Status Report

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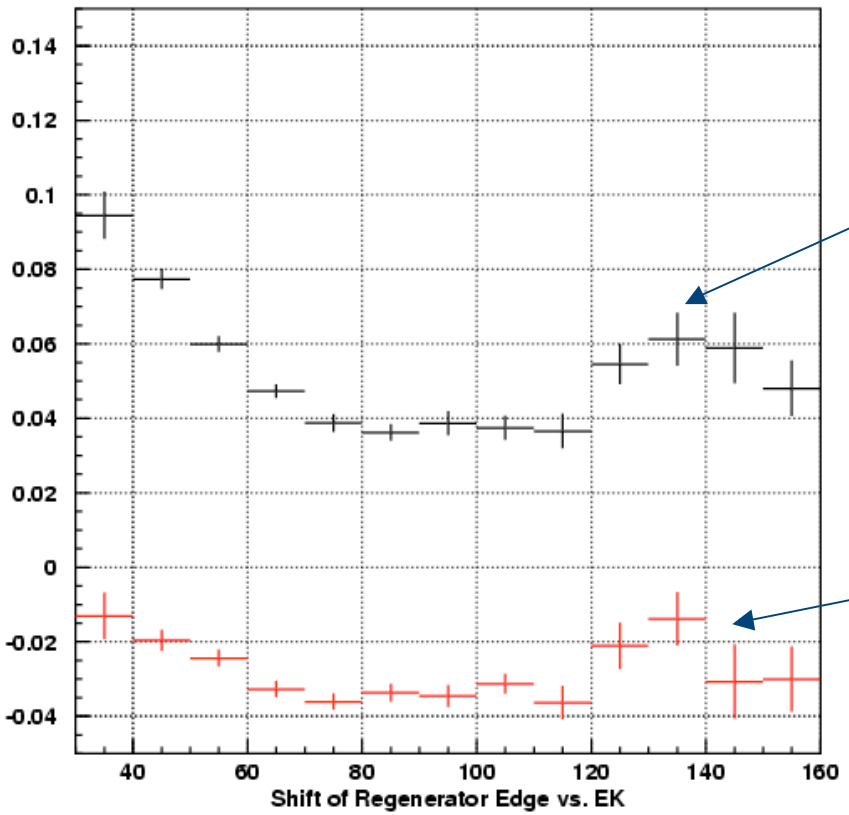
February 25, 2006

Outline

- 1997 data-MC comparison
- 1997 fit results
- 1999 data-MC comparison
- outstanding problems
- studies in progress
- to do list
- summary

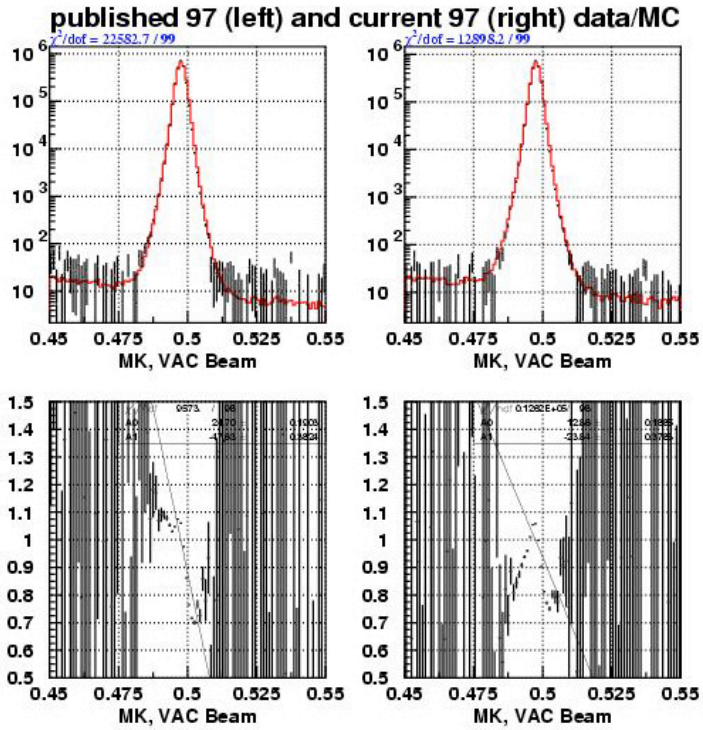
1997 Data-MC Comparison: Regenerator Edge Match

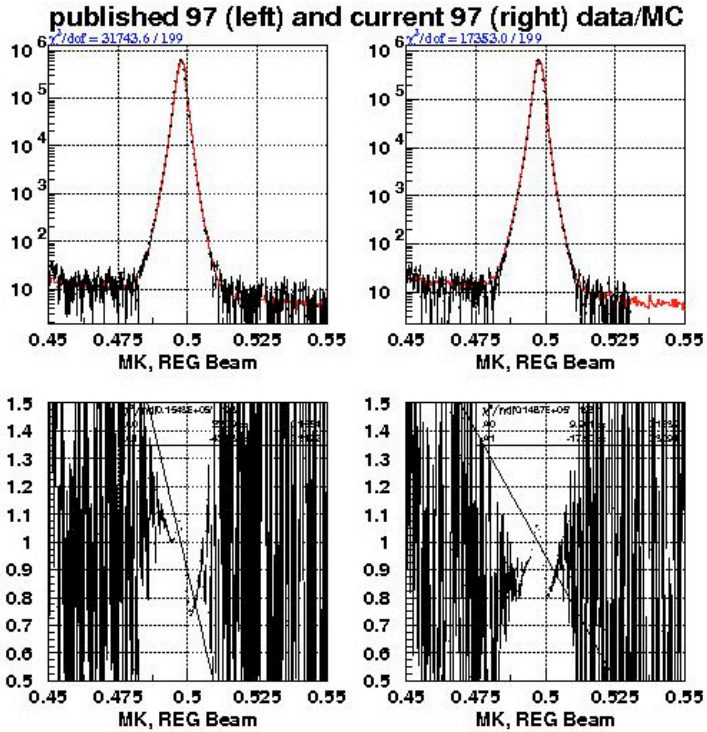


Published Analysis

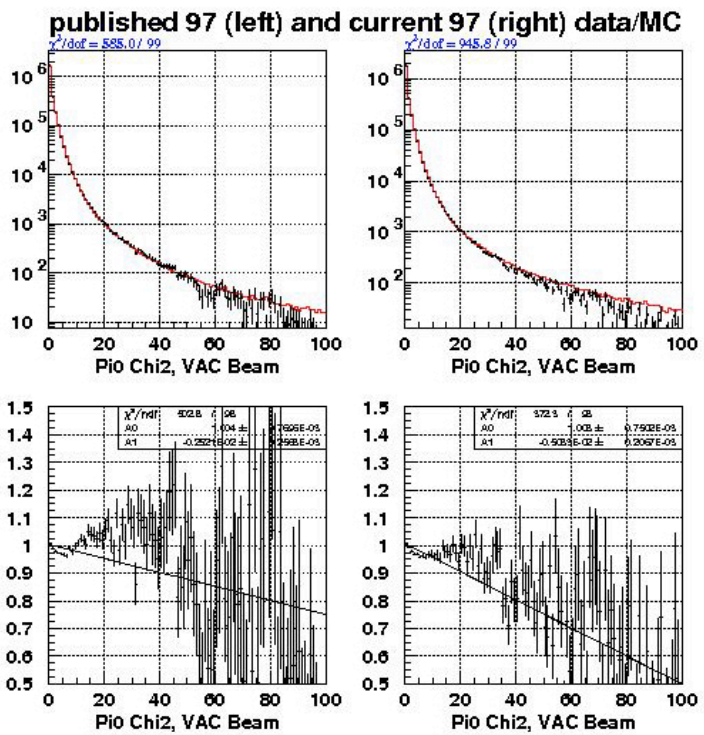
Current Analysis

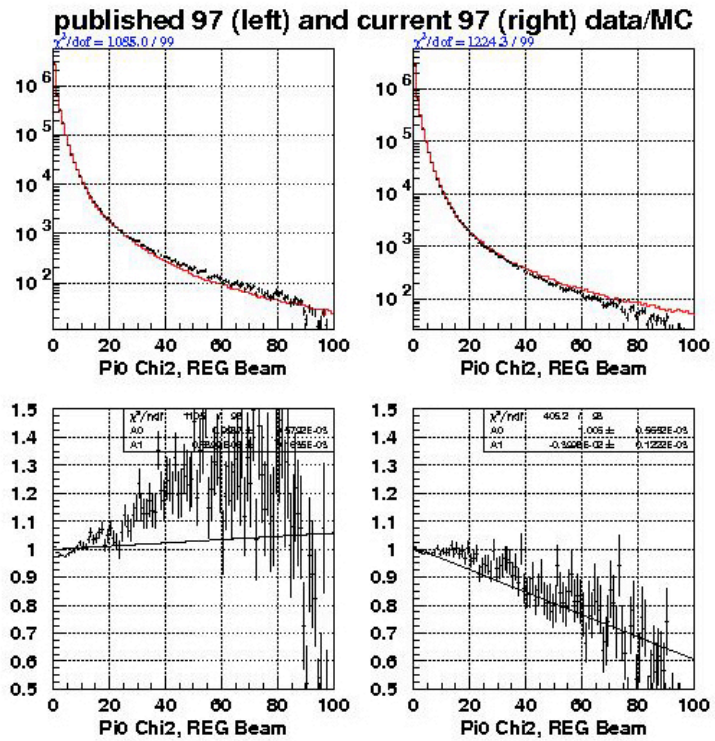
1997 Data-MC Comparison: MK



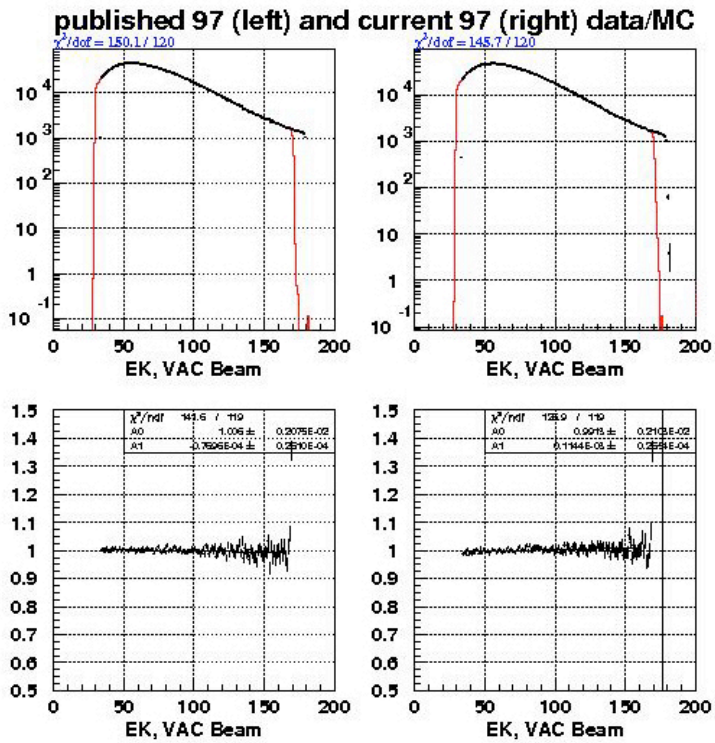


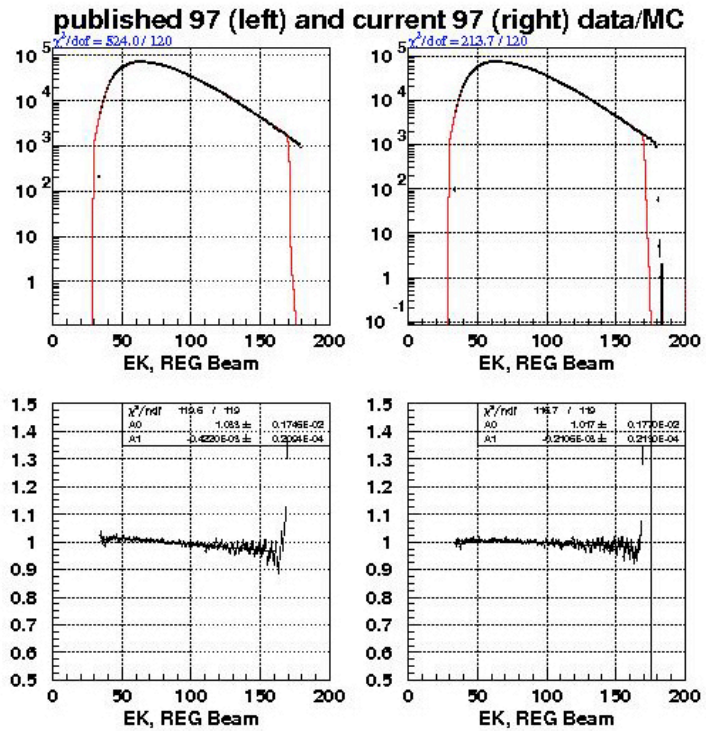
1997 Data-MC Comparison: Pi0 Chi2





1997 Data-MC Comparison: EK





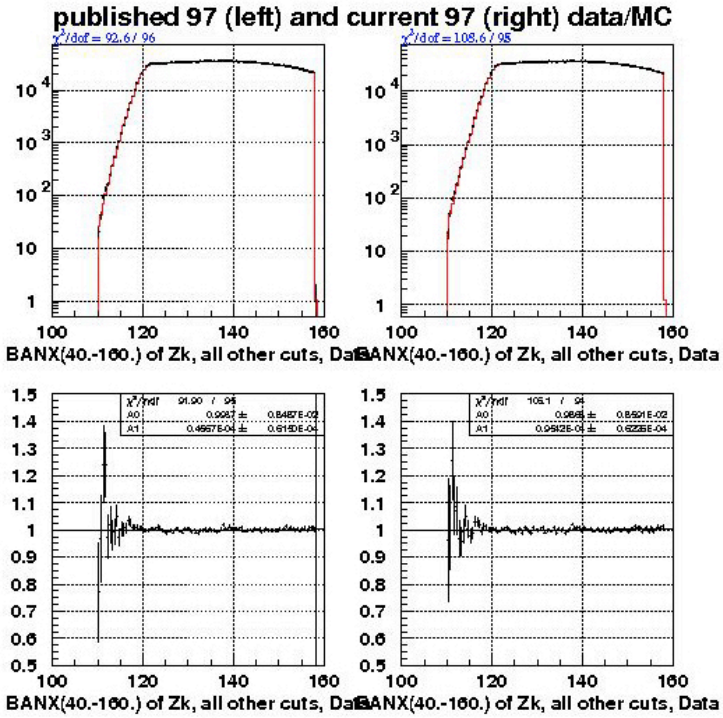
Slope: -0.7696E-4 ± 0.2510E-4

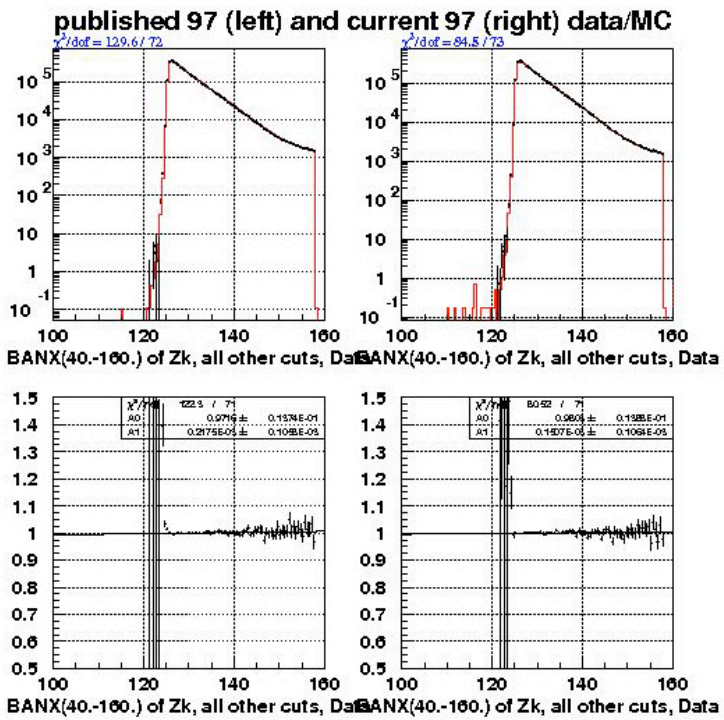
Slope: -0.1144E-3 ± 0.2554E-4

Slope: -0.4220E-3 ± 0.2094E-4

Slope: -0.2106E-3 ± 0.2130E-4

1997 Data-MC Comparison: ZK (Energy Re-weighted)





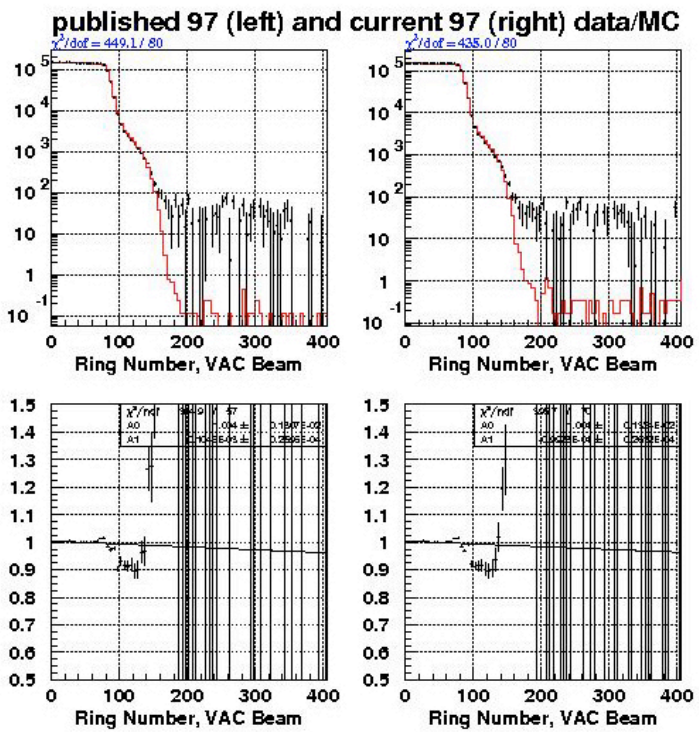
Slope: 0.4567E-4 ± 0.6150E-4

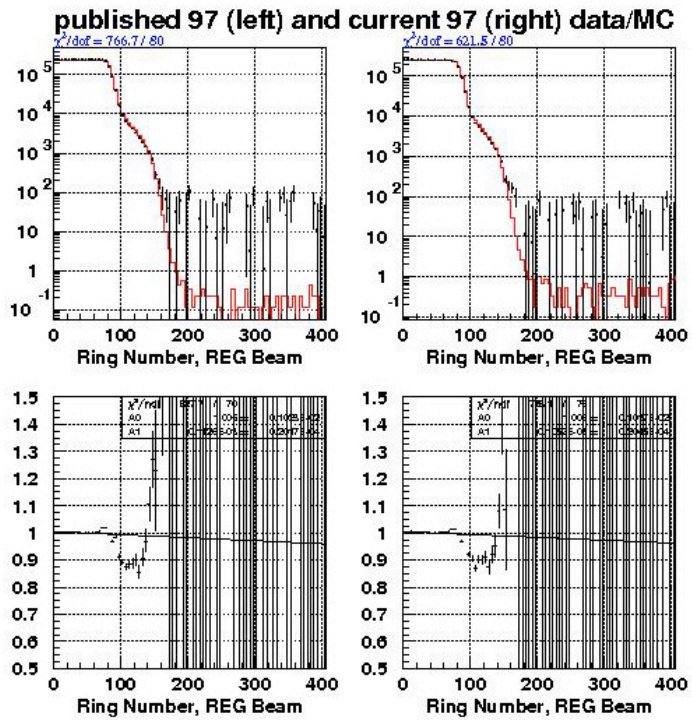
Slope: -0.9542E-4 ± 0.6226E-4

Slope: 0.2175E-3 ± 0.1053E-3

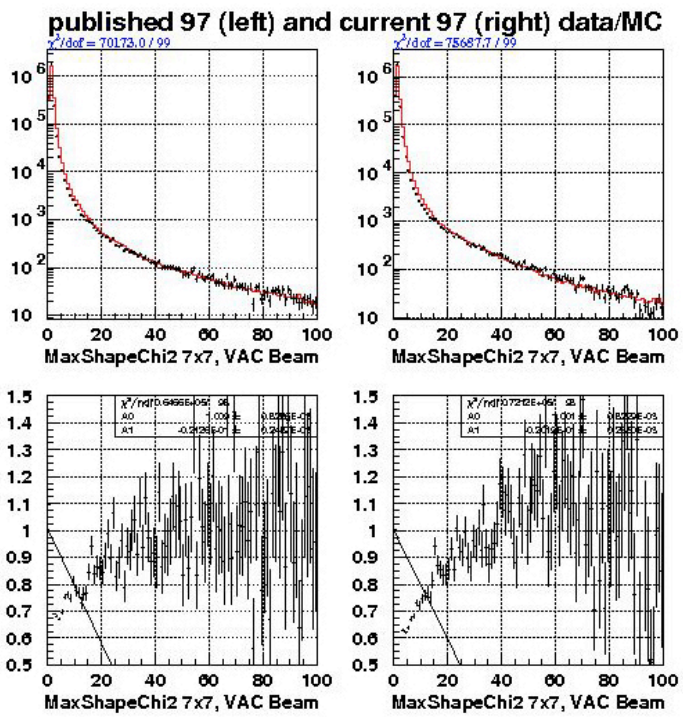
Slope: 0.1507E-3 ± 0.1064E-3

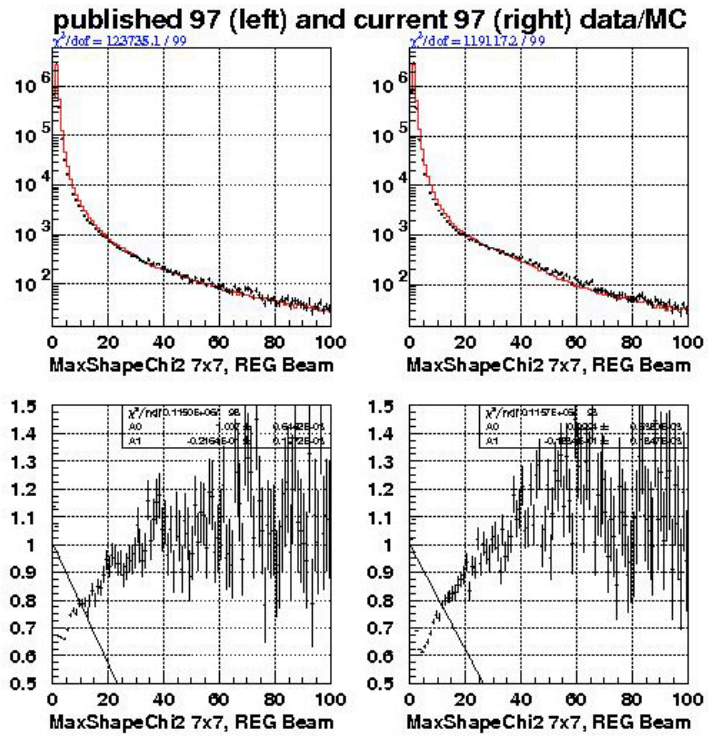
1997 Data-MC Comparison: Ring



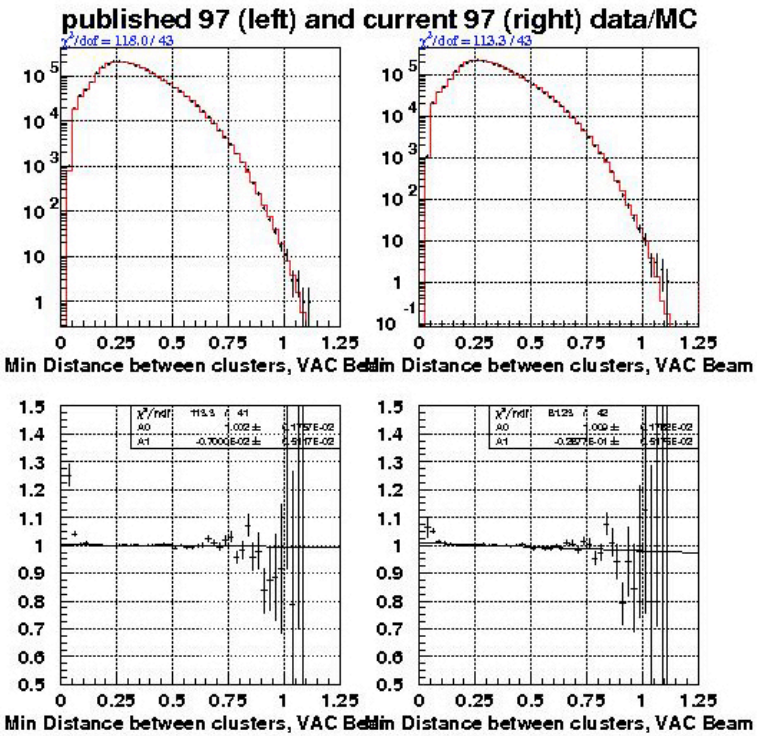


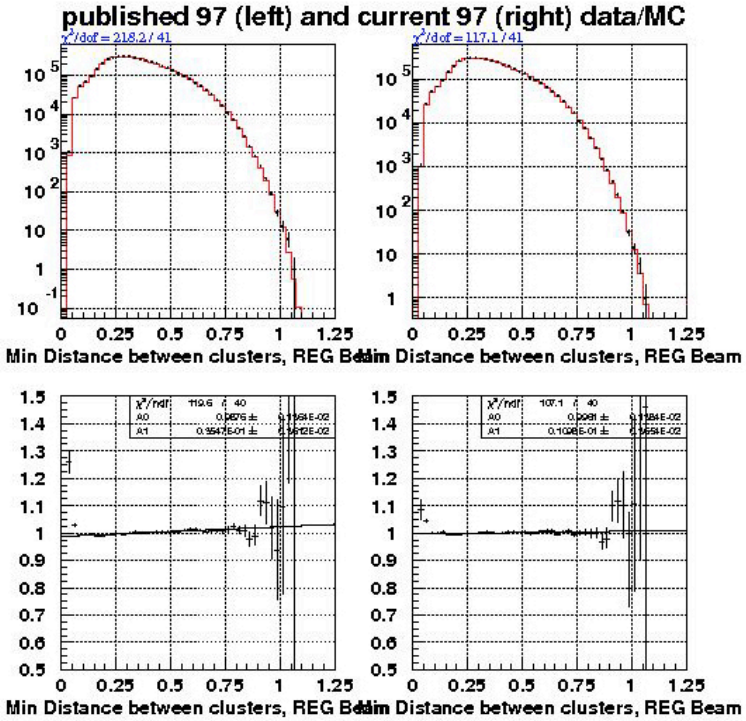
1997 Data-MC Comparison: Shape Chi2





1997 Data-MC Comparison: Minimum Distance





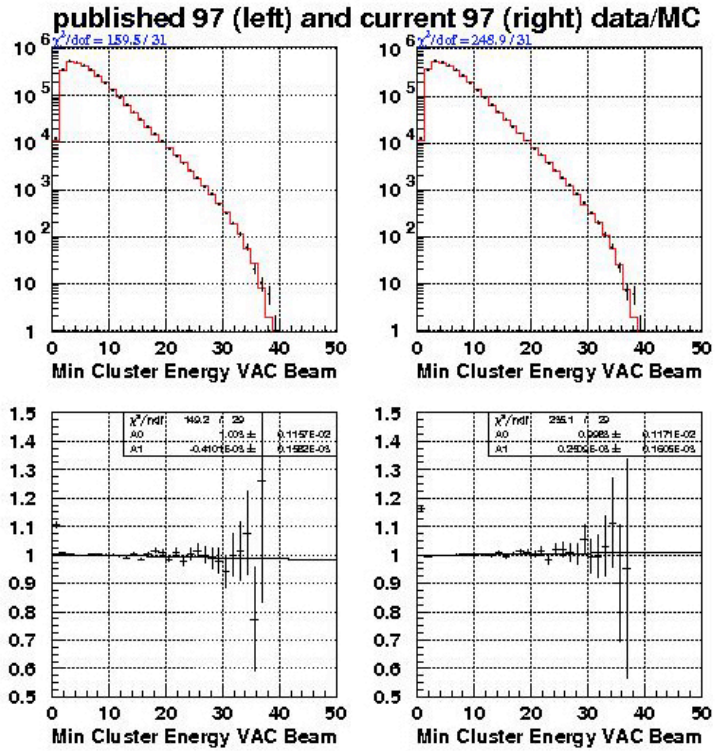
Slope: -0.7000E-2 ± 0.5117E-2

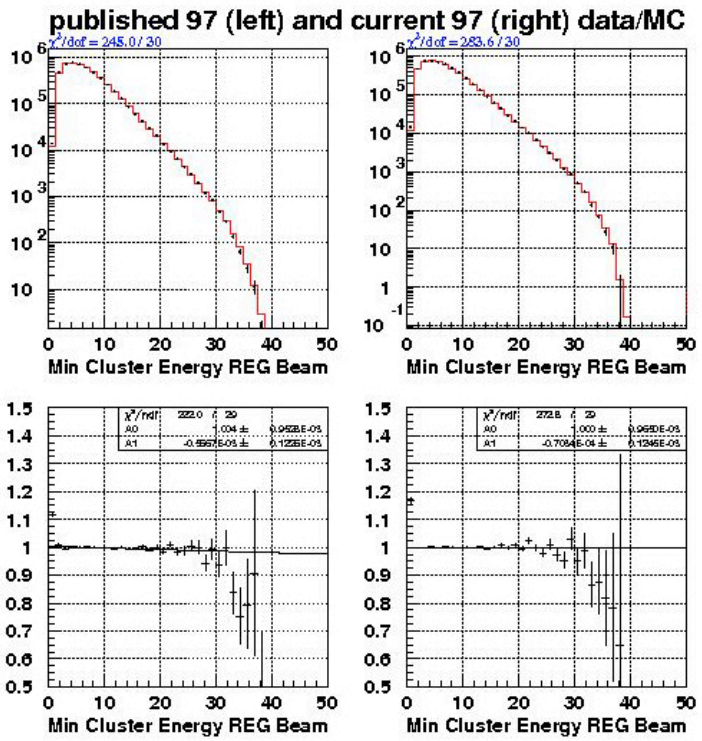
Slope: -0.2877E-1 ± 0.7175E-2

Slope: 0.3547E-1 ± 0.8612E-2

Slope: 0.1098E-1 ± 0.8654E-2

1997 Data-MC Comparison: Minimum Cluster Energy





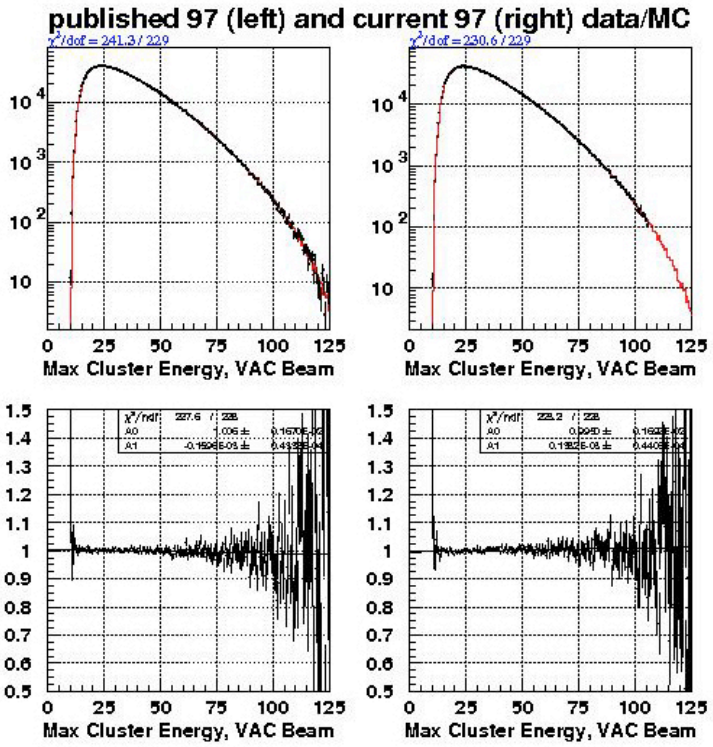
Slope: -0.4101E-3 ± 0.1582E-3

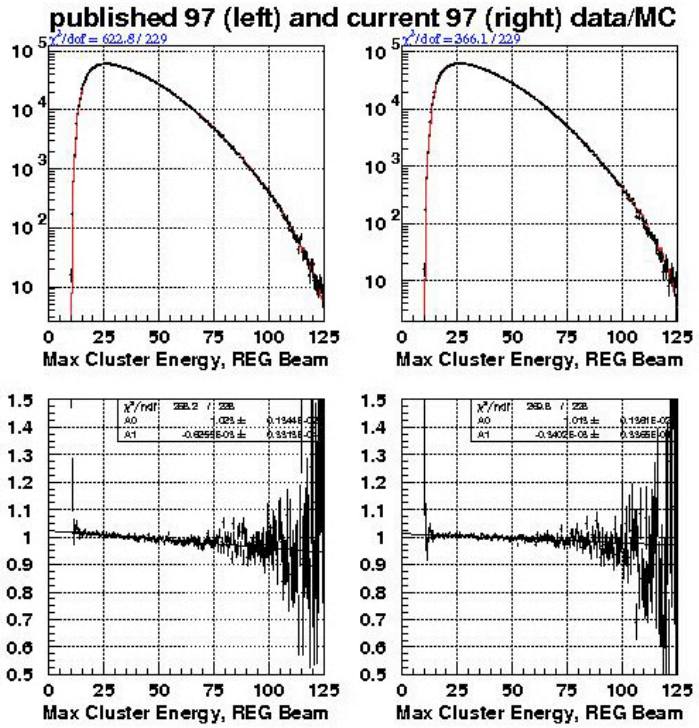
Slope: 0.2509E-3 ± 0.1605E-3

Slope: -0.5667E-3 ± 0.1226E-3

Slope: -0.7034E-4 ± 0.1245E-3

1997 Data-MC Comparison: Maximum Cluster Energy





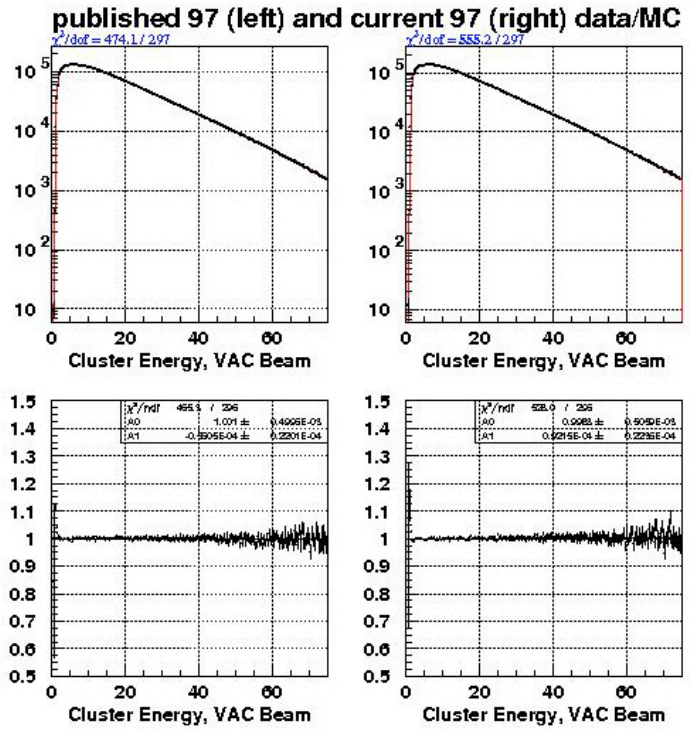
Slope: -0.1596E-3 ± 0.4332E-4

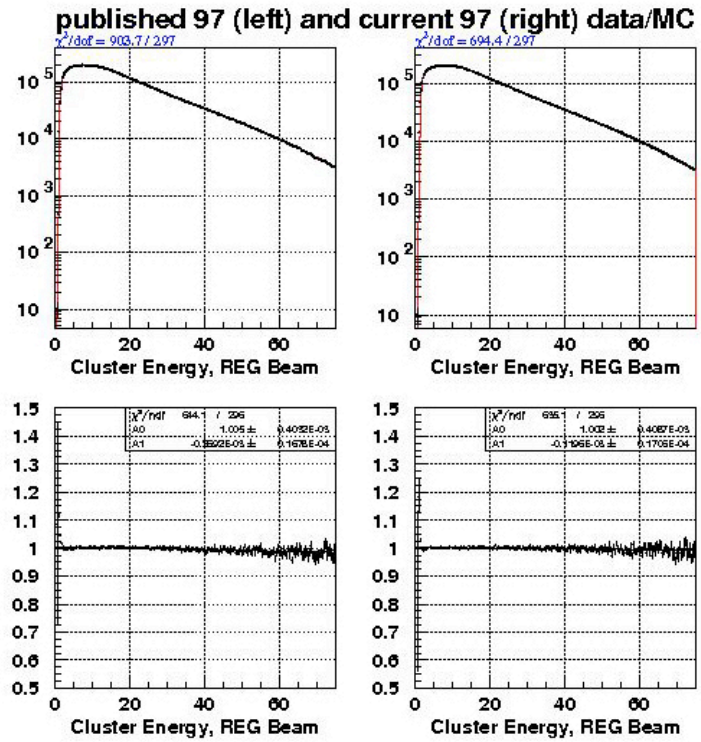
Slope: 0.1382E-3 ± 0.4406E-4

Slope: -0.6255E-3 ± 0.3313E-4

Slope: -0.3402E-3 ± 0.3365E-4

1997 Data-MC Comparison: Cluster Energy





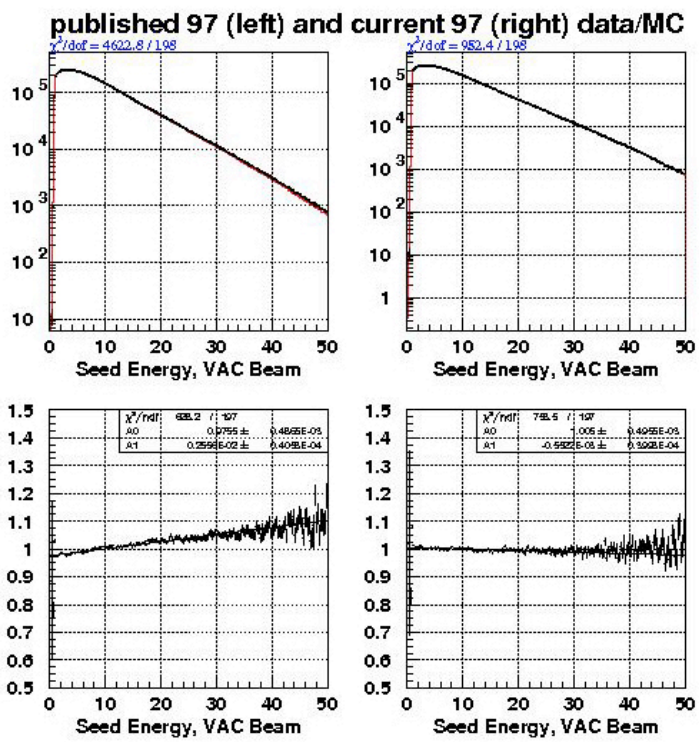
Slope: -0.6605E-4 ± 0.2201E-4

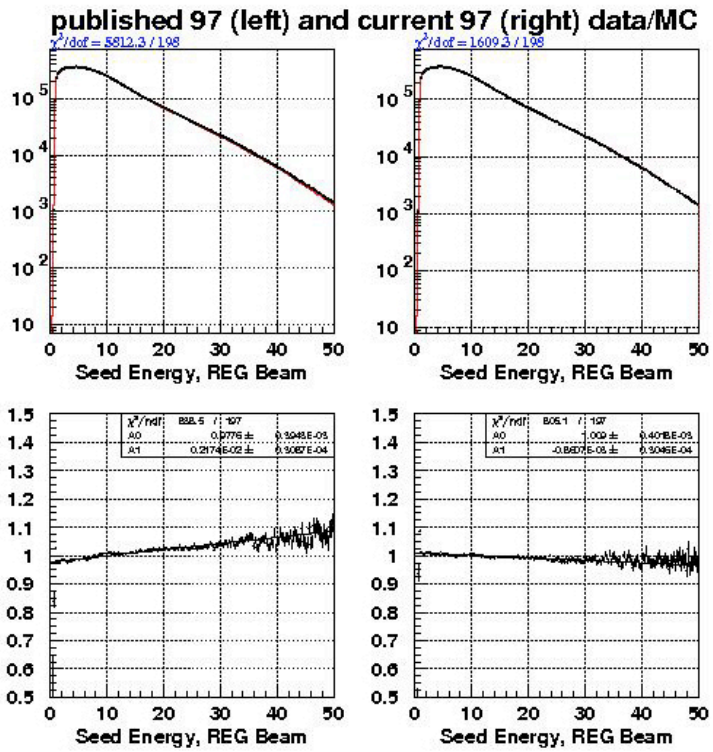
Slope: 0.9215E-4 ± 0.2236E-4

Slope: -0.2692E-3 ± 0.1678E-4

Slope: -0.1196E-3 ± 0.1706E-4

1997 Data-MC Comparison: Seed Energy





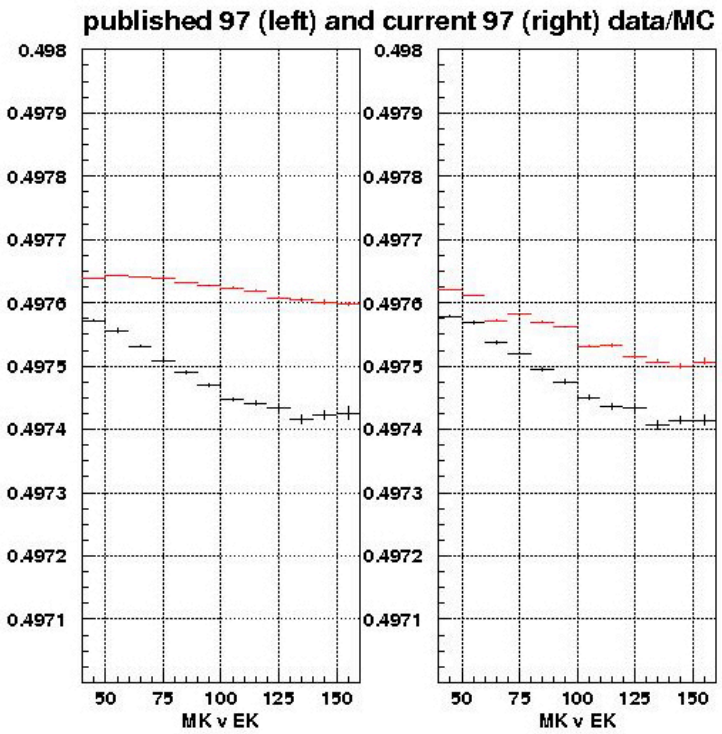
Slope: 0.2556E-2 ± 0.4053E-4

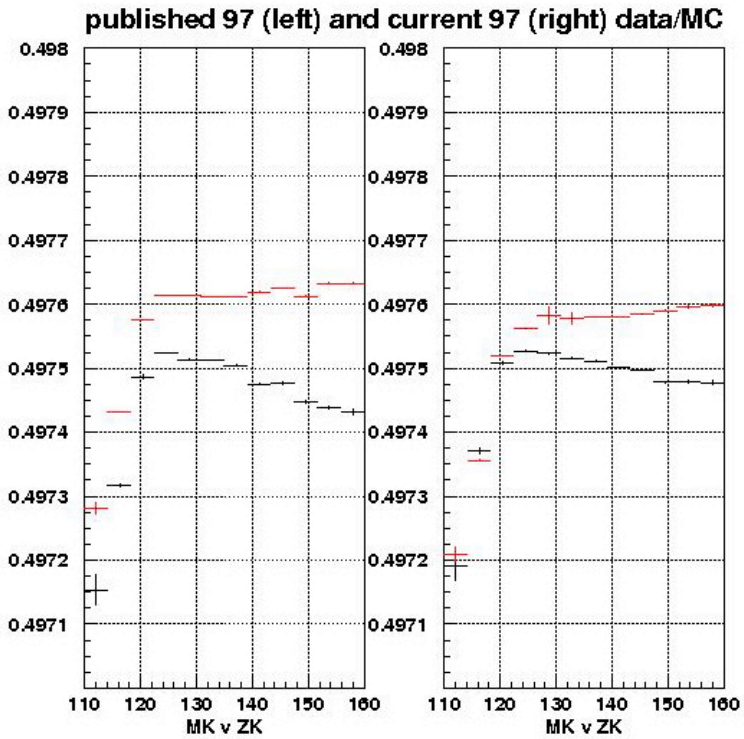
Slope: -0.5522E-3 ± 0.3998E-4

Slope: 0.2174E-2 ± 0.3087E-4

Slope: -0.8607E-3 ± 0.3046E-4

1997 Data-MC Comparison: Kaon Mass





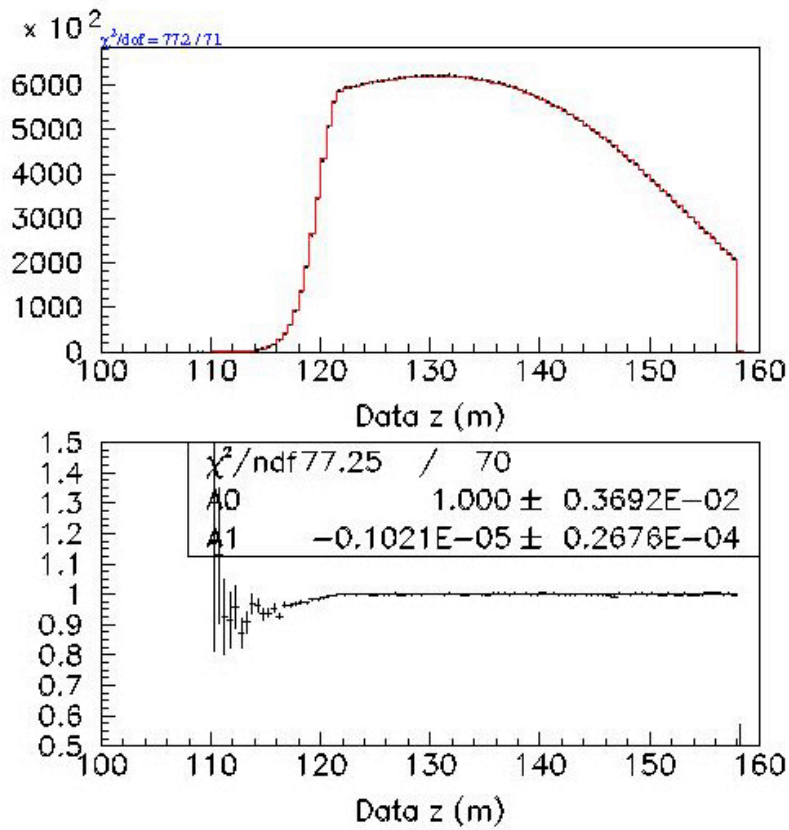
1997 Data-MC Comparison: Energy Scale Checks

	ZReg (Data-MC)	ZVacWin (Data-MC)	Z Stretch
1997 published	-0.8(4) cm	+2.5(2) cm	3.3(5) cm
1997 current*	-1.2(5) cm	+1.8(2) cm	3.0(5) cm

* As of November 2005 – does not use background subtracted energy scale

1997 Data-MC Comparison: 3pi0

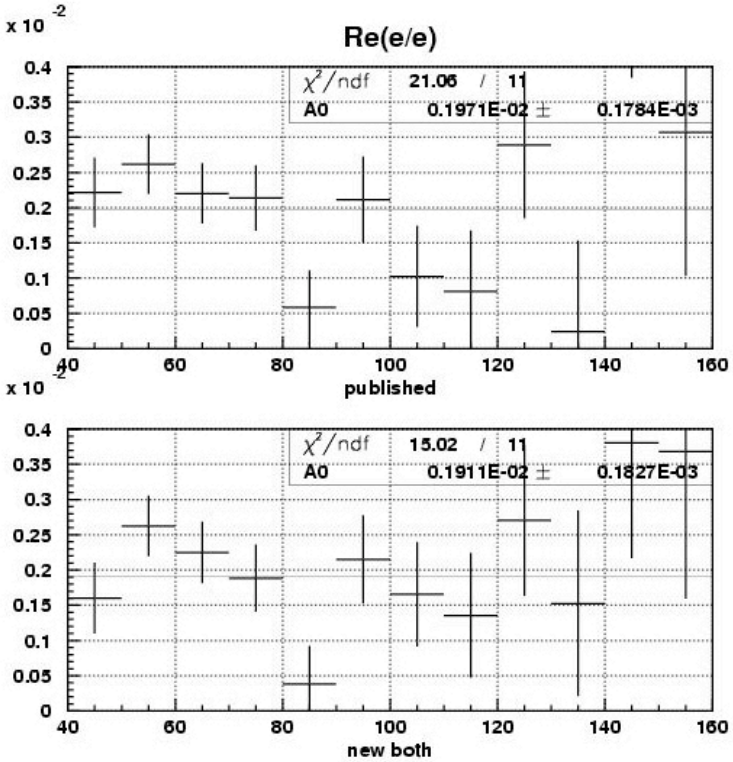
- big energy scale problem
- no downstream z slope
- need this overlay to look better for z slope systematic!

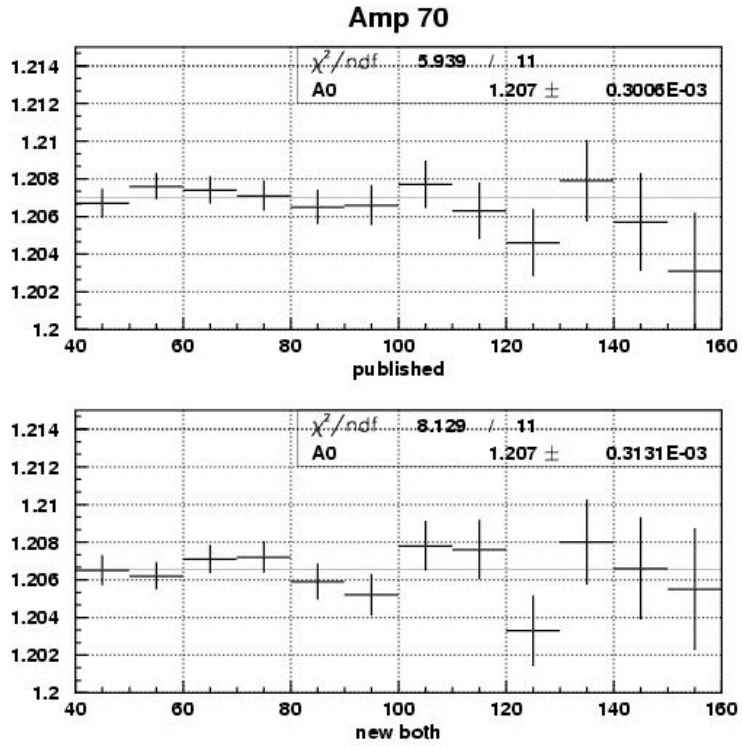


1997 Fit Results

	Published Arrays	Current Arrays
_m	(5225 ± 13) _ 10^6 _s^{-1}	(5238 ± 13) _ 10^6 _s^{-1}
τ_S	(89.70 ± .06) _ 10^{-12} s	(89.66 ± .06) _ 10^{-12} s
Chi2/dof	197.35/199	225/199
Re(__/_)	(19.8 ± 1.8) _ 10^{-4}	(19.1 ± 1.8) _ 10^{-4}
Chi2/dof	29.4/21	25.5/21

1997 Fit Results vs Kaon Momentum





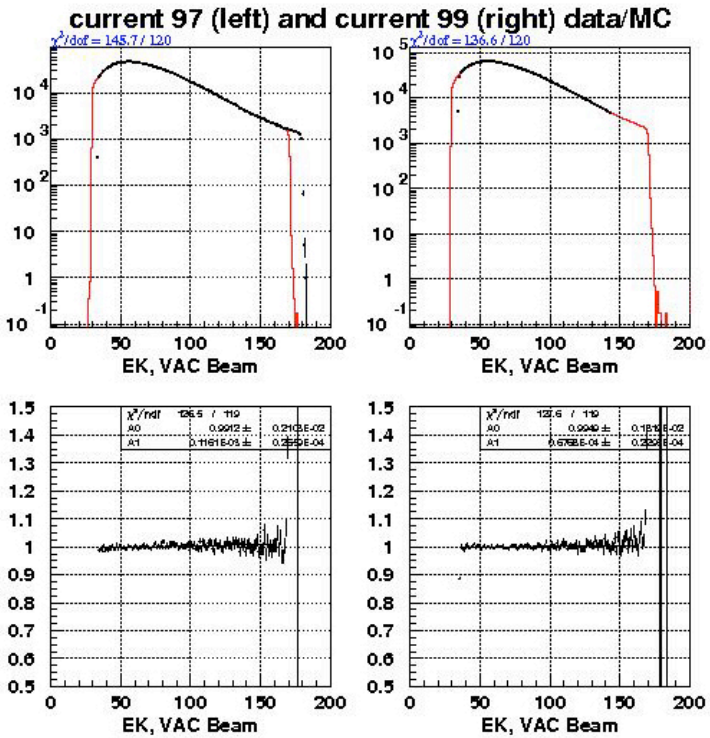
Chi2: 21.06/11 _ 15.02/11

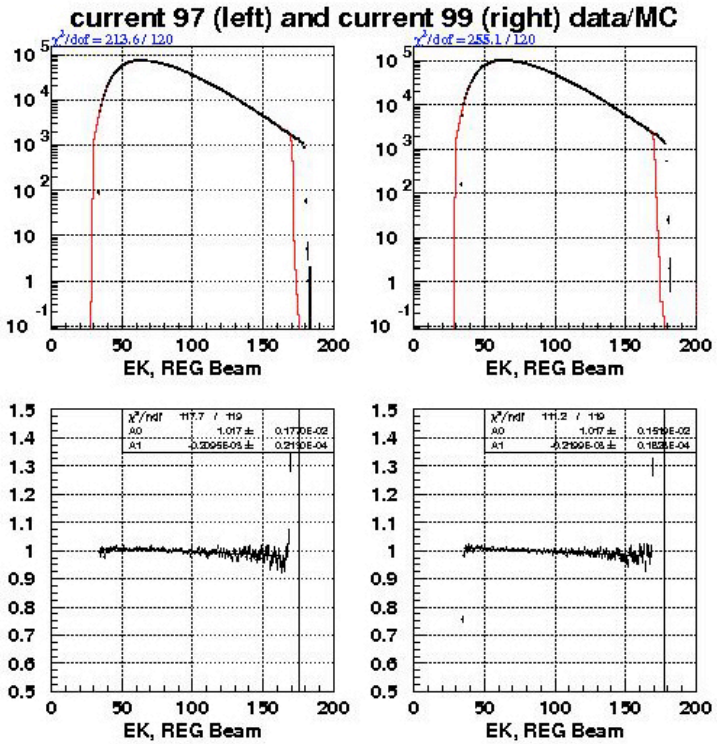
Chi2: 5.939/11 _ 8.129/11

1999 Data-MC Comparison

- regenerator edge match very similar to 1997
- most data-MC overlays very similar to 1997
- a few interesting overlays . . .

1999 Data-MC Comparison: EK





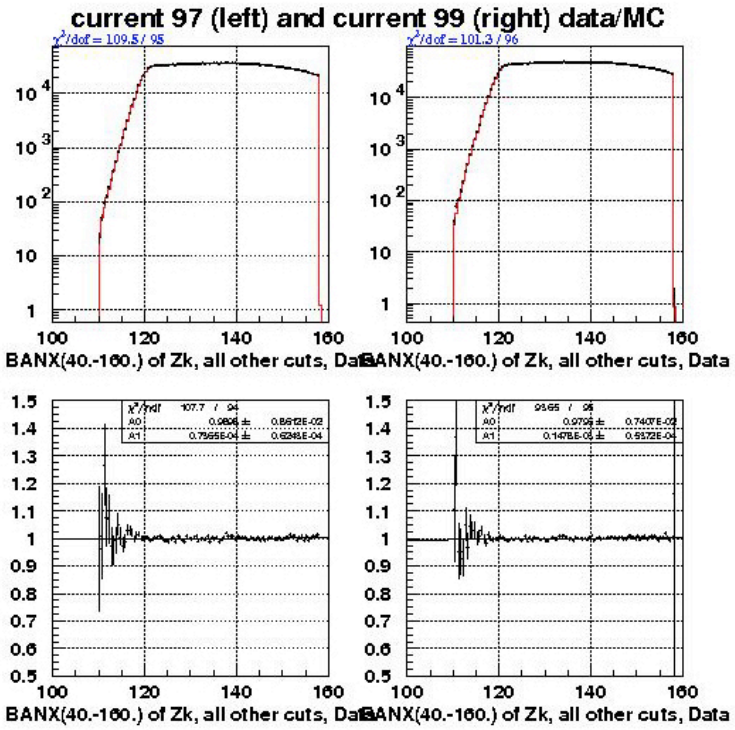
Slope: 0.1161E-3 ± 0.2559E-4

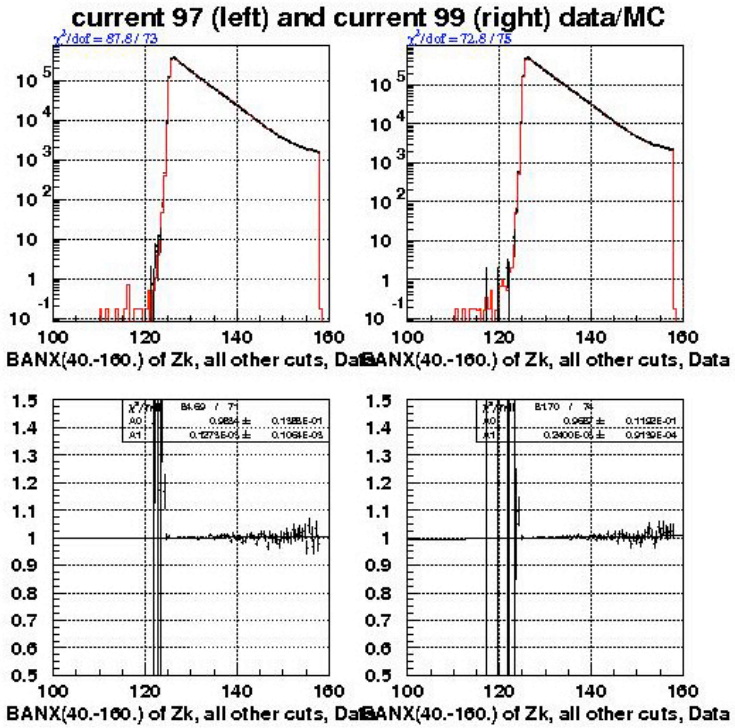
Slope: 0.6768E-4 ± 0.2296E-4

Slope: -0.2095E-3 ± 0.2130E-4

Slope: -0.2199E-3 ± 0.1828E-4

1999 Data-MC Comparison: ZK (Energy Re-weighted)





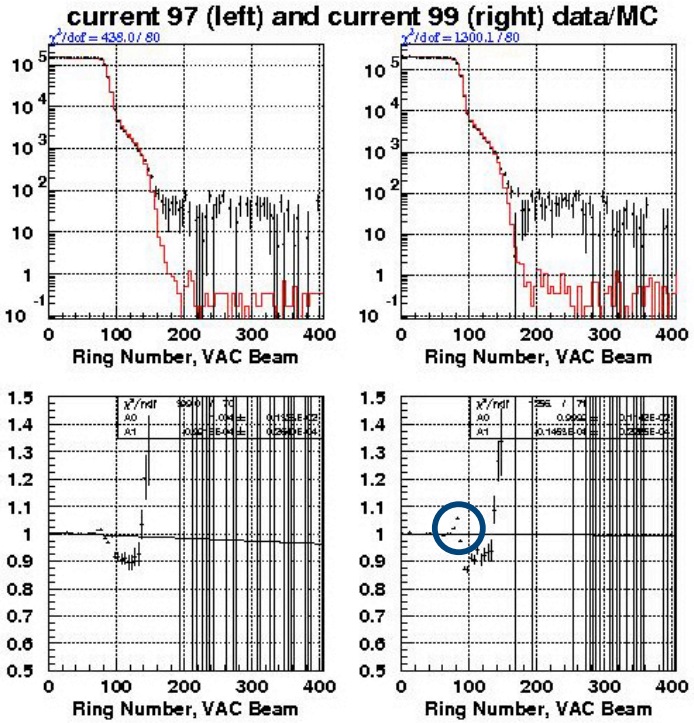
Slope: 0.7365E-4 ± 0.6243E-4

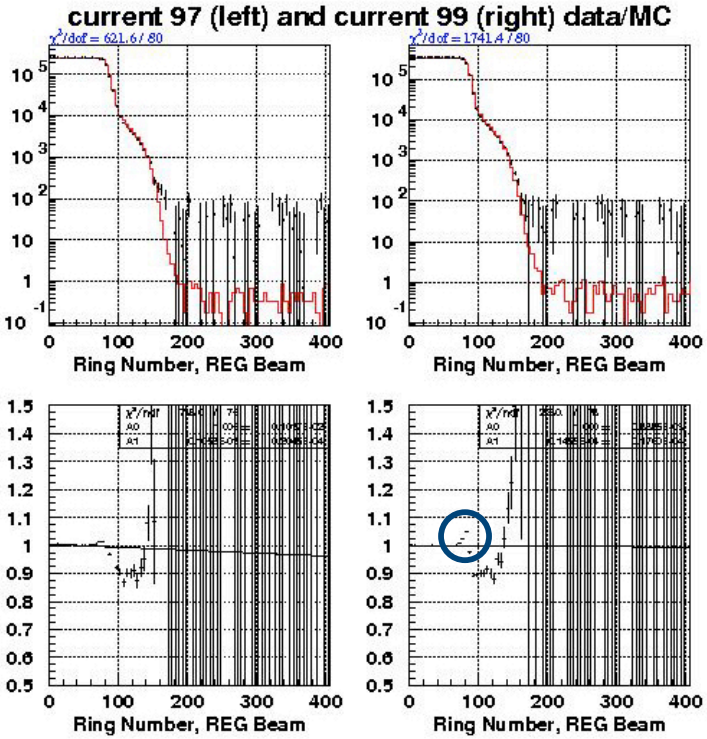
Slope: 0.1478E-3 ± 0.5372E-4

Slope: 0.1273E-3 ± 0.1064E-3

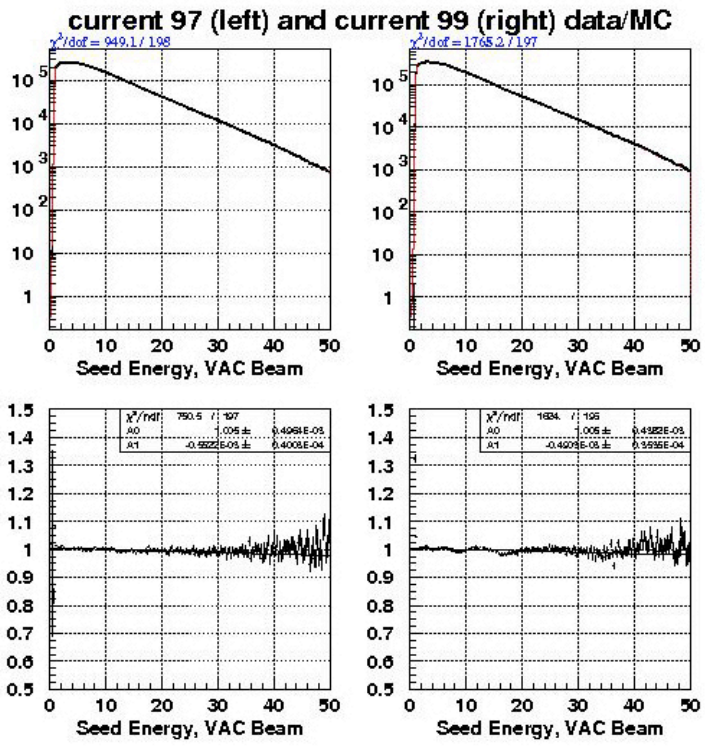
Slope: 0.2400E-3 ± 0.9139E-4

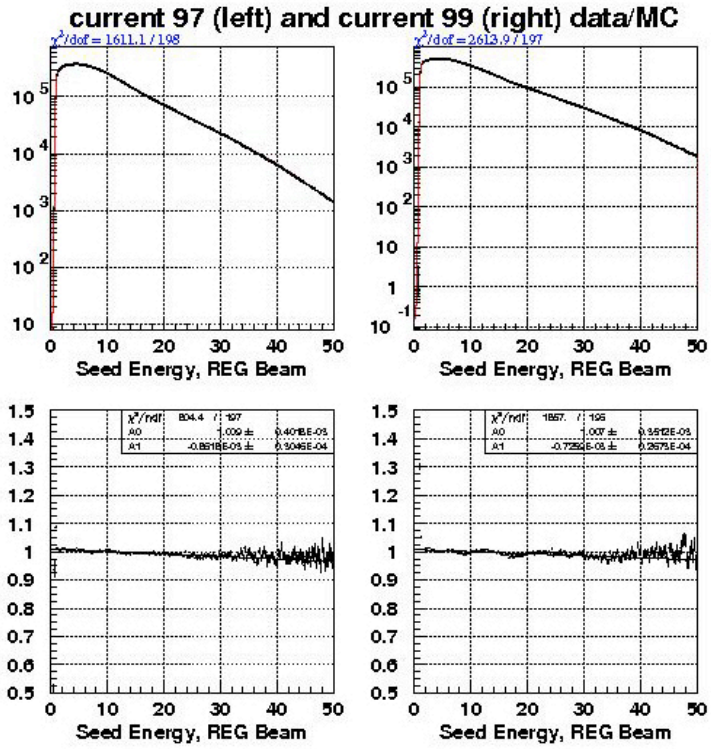
1999 Data-MC Comparison: Ring





1999 Data-MC Comparison: Seed Energy





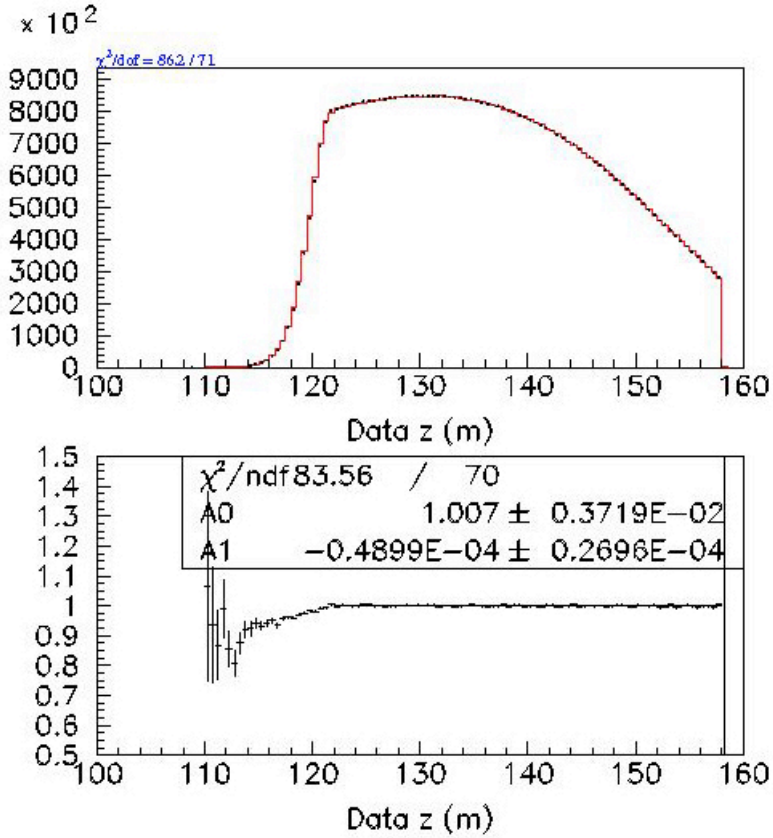
1997 & 1999 Data-MC Comparison: Energy Scale Checks

	ZReg (Data-MC)	ZVacWin (Data-MC)	Z Stretch
1997 published	-0.8(4) cm	+2.5(2) cm	3.3(5) cm
1997 current*	-1.2(5) cm	+1.8(2) cm	3.0(5) cm
1999 current*	-0.2(4) cm	+1.0(2) cm	1.2(4) cm

* As of November 2005 – does not use background subtracted energy scale

1999 Data-MC Comparison: 3pi0

- big energy scale problem
- 2_ downstream z slope
- as in 97, need to solve energy scale problem in order to use this plot for z slope systematic

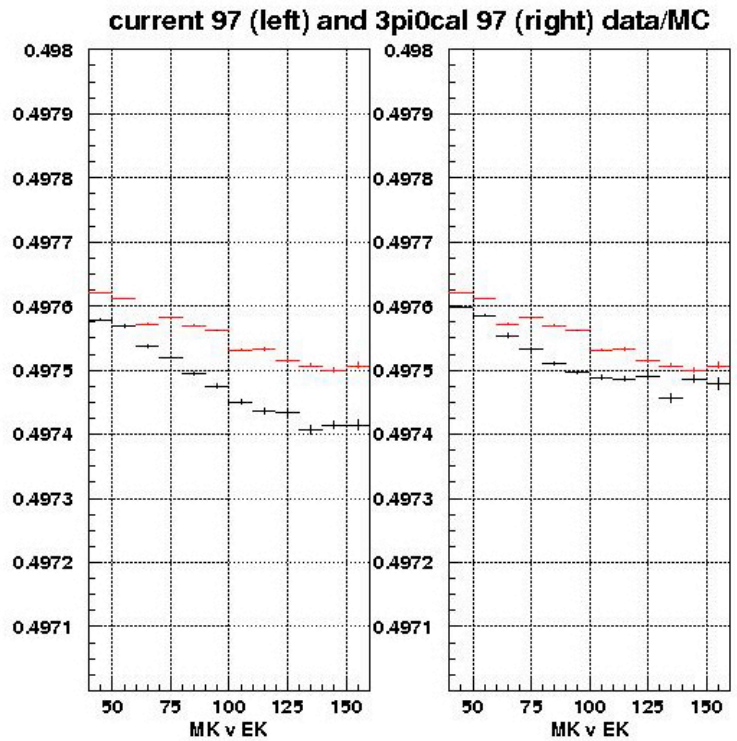


Outstanding Problems

- 1997
  - 3pi0 energy scale mismatch
  - small wiggle in seed energy overlay
- 1999
  - 3pi0 energy scale mismatch
  - large wiggle in seed energy overlay
  - 2pi0/3pi0 z slope
  - ring number overlay

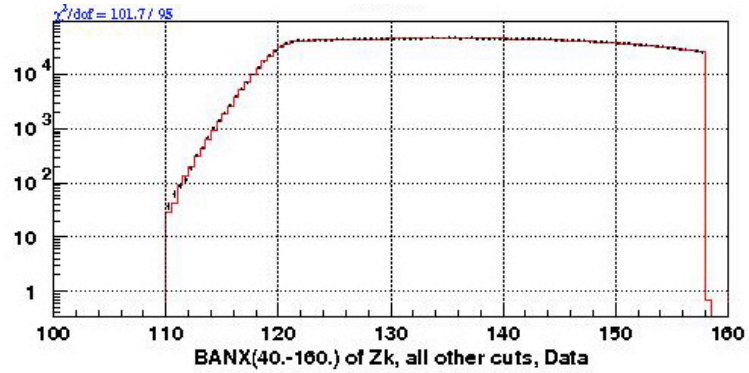
In Progress

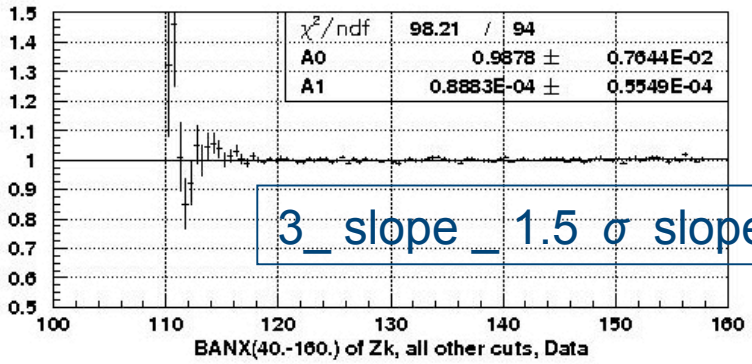
- 3pi0 calibration (RSK)
  - fit each event for 6 photon energies with 4 kinematic constraints
  - correction applied to data
  - yields different regenerator edge scale
  - improves data-MC agreement in kaon mass



In Progress

- z slope studies
  - measured z slope for a number of cut variations
  - tighter cut on minimum photon distance at CsI (mindist > 15 cm) improves z slope
  - update run fractions for 99





3_ slope _ 1.5 σ slope

To Do

- 1997 Systematics
  - cut variations
  - energy scale/non-linearities
- 1999 Systematics
  - neutral trigger
  - cut variations
  - energy scale/non-linearities
- 1996
  - full v7_00 analysis including electron calibration

Summary

- 1997 analysis looks pretty good
  - data-MC overlays similar to published arrays with a few improvements
  - energy scale/non-linearity systematic appears improved
  - fit results are consistent with published results
  - 3pi0s a problem
- 1999 analysis has a few more problems
  - data-MC overlays show a few problems (ring number, z slope, seed energy)
  - energy scale/non-linearity systematic appears smaller than in 97
  - no fits yet
  - 3pi0s a problem
- 1996 analysis remains to be done