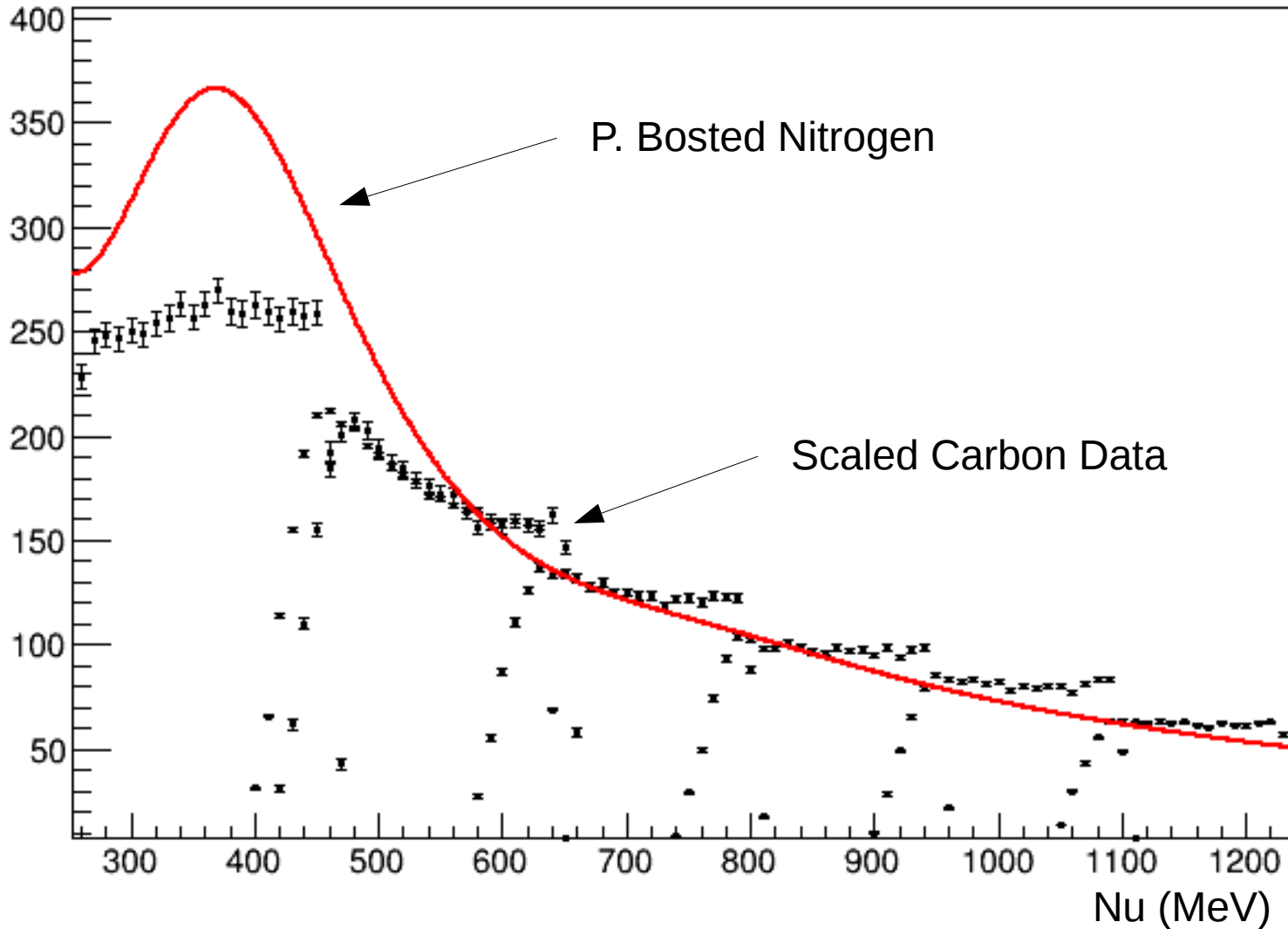


Dilution Update
09/03/14

Three issues to be addressed

- Carbon → Nitrogen scaling factor
 - Current method has a few problems (next slide)
 - Acceptance study will have an effect.
- Radiation Thickness Scaling
 - Need to match R.T. for empty and carbon dilution runs.
 - Carbon R.T. doesn't match production, also needs scaling.
- Uncertainty analysis

3.350 GeV 5T Carbon, acc=3.1e-10

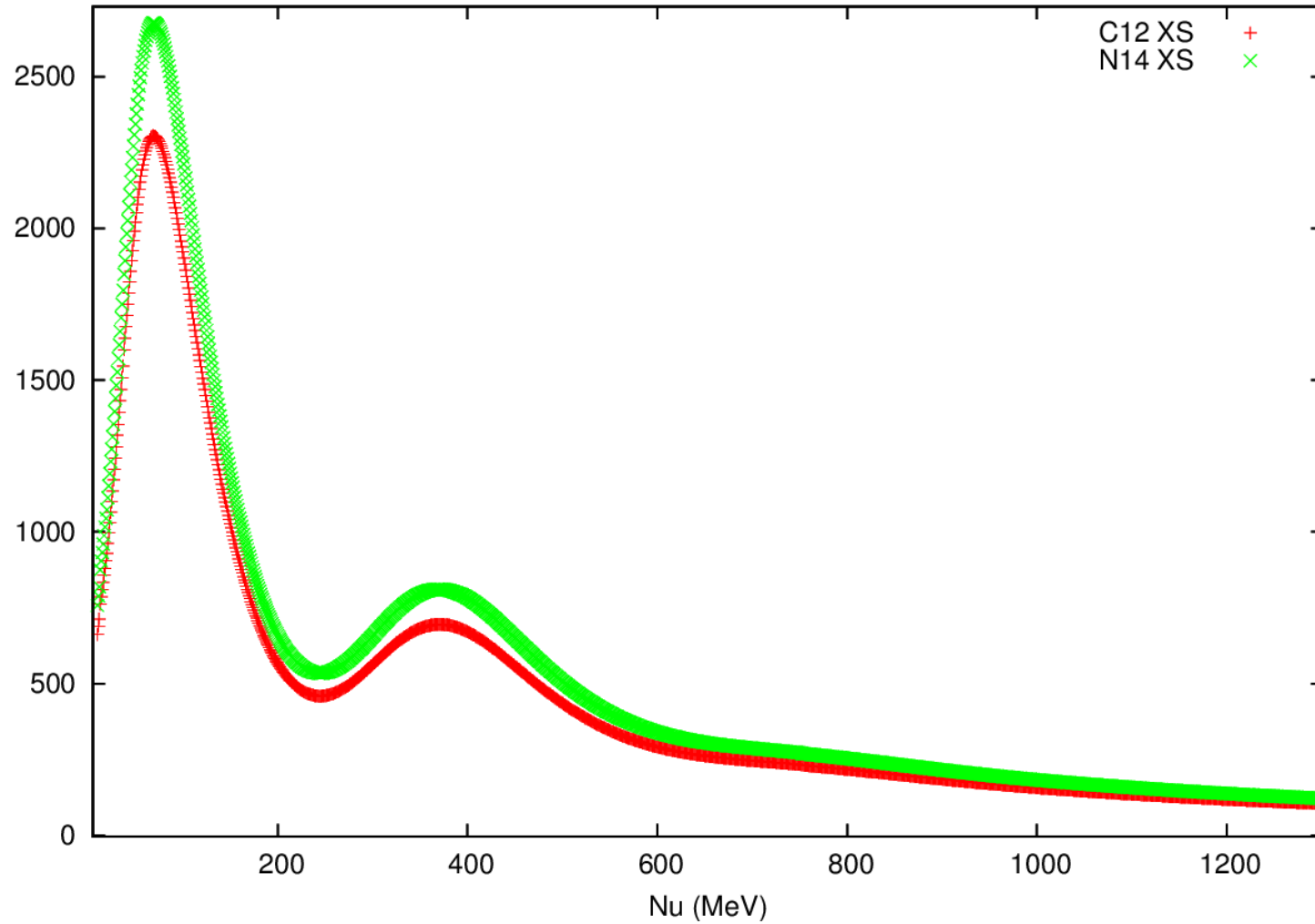


Problems with current method:

- Large Delta gap
- Yield discontinuous at high Nu.
- Should not be a constant scaling factor (Carbon → Nitrogen).

} Acceptance problem?

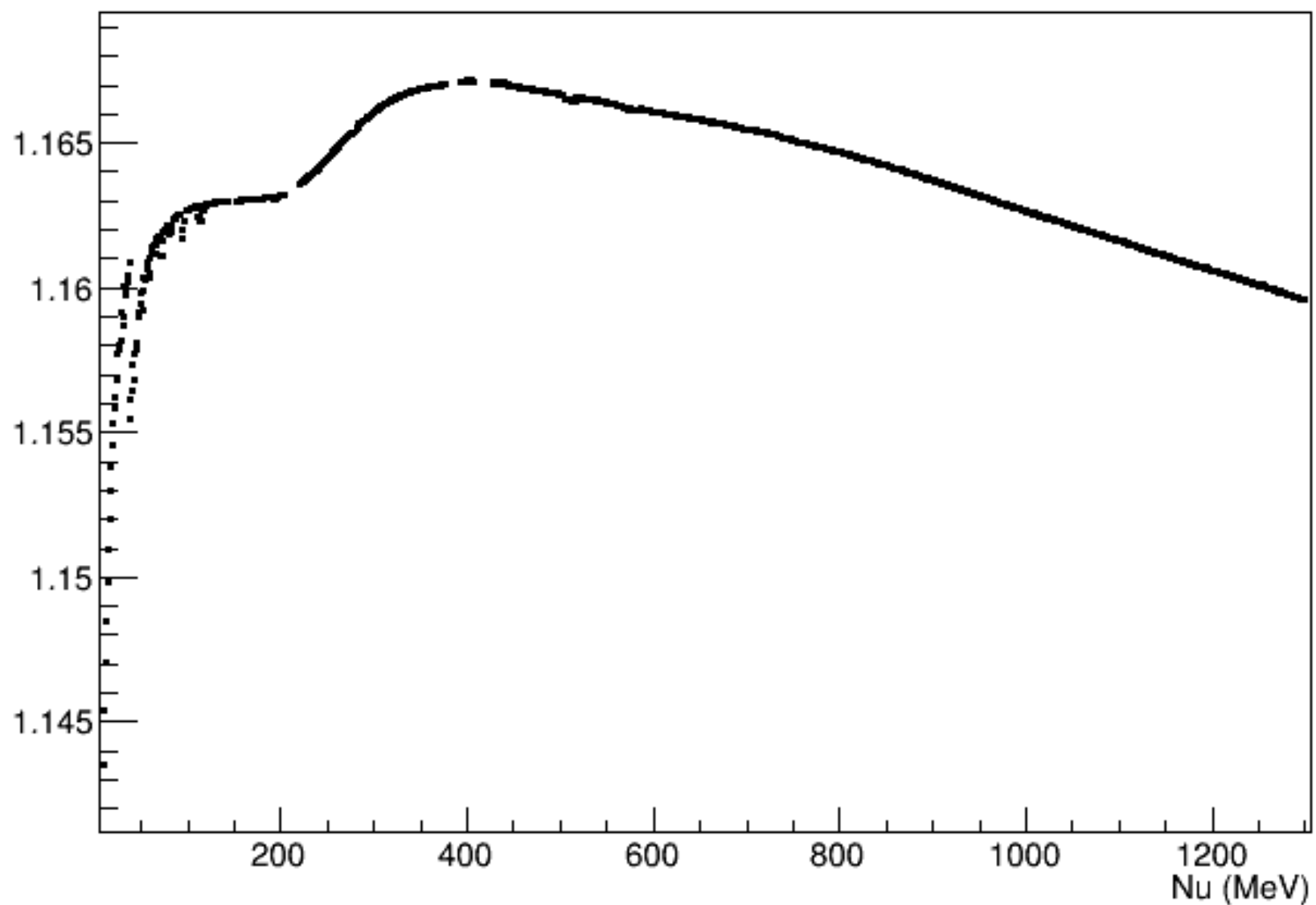
P.Bosted Radiates XS 3.350GeV



New (temporary?) method:

- Run Bosted simulation for both Carbon and Nitrogen.
- Take ratio as scaling factor for data.
- Apply scaling factor bin by bin to carbon data.

Bosted XS ratio for 3.350GeV



Radiation Length Scaling Method:

- Produce 2 radiated carbon models
 - First radiated with carbon dilution R.L.
 - Second radiated with production R.L.
- Ratio of the two cross sections is applied to carbon dilution to scale R.L. to match production.
- Same method for empty dilution.

Production

	cm	g/cm ³	g/cm ²	thickness
name	thick_cm	density	radlen	dens*thick/r adlen
beam exit	0.0381	1.85	65.19	0.00108
air entrance	7.6200	0.0001664	94.32	0.00001
SC entrance	0.0178	2.7	24.011	0.00200
LN2 shield	0.0038	2.7	24.011	0.00043
4k shield	0.0013	2.7	24.011	0.00015
tail nose	0.0127	2.7	24.011	0.00143
LHe	0.4369	0.145	94.322	0.00067
up endcap	0.0018	2.7	24.011	0.00020
LHe	0.6363	0.145	94.322	0.00098
Solid NH3	1.5545	0.817	45.28	0.02805
LHe	0.6363	0.145	94.322	0.00098
down endcap	0.0018	2.7	24.011	0.00020
LHe	0.4369	0.145	94.322	0.00067
tail nose	0.0127	2.7	24.011	0.00143
4k shield	0.0013	2.7	24.011	0.00015
LN2 shield	0.0038	2.7	24.011	0.00043
SC exit	0.0508	2.7	24.011	0.00571
Sum	11.4668			0.04456

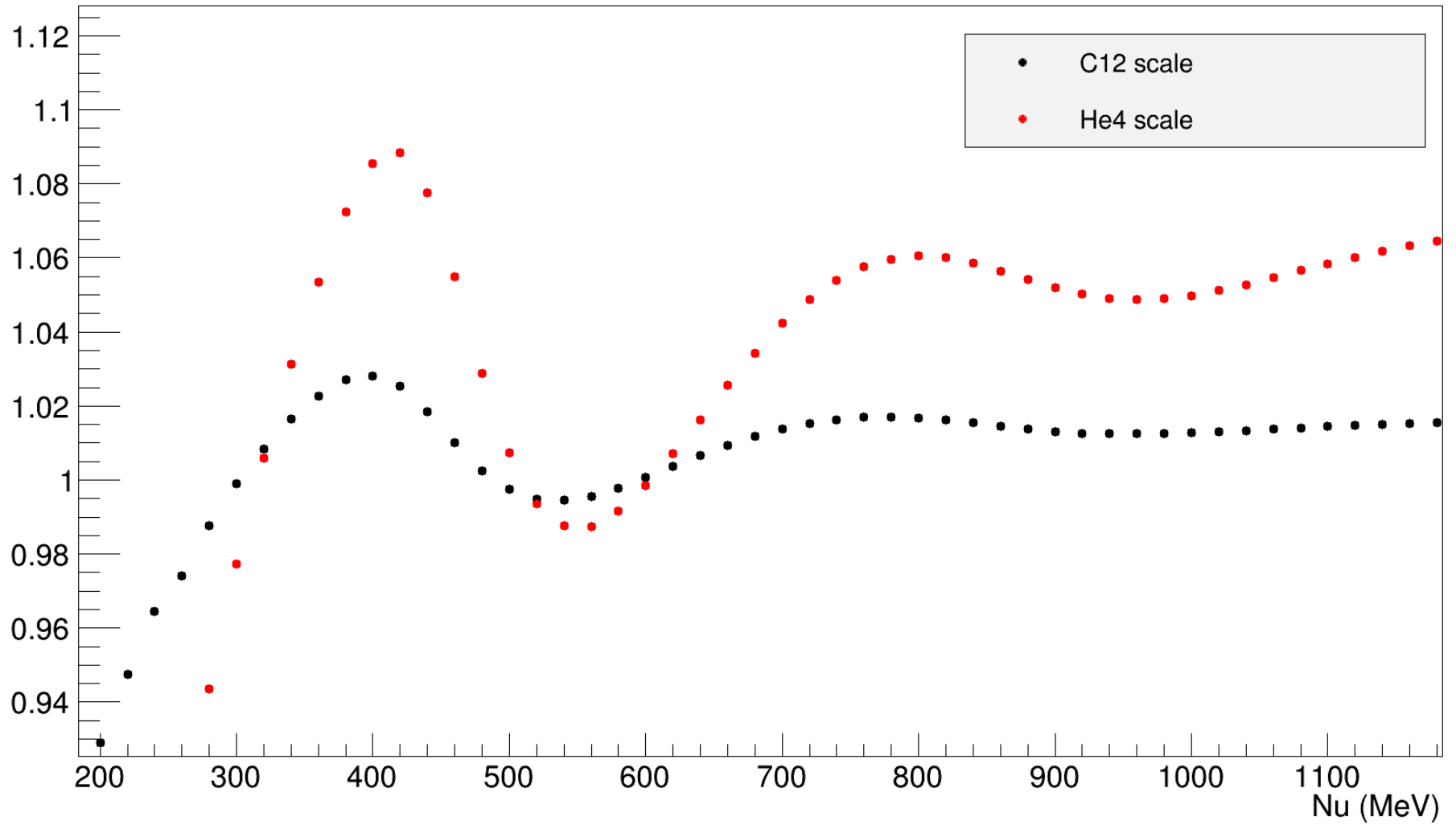
Carbon Dilution

name	thick_cm	density	radlen	dens*thick/r adlen
beam exit	0.0381	1.85	65.19	0.00108
air entrance	7.6200	0.0001664	94.32	0.00001
SC entrance	0.0178	2.7	24.011	0.00200
LN2 shield	0.0038	2.7	24.011	0.00043
4k shield	0.0013	2.7	24.011	0.00015
tail nose	0.0127	2.7	24.011	0.00143
LHe	0.4369	0.145	94.322	0.00067
C12 (thick)	0.3175	2.267	42.6969	0.01686
Lhe (inside)	2.5025	0.145	94.322	0.00385
LHe	0.4369	0.145	94.322	0.00067
tail nose	0.0127	2.7	24.011	0.00143
4k shield	0.0013	2.7	24.011	0.00015
LN2 shield	0.0038	2.7	24.011	0.00043
SC exit	0.0508	2.7	24.011	0.00571
Sum	11.4561			0.03486

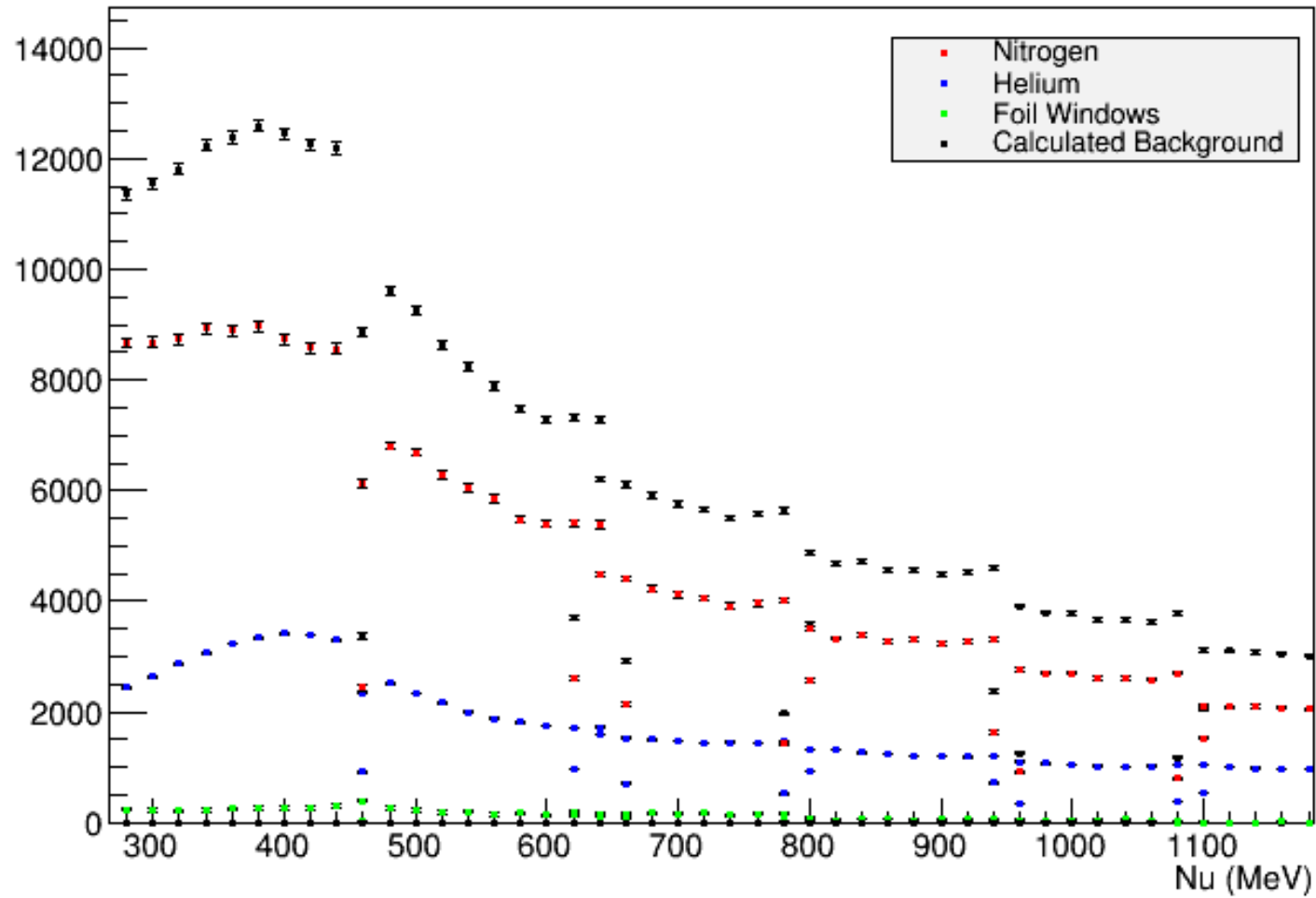
Empty Dilution

name	thick_cm	density	radlen	dens*thick/r adlen
beam exit	0.0381	1.85	65.19	0.00108
air entrance	7.6200	0.0001664	94.32	0.00001
SC entrance	0.0178	2.7	24.011	0.00200
LN2 shield	0.0038	2.7	24.011	0.00043
4k shield	0.0013	2.7	24.011	0.00015
tail nose	0.0127	2.7	24.011	0.00143
LHe	0.4369	0.145	94.322	0.00067
Lhe (inside)	2.8200	0.145	94.322	0.00434
LHe	0.4369	0.145	94.322	0.00067
tail nose	0.0127	2.7	24.011	0.00143
4k shield	0.0013	2.7	24.011	0.00015
LN2 shield	0.0038	2.7	24.011	0.00043
SC exit	0.0508	2.7	24.011	0.00571
Sum	11.4561			0.01849

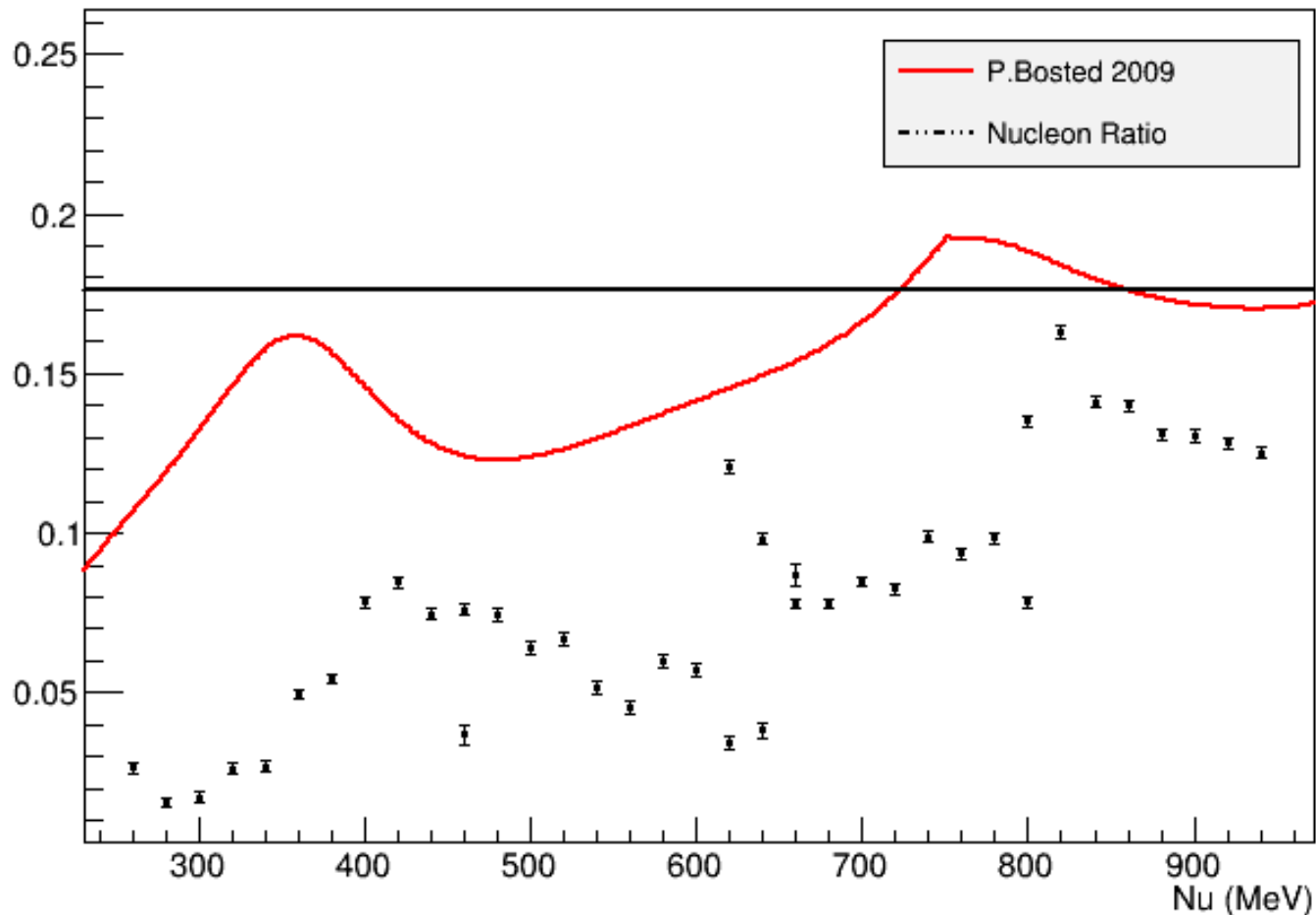
Radiation length scale 3.350GeV



Calculated Background by Material 3.350GeV



3.350GeV Dilution



- Much smaller than expected... possible issue with method?
- Need to include uncertainty. Main uncertainty will come from PF.
- As acceptance becomes better understood the carbon \rightarrow nitrogen scaling factor may change.