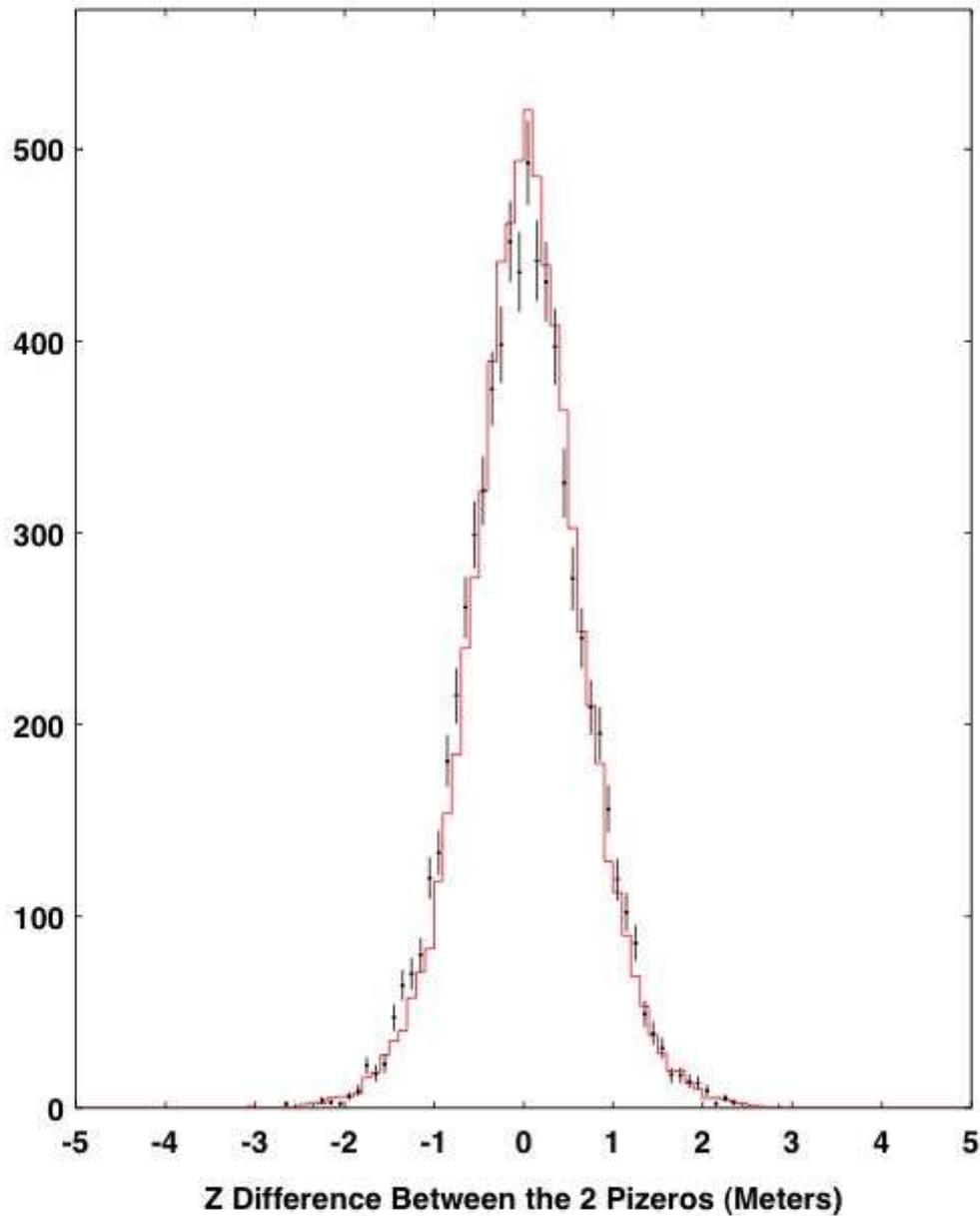
Normal MC

versus

1/9 Data

(ON and OFF Combined)

$\chi^2/\text{dof} = 82.8 / 51$



Normal MC

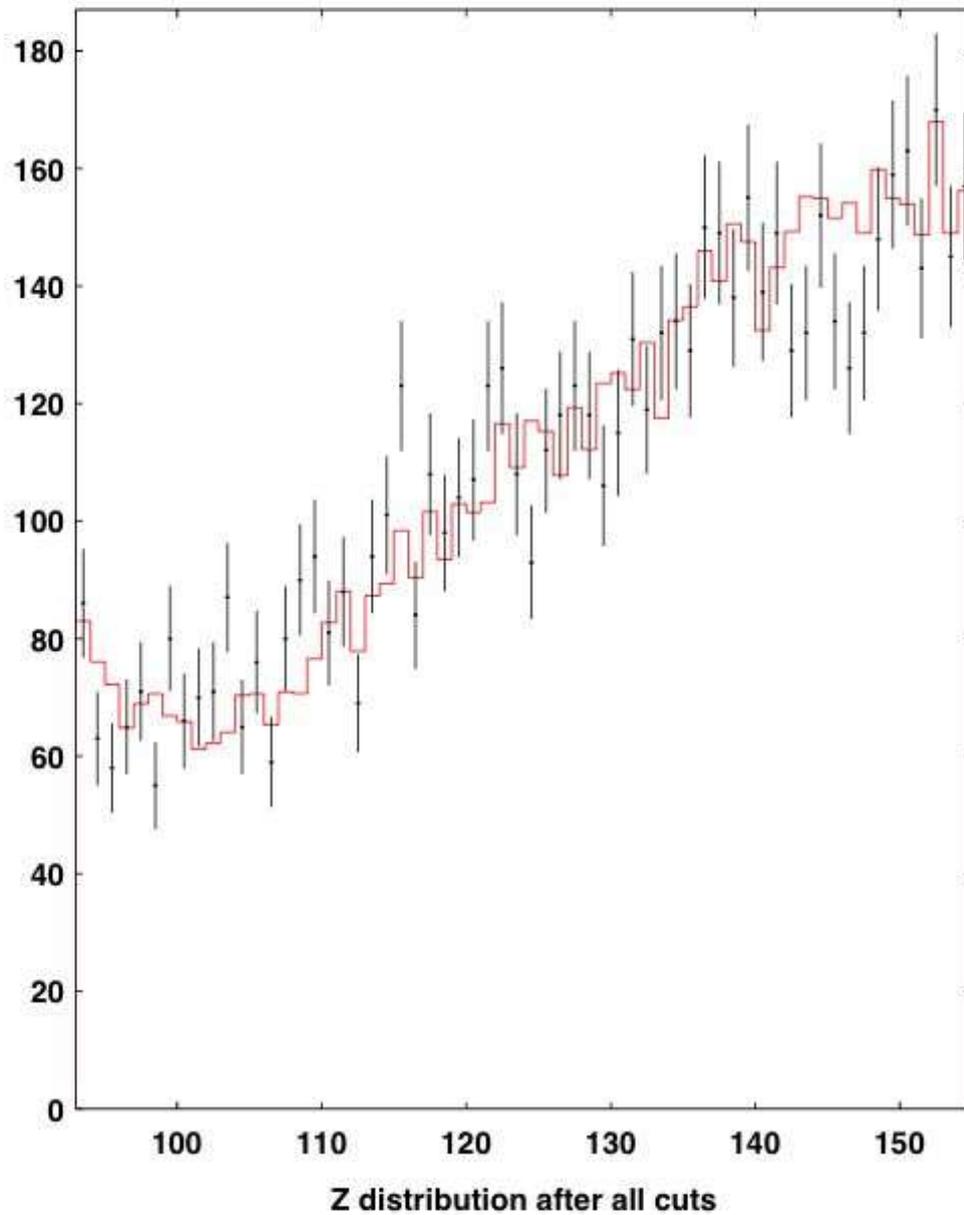
versus

1/9 Data

(ON and OFF Combined)

Kaon Z-vertex
resolution ~ 30 cm

$\chi^2/\text{dof} = 65.0 / 61$

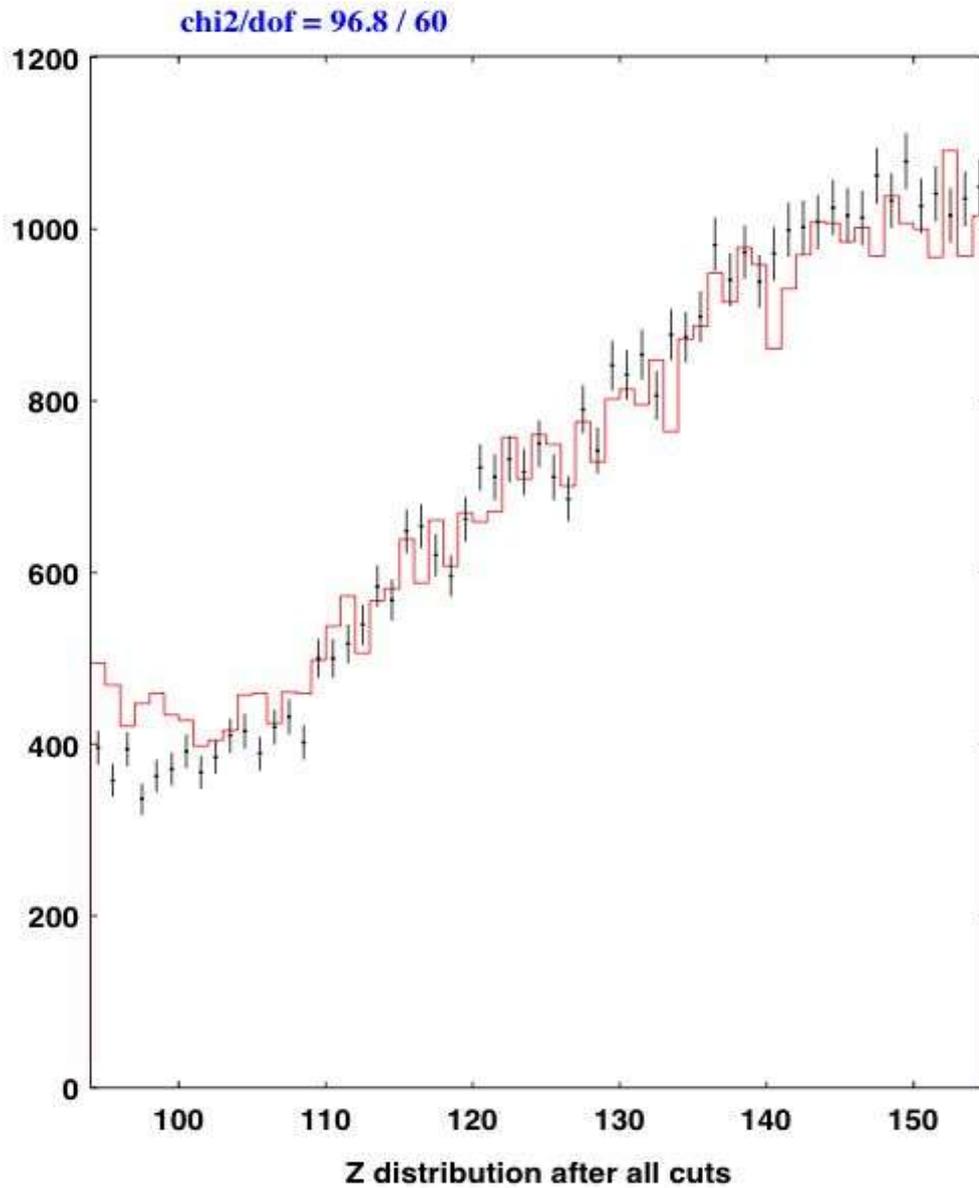


Normal MC

versus

1/9 Data

(ON and OFF Combined)



Dots

Monte Carlo with EM-regen

$$B_{\text{critical}} = 0$$

$$E_{\text{critical}} = 0$$

Histogram

Normal Monte Carlo

More Extensive Comparisons between

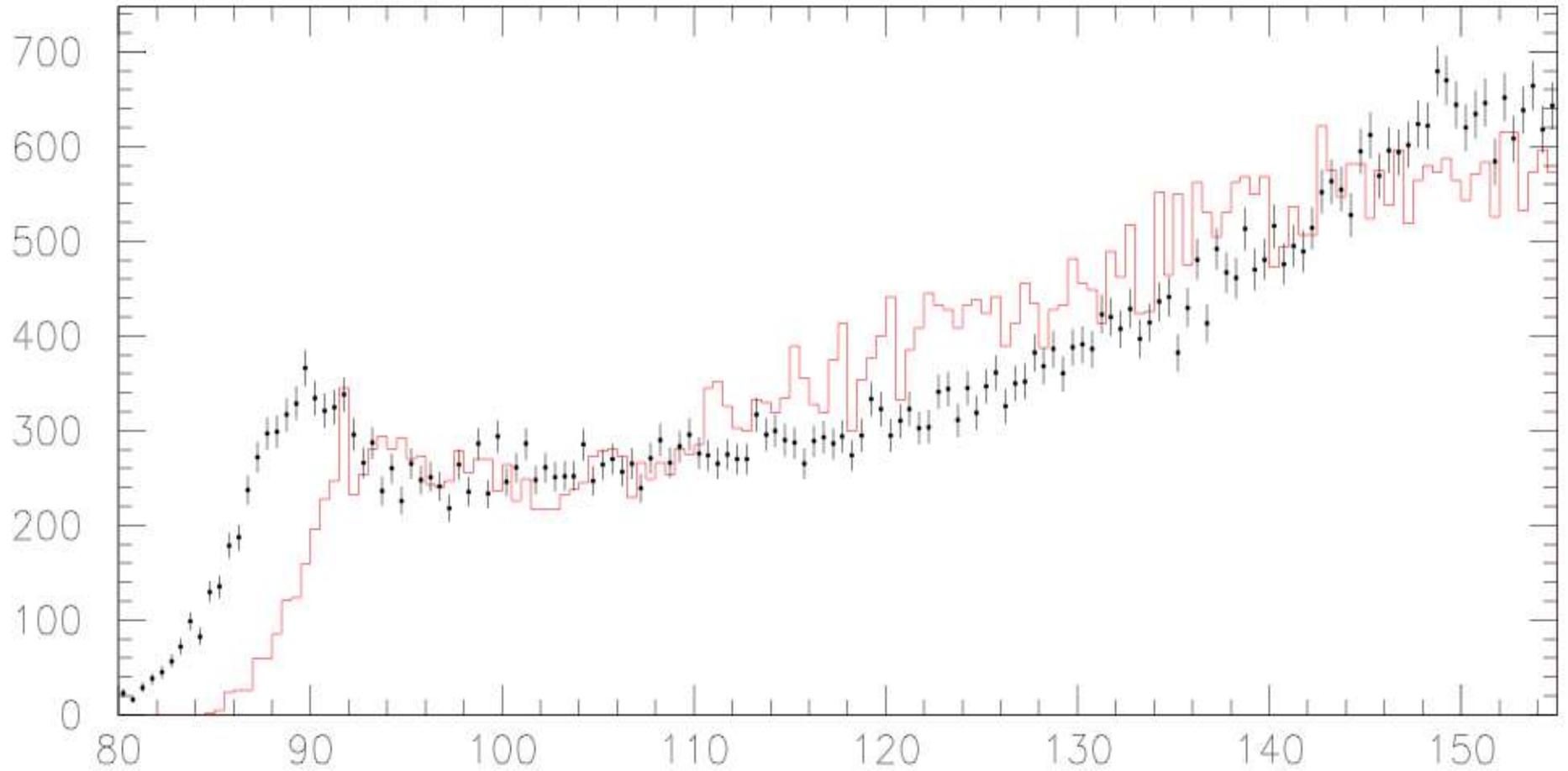
NM3S ON Data

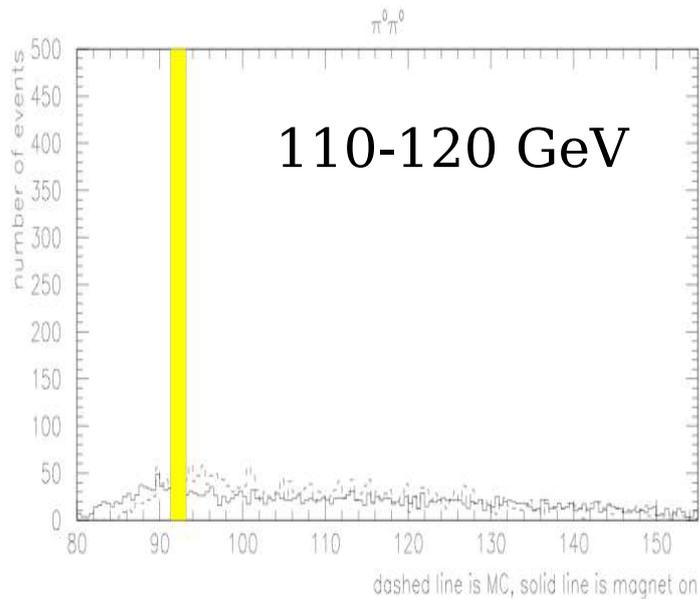
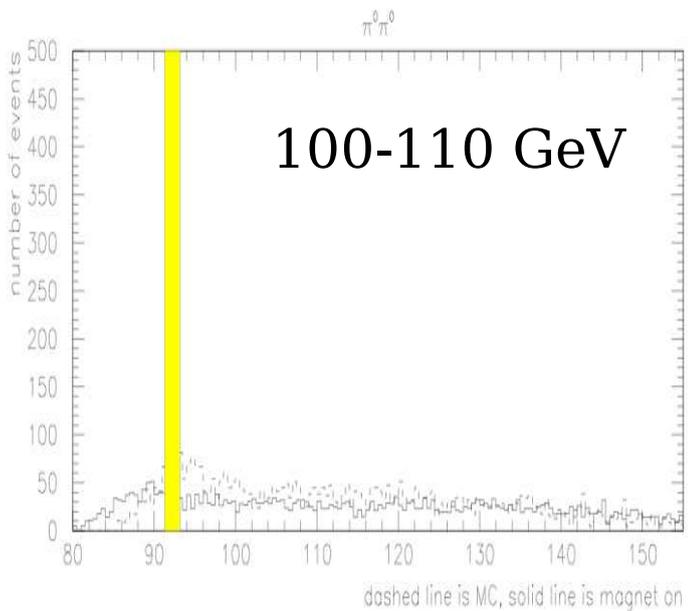
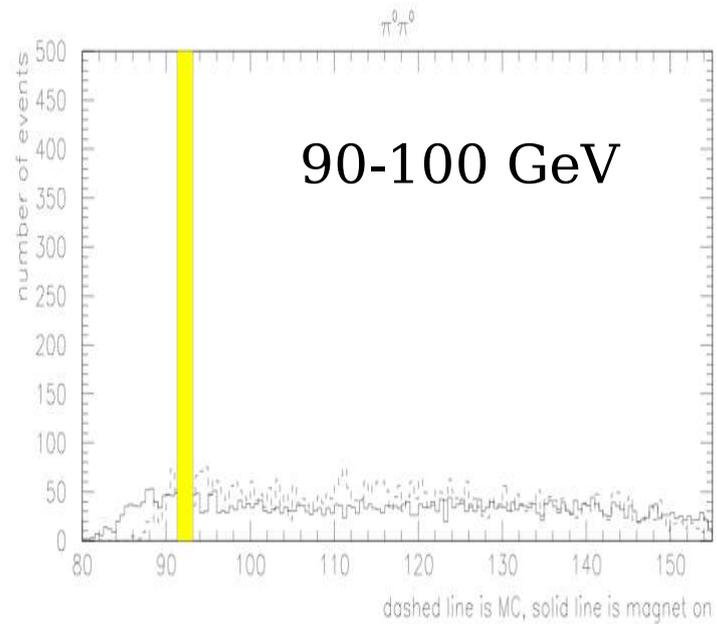
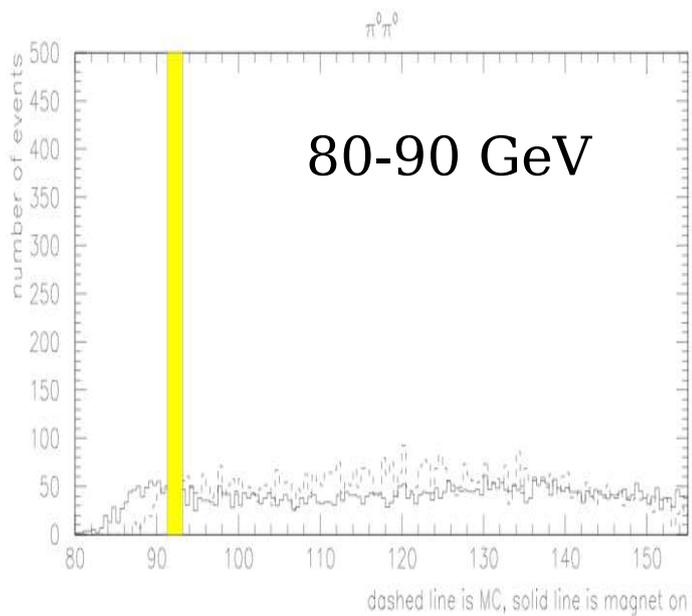
versus

Normal Monte Carlo

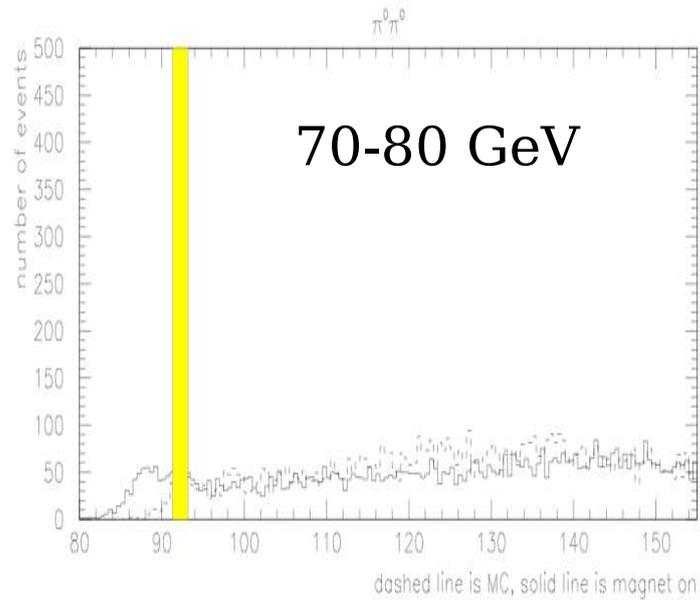
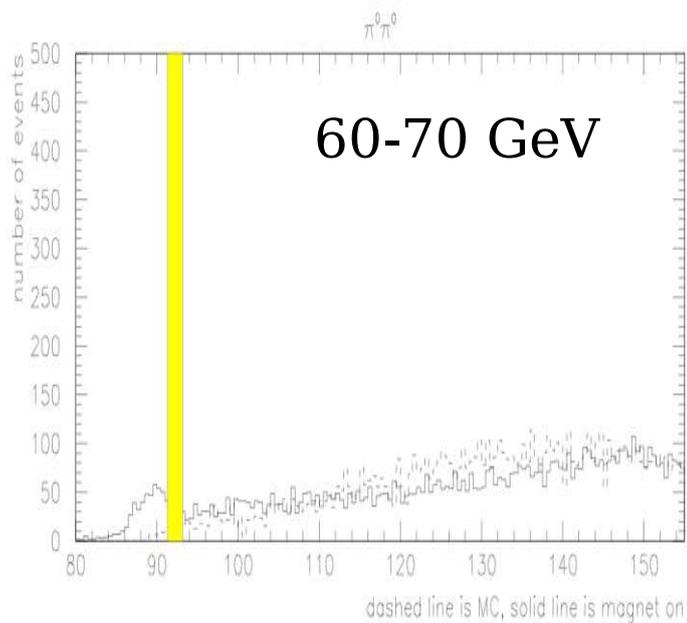
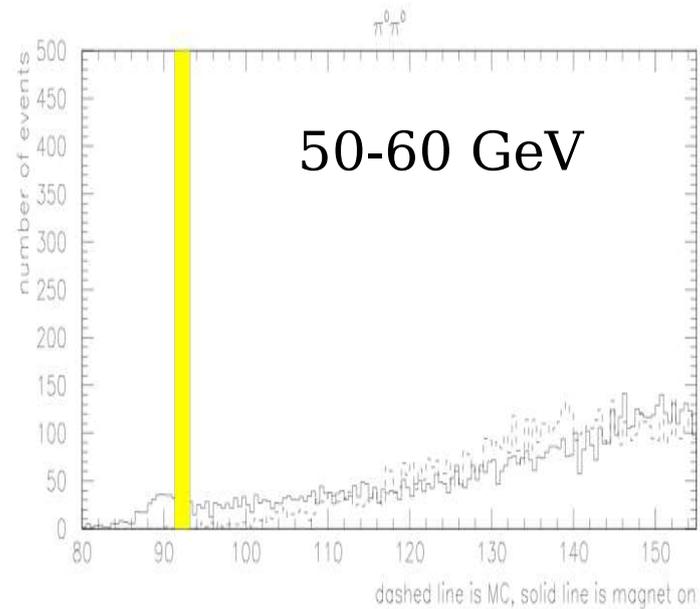
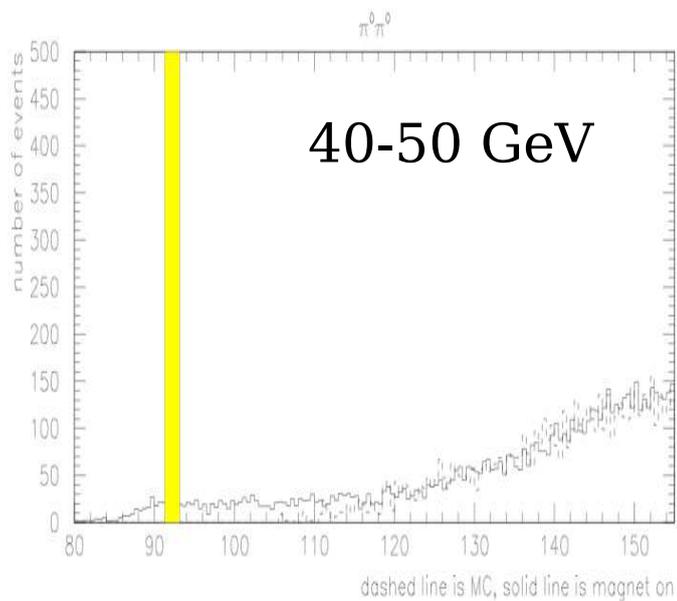
Decays Upstream of Collimator (85
meters) not simulated.

NM3S ON data (dots) versus Normal MC (hist)





Decays upstream of 85 meters NOT simulated



Decays upstream of 85 meters NOT simulated

- Don't understand all the data-MC comparisons yet.
- Very large z-vertex mismatch for $E_k < 60$ GeV.
- Decays upstream of 85 meters not simulated. For some reason, events in that region take a very long time to generate.
- Having trouble locating the accidental file.
- EM-Regeneration effect is 50% implemented in MC.
- Recently recrunched the data to put more variables into our ntuples. Expect the data-cleanliness to improve.
- Stay tuned.