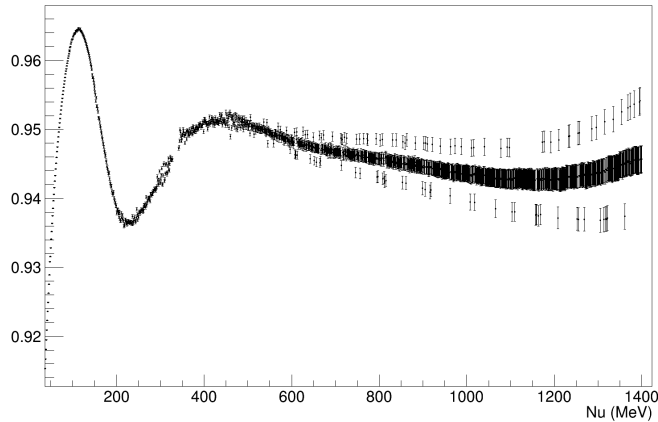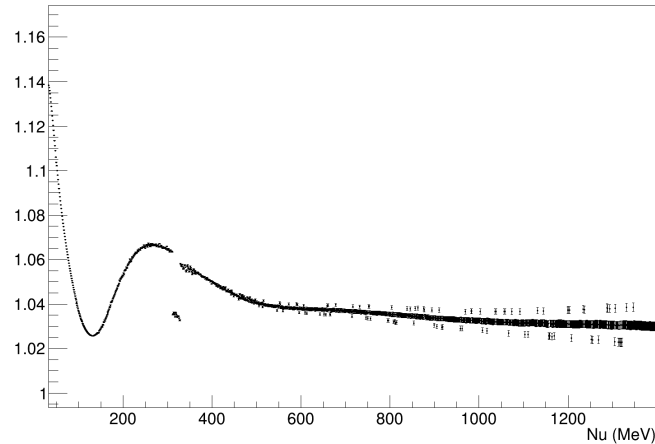# Dilution Analysis
March 4, 2015

Last Time

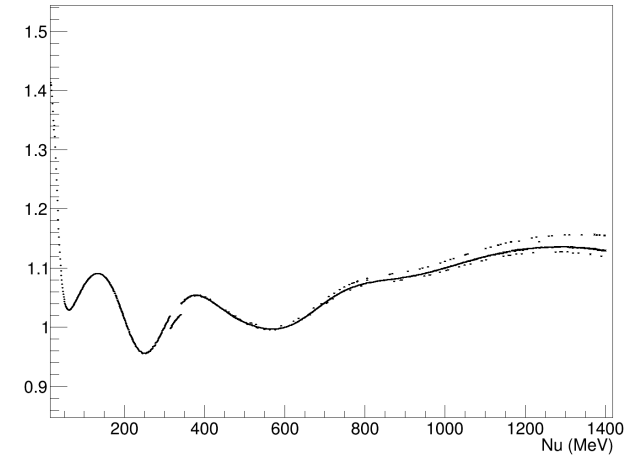Used P.Bosted simulation to find a tuned XS ratio for carbon →nitrogen and dilution helium →production helium

Helium XS ratio: empty dilution →carbon dilution

Helium XS ratio: empty dilution → production
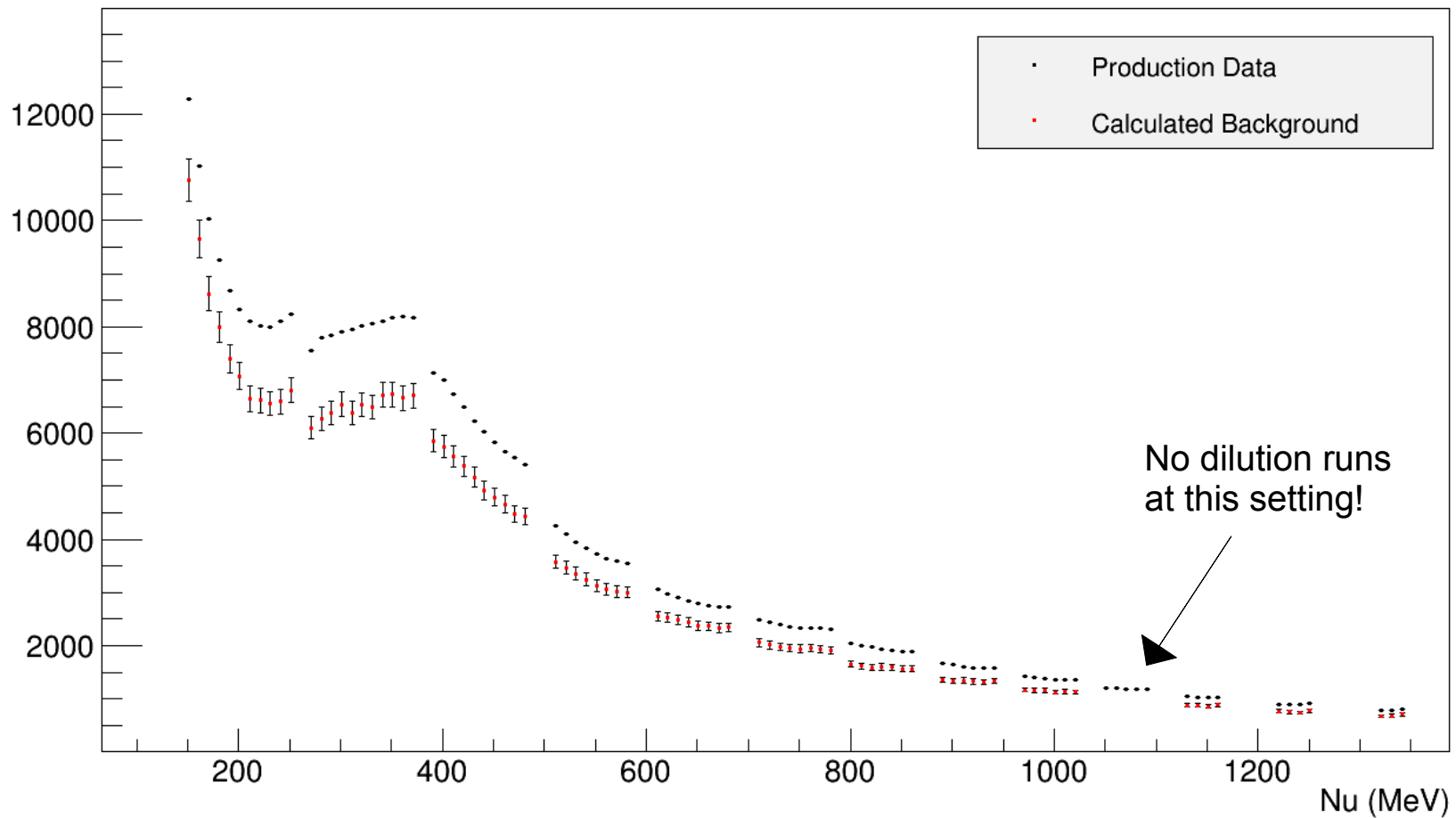
C12/N14 XS ratio: carbon dilution → nitrogen production

Apply XS ratios to dilution runs to calculate the production background:

$$Y_{bg} = [Y_{dummy} - Y_{empty}] + [(1 - pf \frac{L_{tg}}{L_{total}}) \alpha Y_{empty}] + [\gamma(pf) \frac{\rho_N L_{target} M_C}{\rho_C L_C M_N} (Y_{carbdil} - (1 - \frac{L_c}{L_{total}}) \beta Y_{empty})]$$

Ratio 1   Ratio 3   Ratio 2
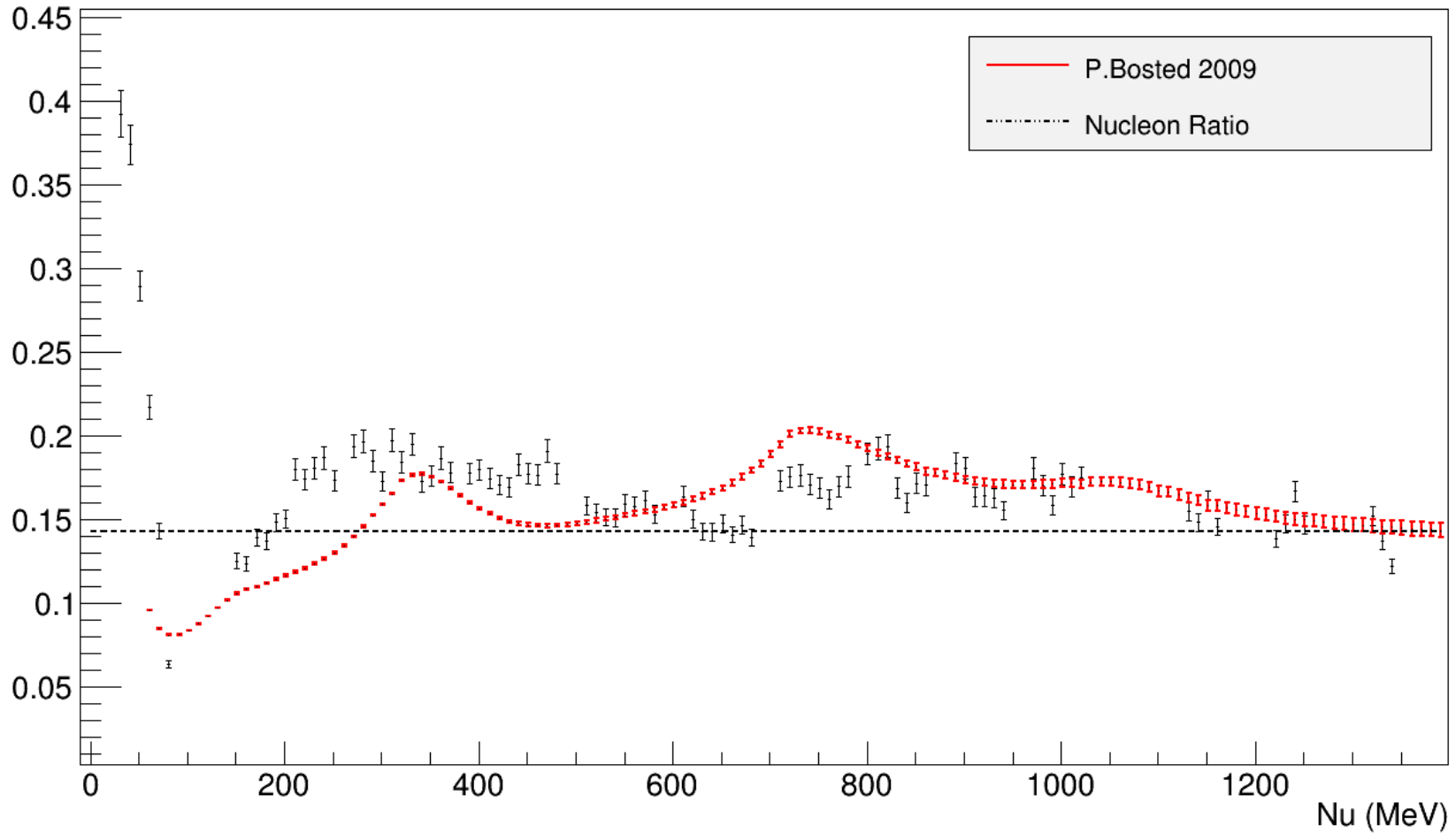
Calculated Background

2.254GeV 5T Transverse Normalized Yields

Calculated Dilution

2.254GeV 5T Transverse Dilution

To do

- Update results with material specific packing fractions and improved tune.

- Clean up results for other settings.
  - So far I've looked at 2.2GeV 5T trans/long, 1.1GeV 2.5T and 2.2GeV 2.5T, other settings don't look as good as what I showed today. Possibly due to model tune or beam position dependence in yields.

- Will start writing up a tech note next week.

- Suggestions from meeting?