

Packing Fraction Revisited

M. Cummings

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Method

$$Y_{pf} = Y_N + Y_{H_3} + \underline{Y_{He}} + \underline{Y_{Al}}$$

Includes contributions from aluminum end cap and NMR coil



$$Y_{pf} = Y_N + Y_{H_3} + Y'_{He} + Y_{dummy}$$



$$\frac{Y_{pf} - Y_{dummy}}{\underline{Y_{empty}}} = \frac{Y_N + Y_{H_3} + Y'_{He}}{\underline{Y_{empty}}}$$

$$Y_{He} = \underbrace{Y_{He}^{out}}_{\text{He outside the target cup}} + \underbrace{Y_{He}^{in}(1 - pf)}_{\text{He inside the target cup}}$$

Want to use cross section ratios: normalize by total counts with only helium

Method

$$\frac{Y_{pf} - Y_{dummy}}{Y_{empty}} = \frac{Y_N + Y_{H_3} + Y'_{He}}{Y_{empty}}$$

$$Y_x = \frac{\rho_x}{e} \frac{\sigma_x}{\Delta\Omega\Delta E'\Delta Z}$$

$$\rho_x = \frac{\rho_{mass} l_{tg} N_A}{M_{molar}}$$



$$\frac{Y_{pf} - Y_{dummy}}{Y_{empty}} = \frac{pf}{\rho_{He}\sigma_{He}} (\rho_N \sigma_N A_N + \rho_{H_3} \sigma_{H_3} A_{H_3} - \rho_{He} \sigma_{He} A_{He})$$

Cross sections
obtained
from g2psim

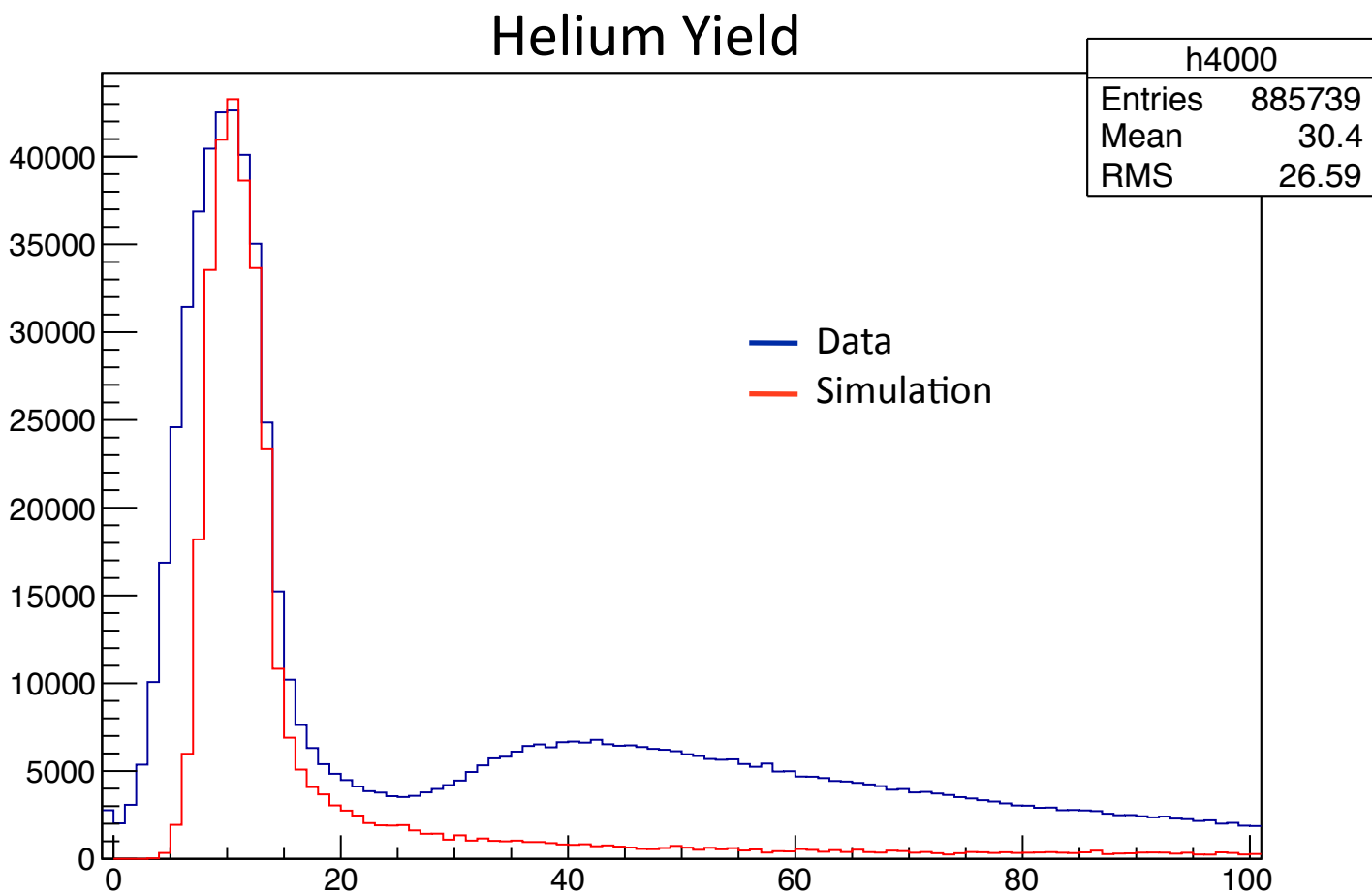
$$A_x = \frac{\# \text{ of counts in cut}}{\text{total } \# \text{ of counts in fit}}$$

Run Selection

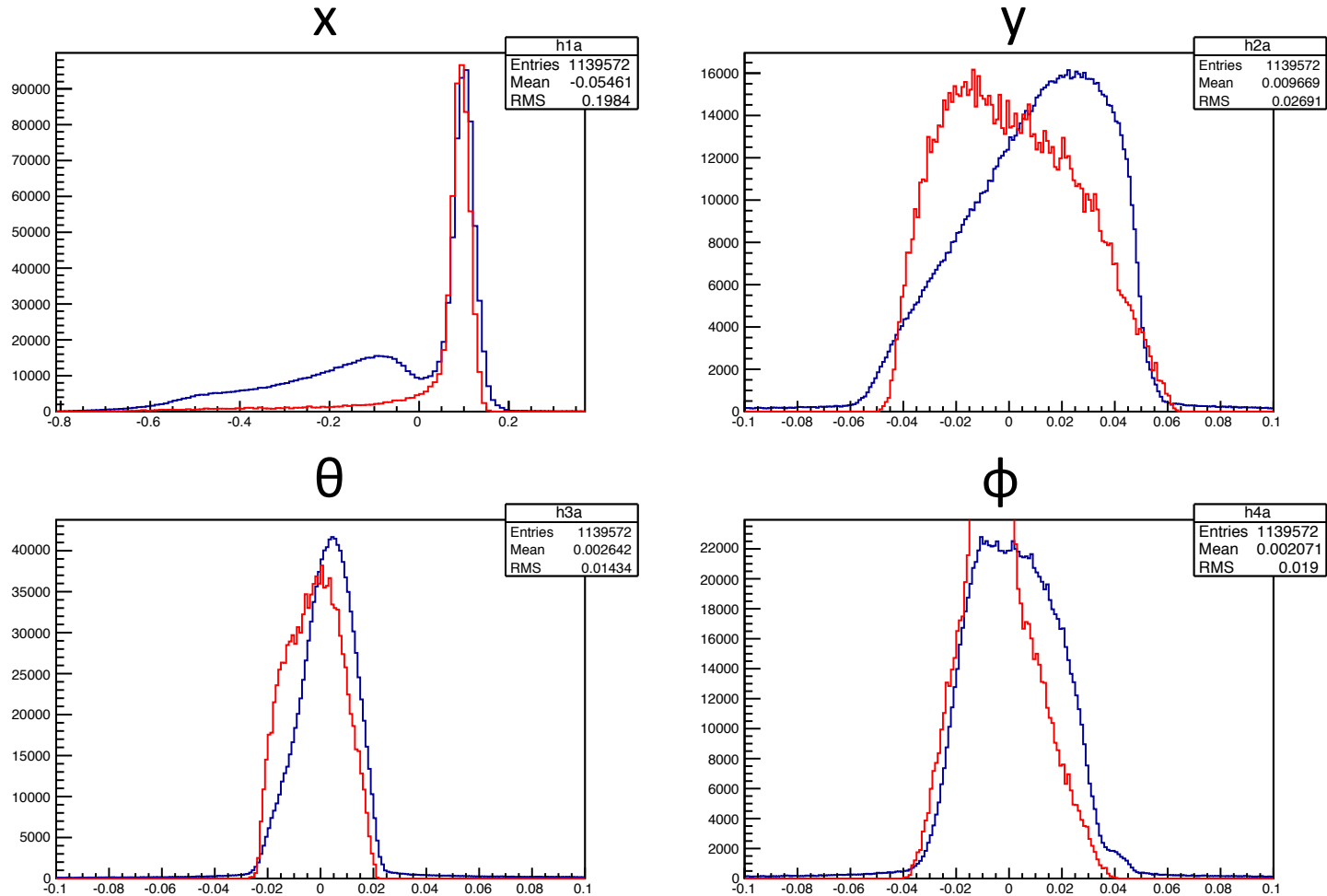
	Run	Tgt x	Tgt y	Tgt theta	Tgt phi
prod.	3446	4.57	3.38	0.0636	0.0042
dummy	3448	4.62	3.30	0.0635	0.0042
empty	3449	5.89	1.69	0.0619	0.0056
packing fraction ↓	3503	2.09	1.05	0.0608	0.0033
	3574	2.00	0.49	0.0601	0.0009
	3727	4.75	2.30	0.0633	0.0049
	3864	0.84	0.69	0.0608	0.0007

- Use “dummy” run in place of “empty” run
- Use production run in place of “packing fraction” run

Comparison of Data & Simulation



Comparison of Data & Simulation



Focal Plane Variables

Fitting Routine

Run 3446

