Comparison of full reconstruction/production vs. post production

Please go here.

Space Charge effects in strange decays

Herein, **old** refers to the older, constant space charge correction, and **new** refers to the newer, 1/r^2 space charge correction.

Shown are mass plots from ~10k (10133) events in one Full Field central run (2322023), and ~10k (10002) events in one Reverse Full Field central run (2325002). The only cuts beyond what are in the reconstruction are ptV0 > 0.7 GeV/c for the Lambdas and AntiLambdas in order to bring out good signal-to-noise. For reference, Mass(Lambda) = 1.116 GeV/c^2, and Mass(K0short) = 0.498 GeV/c^2. Fit result parameters are shown at the bottom of the page along with the macro used to obtain the results.

Comments:

The data look very similar, showing no gross differences. I have used simple gaussian signal plus linear background fits to get a measure of the signal from height*width of the gaussian. For the Full Field data, the ratio of the measures of the AntiLambdas to Lambdas drops from 0.817 (old) to 0.771 (new), a ~6% drop! For the Reverse Full Field data, the ratio rises from 0.705 (old) to 0.713 (new), a ~1% rise. Coming from the same datasets, most of the errors in the comparison of these ratios for each field setting cancel. The ratios do appear to come closer together! I'm not stating that the ratios from the opposite fields do or do not agree with each other as the Full Field and Reverse Full Field are different datasets with different errors and possibly different biases from the appropriateness of my fit function. But the two datasets appear to respond differently to the corrections.

The Full Field run had beam intensities of 28.81 and 28.46 (E09 ions, blue and yellow respectively). The Reverse Full Field run had beam intensities of 26.00 and 20.64. The higher intensity in the Full Field run would possibly lead to a larger effect in that data. So perhaps the larger shift in that data is expected? (though perhaps not by THAT much?)

It should also be kept in mind that the ratios may be changing in part due to (Anti)Lambdas being shifted in pt across my 0.7 GeV/c cut.

Central Full Field:

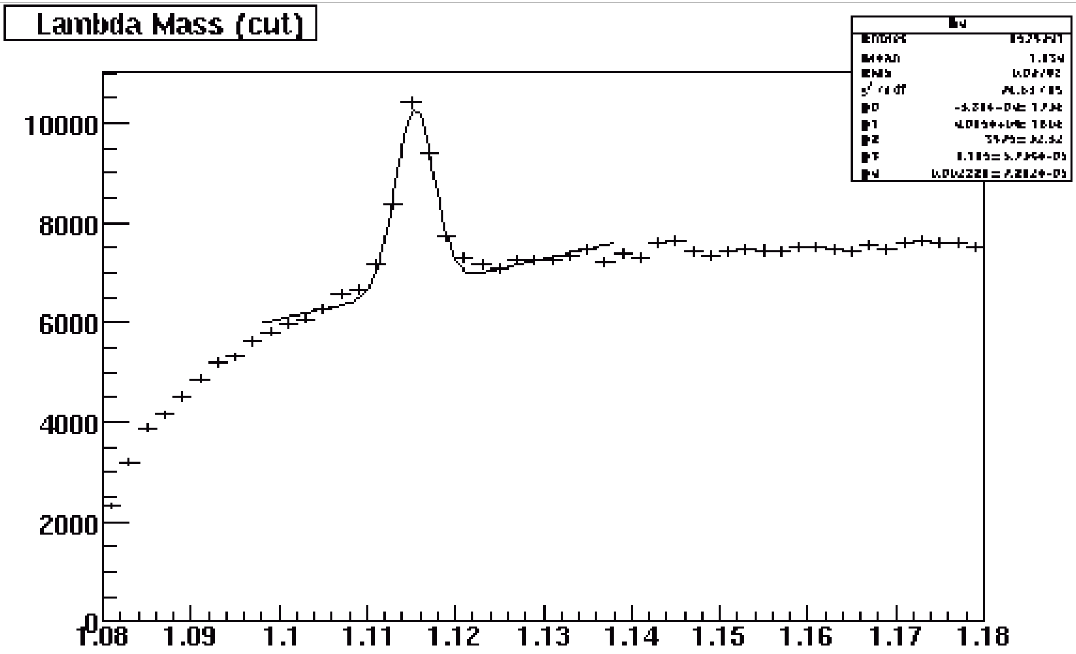

Figure 1. Lambda mass, old space charge correction.

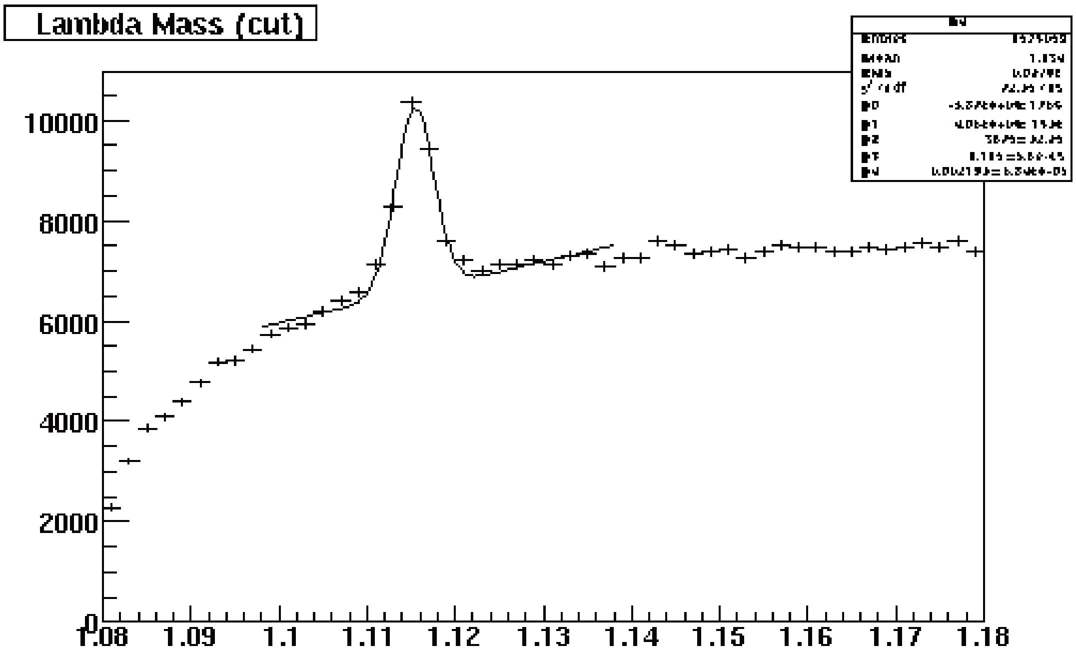

Figure 2. Lambda mass, new space charge correction.

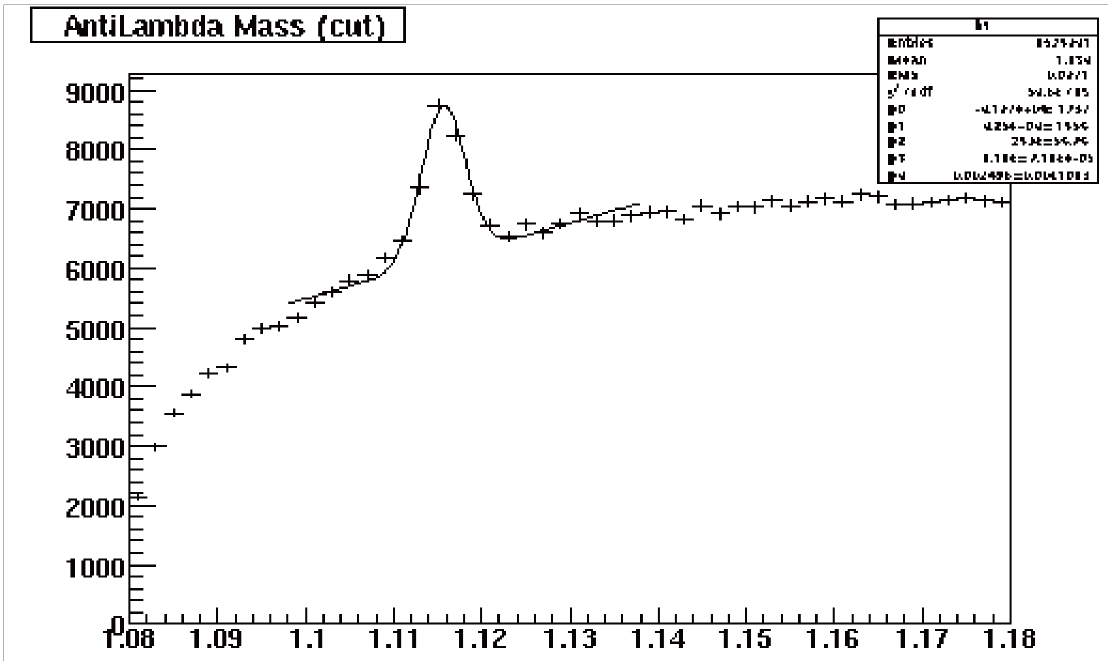

Figure 3. AntiLambda mass, old space charge correction.

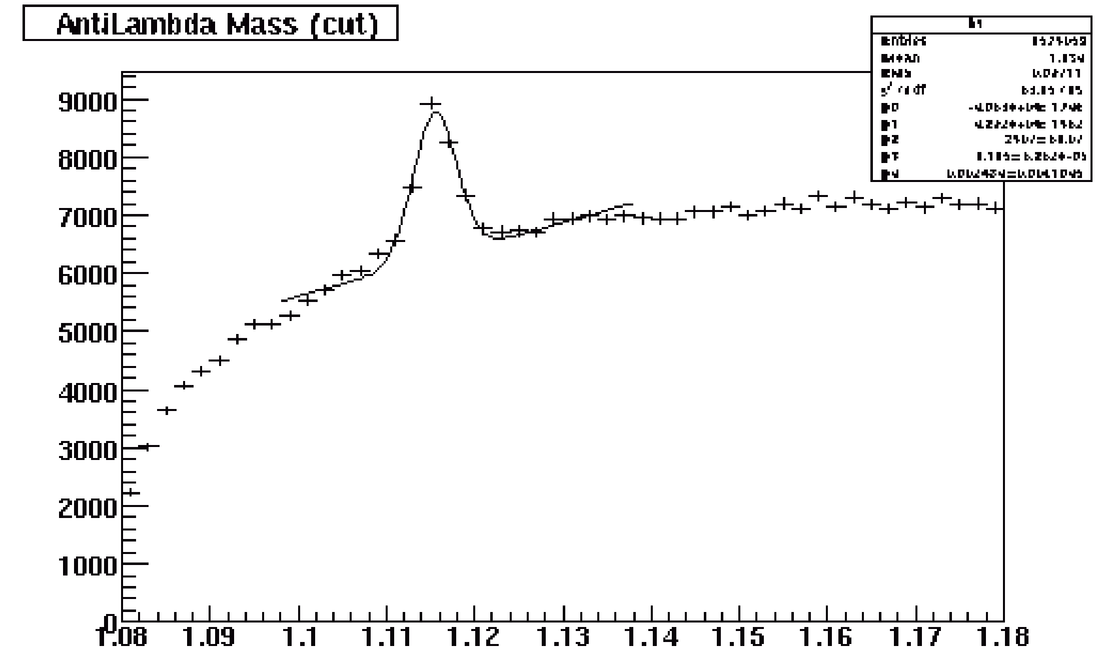

Figure 4. AntiLambda mass, new space charge correction.

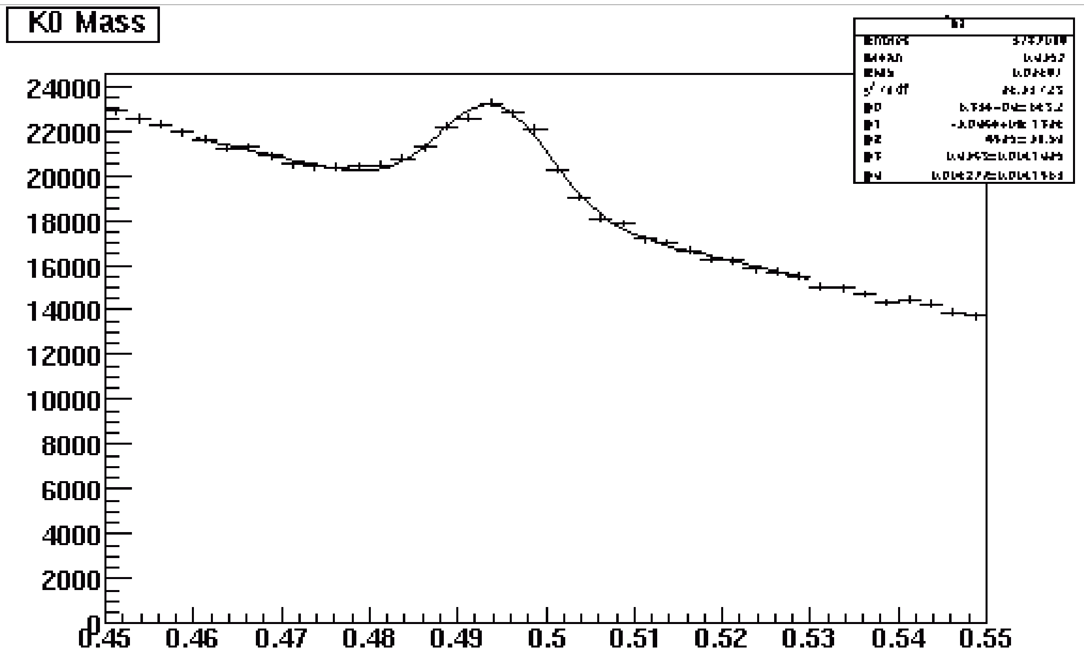

Figure 5. K0 mass, old space charge correction.

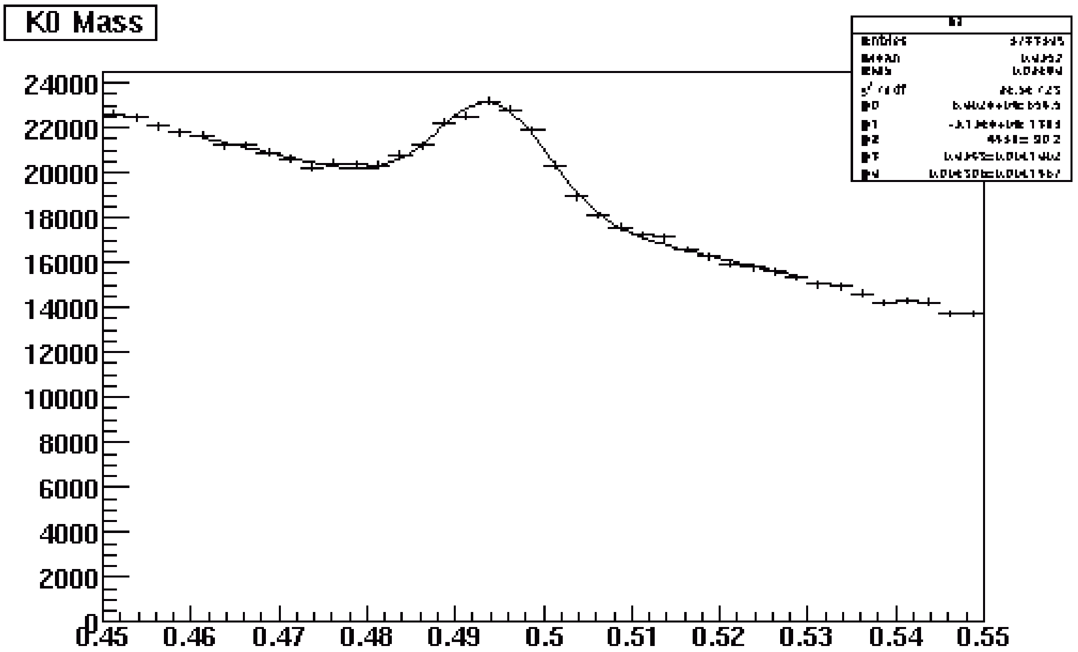

Figure 6. K0 mass, new space charge correction.

Central Reverse Full Field:

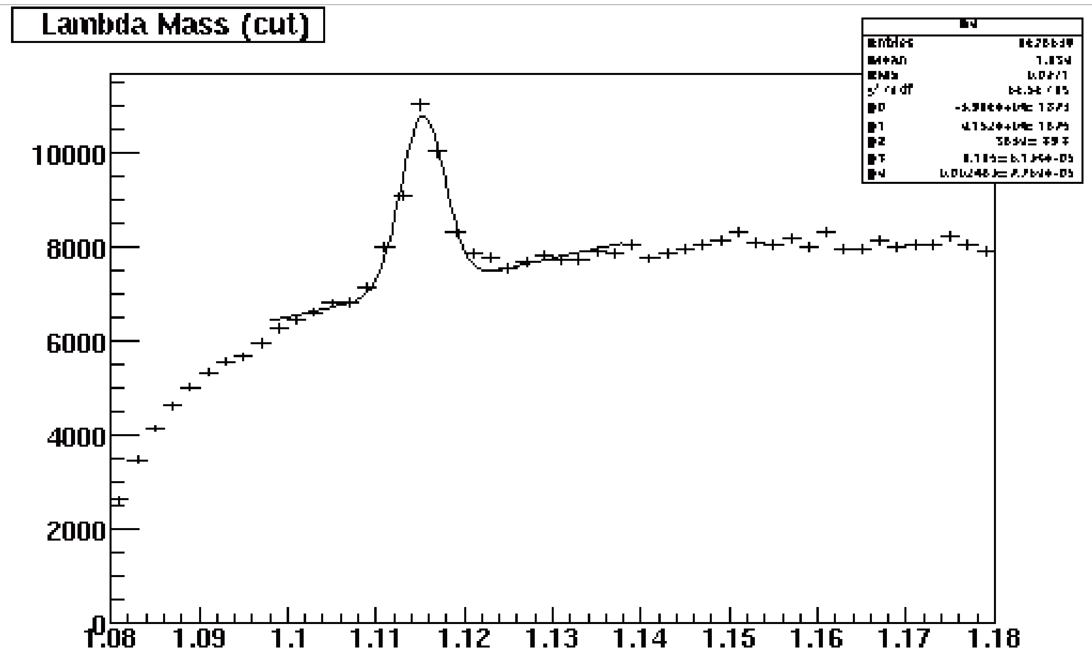

Figure 1. Lambda mass, old space charge correction.

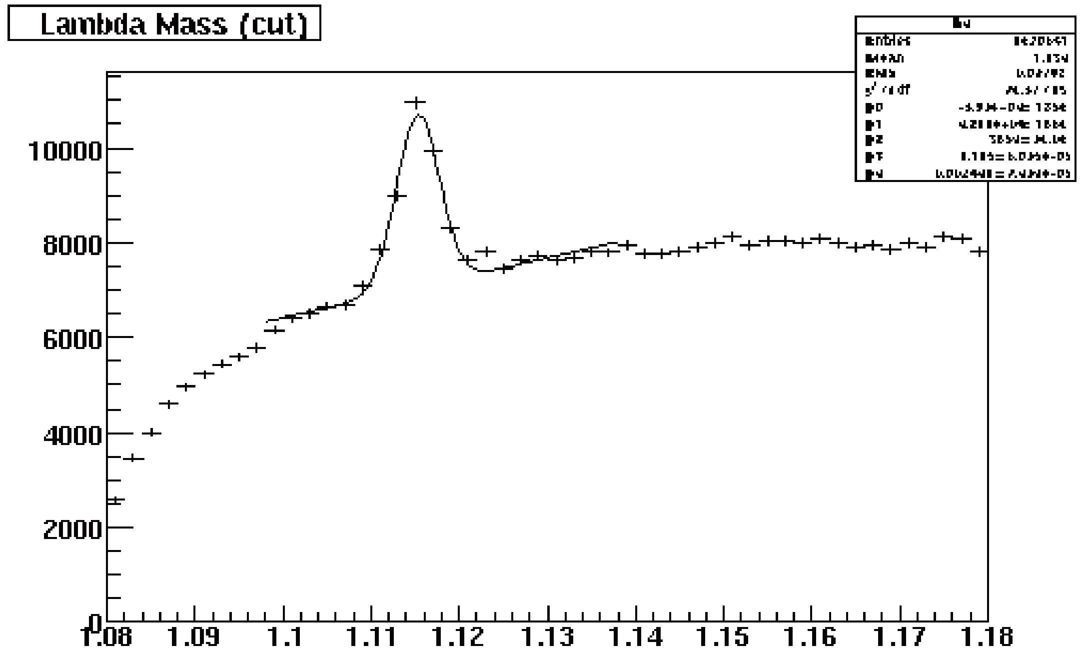

Figure 2. Lambda mass, new space charge correction.

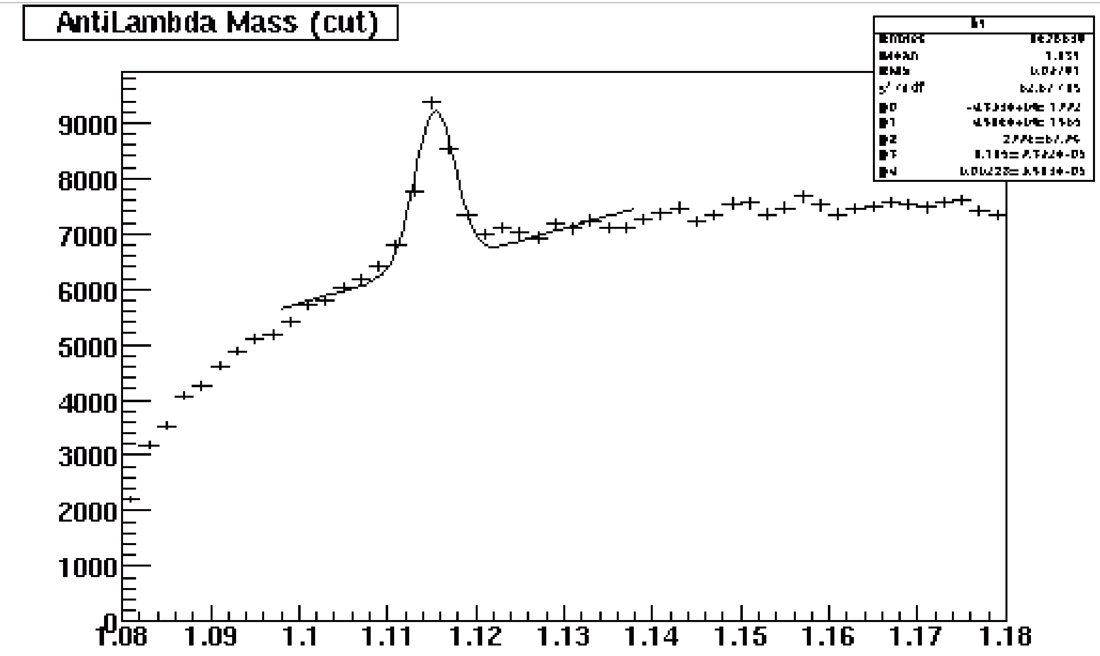

Figure 3. AntiLambda mass, old space charge correction.

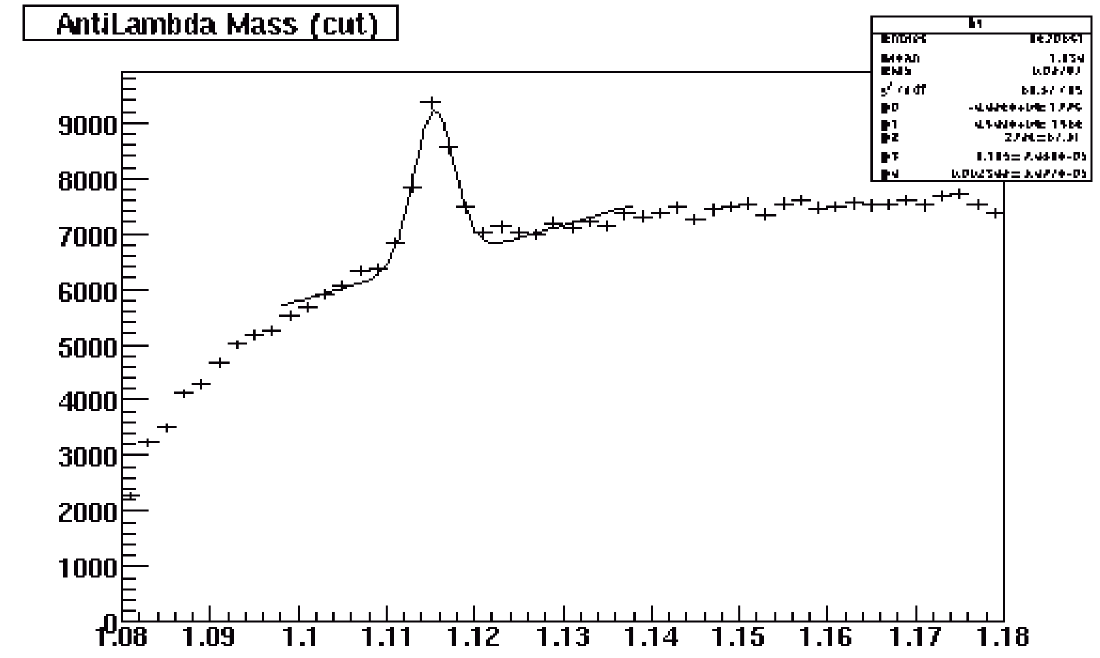

Figure 4. AntiLambda mass, new space charge correction.

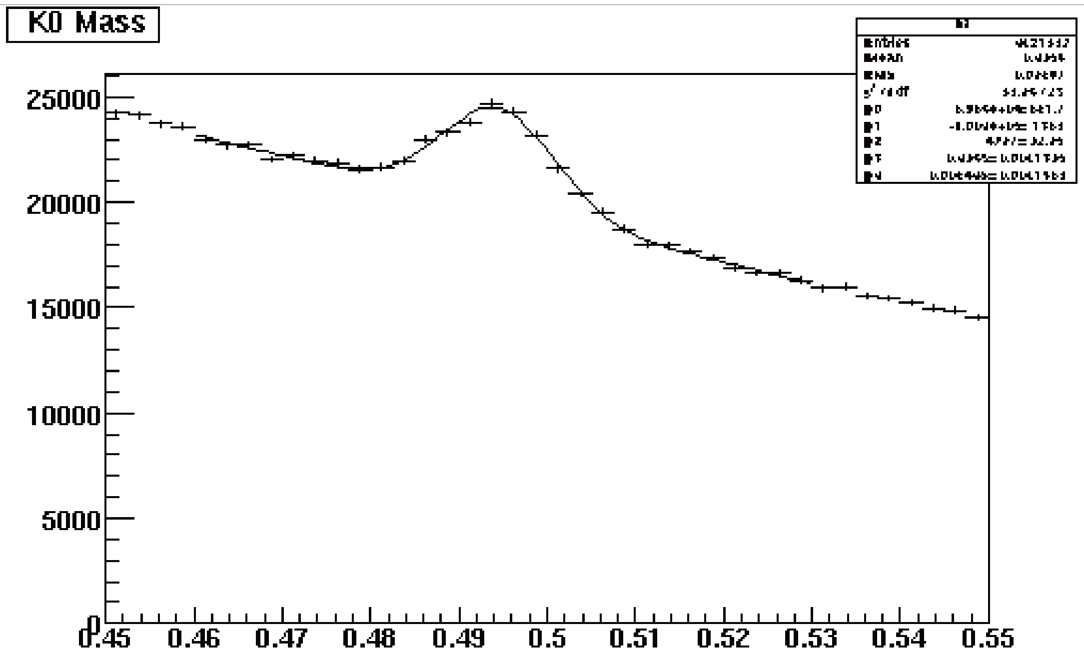

Figure 5. K0 mass, old space charge correction.

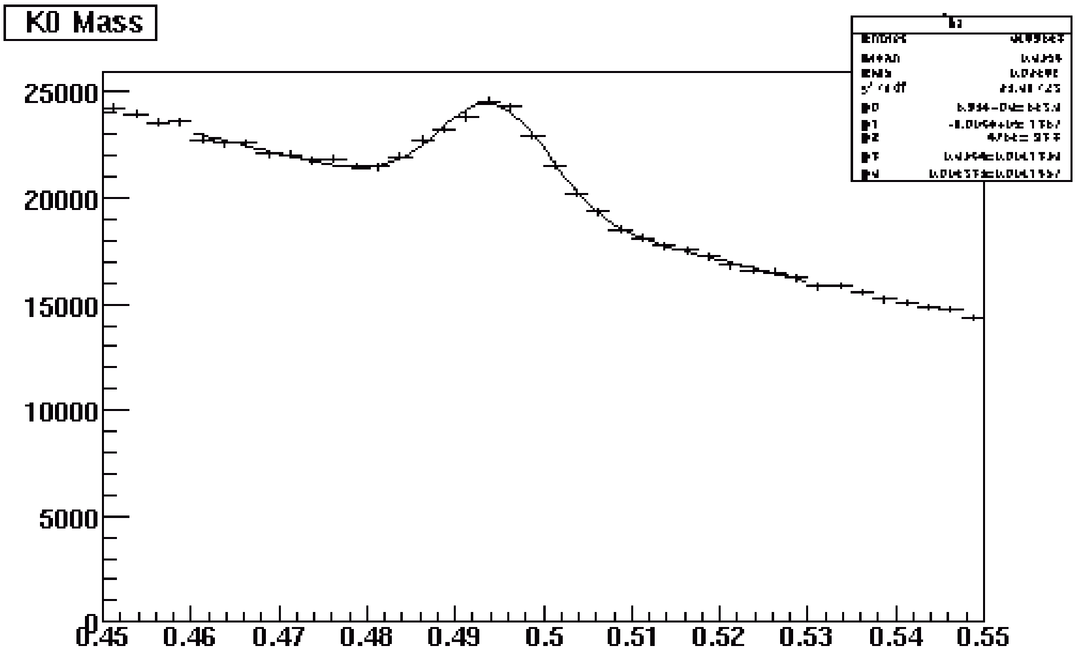

Figure 6. K0 mass, new space charge correction.

Fit function = p0 + p1*x + p2*exp(-(x-p3)^2 / (2 * p4^2))

Species	Field	Correction	NAME	VALUE	ERROR	STEP SIZE	1ST DERIV.
Lambda	FFF	Old	p0	-3.80994e+04	1.79767e+03	7.82430e-02	-1.60938e-05
			p1	4.01477e+04	1.60760e+03	7.00241e-02	-1.80289e-05
			p2	3.57460e+03	9.23156e+01	2.88185e-01	1.38343e-05
			p3	1.11539e+00	5.79388e-05	5.31859e-07	-4.36276e+00
			p4	2.22094e-03	7.21190e-05	2.06817e-07	9.31490e+00
			Measure:	7.9390			
		New	p0	-3.87826e+04	1.78424e+03	7.89004e-02	1.11502e-05
			p1	4.06785e+04	1.59565e+03	7.06138e-02	1.20374e-05
			p2	3.67515e+03	9.22526e+01	2.93642e-01	-2.29245e-05
			p3	1.11540e+00	5.59988e-05	5.31863e-07	4.87567e+01
			p4	2.19930e-03	6.84567e-05	2.00694e-07	4.97636e+01
			Measure:	8.0828			
	RFF	Old	p0	-3.91618e+04	1.87325e+03	7.98212e-02	6.37465e-06
			p1	4.15201e+04	1.67474e+03	7.14336e-02	7.26525e-06
			p2	3.63892e+03	8.97994e+01	2.76318e-01	-4.68637e-06
			p3	1.11530e+00	6.19381e-05	5.31814e-07	-8.38933e+00
			p4	2.46855e-03	7.76878e-05	2.16475e-07	1.64814e+00
			Measure:	8.9829			
		New	p0	-3.99001e+04	1.85644e+03	-1.57902e+01	-9.39004e-05
			p1	4.21060e+04	1.65976e+03	1.41116e+01	-1.04760e-04
			p2	3.65932e+03	9.00578e+01	-1.84721e+00	-3.69727e-05
			p3	1.11531e+00	6.09465e-05	2.89372e-07	-1.92900e+01
			p4	2.44098e-03	7.49889e-05	1.33347e-06	-8.57549e+01
			Measure:	8.9323			
AntiLambda	FFF	Old	p0	-4.12699e+04	1.73728e+03	-2.42136e+00	6.25032e-02
			p1	4.25018e+04	1.55370e+03	2.34725e+00	6.99726e-02
			p2	2.59829e+03	5.47397e+01	3.33706e-02	4.51604e-02
			p3	1.11564e+00	7.11811e-05	-1.24491e-07	2.10410e+04
			p4	2.49765e-03	1.01343e-04	-6.53333e-07	1.80433e+04
			Measure:	6.4896			
		New	p0	-4.08349e+04	1.74633e+03	7.13334e-02	3.51718e-05
			p1	4.22152e+04	1.56170e+03	6.38470e-02	3.93880e-05
			p2	2.50697e+03	8.10656e+01	2.39740e-01	-4.33803e-06
			p3	1.11548e+00	8.26157e-05	5.31903e-07	2.28948e+01
			p4	2.48431e-03	1.04515e-04	2.79668e-07	2.01765e+01
			Measure:	6.2281			
	RFF	Old	p0	-4.39342e+04	1.77212e+03	1.15136e+01	-1.82302e-05
			p1	4.51585e+04	1.58475e+03	-1.03208e+01	-2.01176e-05
			p2	2.77787e+03	8.77379e+01	1.94801e-02	-2.62743e-06
			p3	1.11534e+00	7.32222e-05	-3.42579e-07	-6.71225e+00
			p4	2.28001e-03	9.51312e-05	1.94989e-07	7.96298e-02
			Measure:	6.3336			
		New	p0	-4.42610e+04	1.77378e+03	3.64516e+01	2.57434e-04
			p1	4.54948e+04	1.58637e+03	-3.21769e+01	2.86073e-04
			p2	2.71999e+03	8.79096e+01	5.94117e-01	1.24210e-05
			p3	1.11537e+00	7.43104e-05	3.85218e-07	-2.80820e+00
			p4	2.34207e-03	9.47721e-05	-1.65548e-06	6.23533e+01
			Measure:	6.3704			
K0 short	FFF	Old	p0	6.33047e+04	6.63205e+02	2.10039e+00	-3.54466e-05
			p1	-9.04387e+04	1.32614e+03	-4.70089e+00	-1.79452e-05
			p2	4.52541e+03	9.15929e+01	9.78719e-01	-7.84742e-06
			p3	4.94312e-01	1.42452e-04	-8.22166e-07	5.90868e-01
			p4	6.27693e-03	1.58338e-04	1.58207e-06	-1.07334e+00
			Measure:	29.406			
		New	p0	6.40153e+04	6.56499e+02	-3.47180e+00	-1.29197e-05
			p1	-9.19614e+04	1.31305e+03	6.90457e+00	-7.32936e-06
			p2	4.53053e+03	9.01994e+01	-2.85960e-01	-1.92053e-06
			p3	4.94316e-01	1.40208e-04	6.92714e-07	1.26992e+00
			p4	6.30566e-03	1.58721e-04	4.52152e-07	1.64083e-01
			Measure:	28.568			

RFF	Old	p0 6.96371e+04 6.81654e+02 7.71849e-02 -3.12589e-05 p1 -1.00912e+05 1.36319e+03 1.55096e-01 -1.30703e-05 p2 4.72688e+03 9.22500e+01 2.04991e-01 -3.65983e-05 p3 4.94508e-01 1.39496e-04 3.84215e-07 2.63259e+01 p4 6.44461e-03 1.56298e-04 3.11724e-07 -1.44056e+01 **Measure:** 30.462
	New	p0 6.92991e+04 6.83887e+02 9.40420e+00 7.57102e-05 p1 -1.00414e+05 1.36716e+03 -1.84589e+01 3.73839e-05 p2 4.76827e+03 9.37961e+01 1.17490e+00 1.61918e-05 p3 4.94444e-01 1.39943e-04 8.59530e-07 4.76543e+00 p4 6.33307e-03 1.55746e-04 1.14390e-06 1.65859e+01 **Measure:** 30.198

Macro:

```
root4star 'strangeFormulas.C("*.MuDst.root")'
```

```
TH1F h2("h2","K0 Mass",40,0.45,0.55);
TH1F h4("h4","Lambda Mass (cut)",50,1.08,1.18);
TH1F h5("h5","AntiLambda Mass (cut)",50,1.08,1.18);

TString lcuts;
lcuts = "(V0.ptV0()>0.7)";
strangeTree.Draw("V0.massLambda()>>h4",lcuts.Data());
strangeTree.Draw("V0.massAntiLambda()>>h5",lcuts.Data());
strangeTree.Draw("V0.massK0Short()>>h2");

gStyle->SetOptFit(1111);
TF1 myf("myf","[0]+(x*[1])+gaus(2)",1.098,1.138);

myf.SetParameters(-50000,50000,4000,1.116,0.0025);
h4.Fit("myf","R","e");
myf.SetParameters(-50000,50000,4000,1.116,0.0025);
h5.Fit("myf","R","e");
myf.SetRange(0.46,0.53);
myf.SetParameters(7000,-10000,400,0.498,0.001);
h2.Fit("myf","R","e");
```