

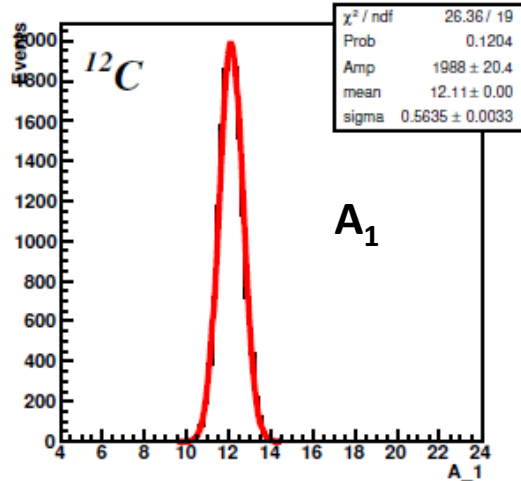
Resolution on Carbon

TRY TO UNDERSTAND:

- A1, A2 and A3 resolution depending on tof, p and T resolution;

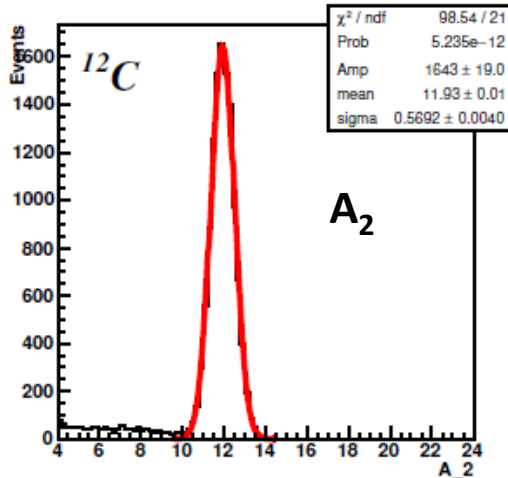
TOF (β) – TRACKER (p)

$$A_1 = \frac{p}{U \beta \gamma}$$



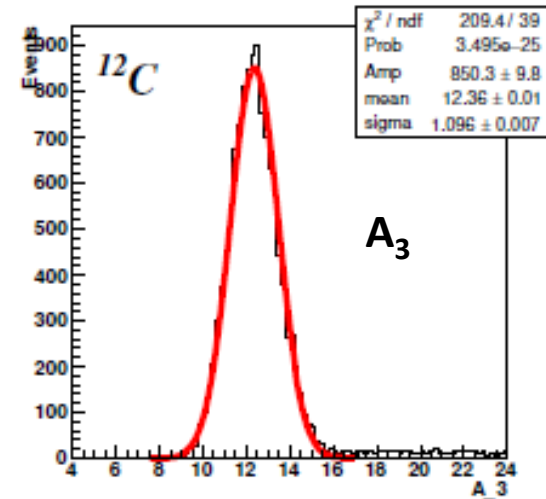
TOF (β) – CALO (T)

$$A_2 = \frac{T}{U(\gamma - 1)}$$



TRACKER (p) – CALO (T)

$$A_3 = \frac{p^2 - T^2}{2 U T}$$



RESOLUTIONS ON **CDR** (for ^{12}C)

- $T_{\text{of}} = 100 \text{ ps}$ (1.3%)
 - $p = 4.0 \%$
 - $T = 1.5 \%$
- $\sigma_{A1} = 4.6\%$
 $\sigma_{A2} = 4.7\%$
 $\sigma_{A3} = 9.2\%$

Analytic Resolution

TOF (β) – TRACKER (p)

$$A_1 = \frac{p}{U \beta \gamma}$$

TOF (β)– CALO (T)

$$A_2 = \frac{T}{U(\gamma - 1)}$$

TRACKER (p) – CALO (T)

$$A_3 = \frac{p^2 - T^2}{2 U T}$$

$$\sigma_{A_1} = \frac{p}{U \cdot \beta} \sqrt{\frac{1}{1 - \beta^2} \frac{1}{tof^2} \sigma_{tof}^2 + (1 - \beta^2) \left(\frac{\sigma_p}{p} \right)^2}$$

$$\sigma_{A_2} = \frac{T}{U \cdot \left(1 - \sqrt{1 - \beta^2} \right)} \sqrt{\frac{\beta^4}{1 - \beta^2} \frac{1}{\left(1 - \sqrt{1 - \beta^2} \right)^2} \frac{1}{tof^2} \sigma_{tof}^2 + (1 - \beta^2) \left(\frac{\sigma_T}{T} \right)^2}$$

$$\sigma_{A_3} = \frac{1}{U \cdot T} \sqrt{p^4 \left(\frac{\sigma_p}{p} \right)^2 + \frac{(p^2 + T^2)^2}{4} \left(\frac{\sigma_T}{T} \right)^2}$$

KINEMATICS of the ^{12}C fragment

- $\beta = 0.56,$
- $p = 7.5 \text{ GeV}/c;$
- $T = 2.3 \text{ GeV}$
- $Tof = 7.7 \text{ ns}$

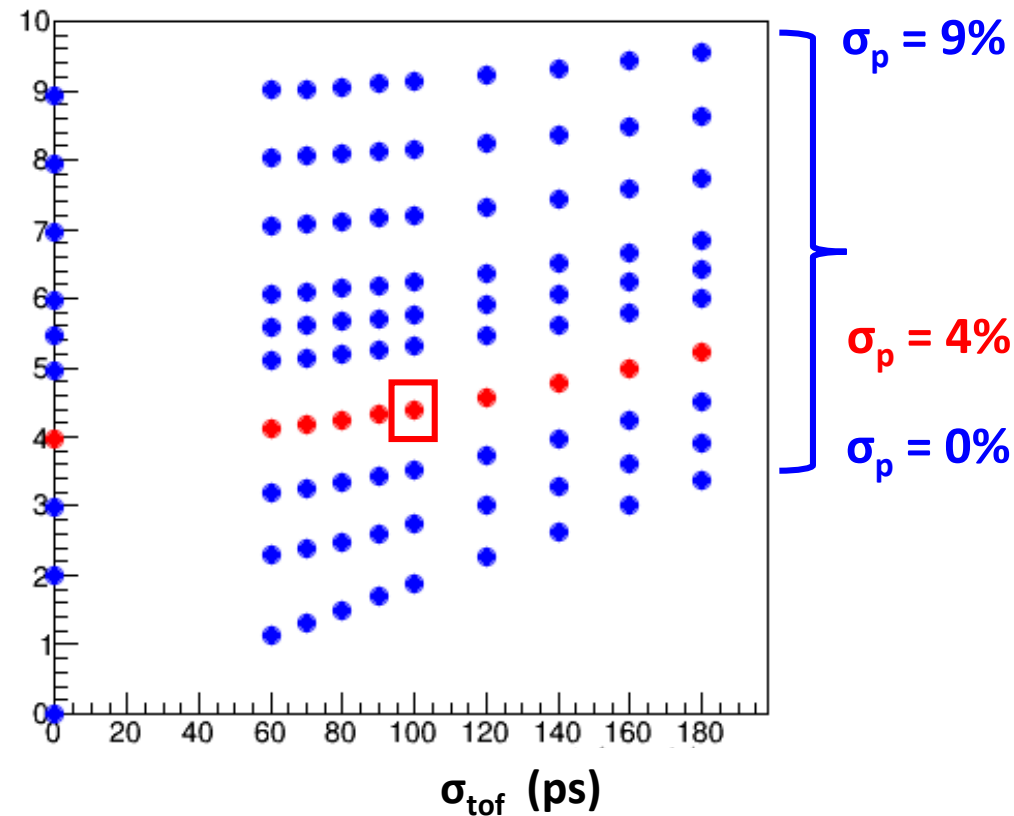
TESTED RESOLUTIONS

□ $Tof = \{0, 60, 70, 80, 90, 100, 120, 140, 160, 180\} \text{ ps}$

□ $p = \{0, 2, 3, 4, 5, 5.5, 6, 7, 8, 9\} \%$

² □ $T = \{0, 0.5, 1.0, 1.3, 1.5, 1.7, 2.0, 2.5, 3.0, 3.5\} \%$

σ_{A1} vs tof resolution (ns)



σ_{A1} comparison

- CDR = 4.6%
- ANALITICAL = 4.4%

A1:

- Low dependence on σ_{Tof}
- High dependence on σ_p

$\sigma_{tof} = 180$ ps

$\sigma_{tof} = 100$ ps

$\sigma_{tof} = 60$ ps

$\sigma_{tof} = 0$ ps

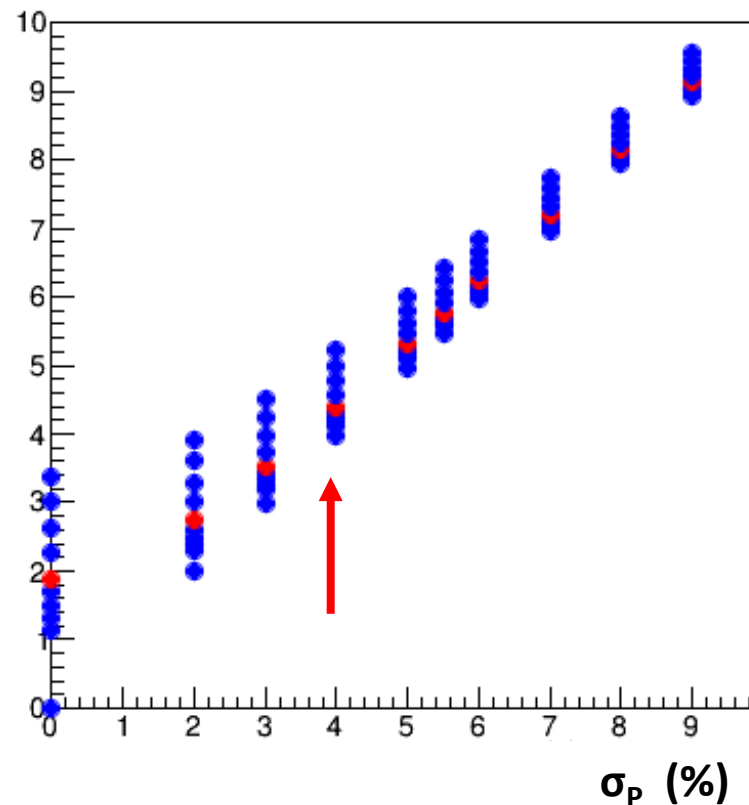
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A_1 Resolution

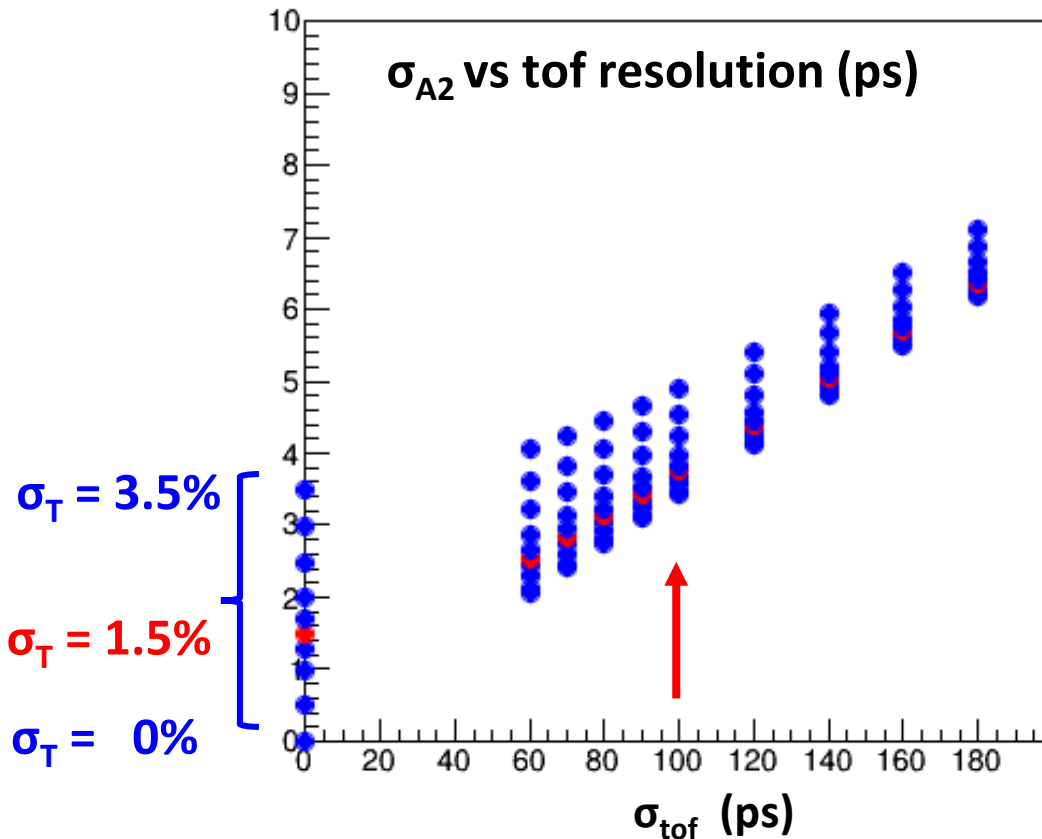
TOF (β) – TRACKER (p)

$$A_1 = \frac{p}{U \beta \gamma}$$

σ_{A1} vs p resolution (%)



A₂ Resolution



σ_{A2} comparison

□ CDR = 4.7%

□ ANALITICAL = 3.7%
 (neutron energy loss?)

A2:

- Low dependence on σ_T
- High dependence on σ_{Tof}

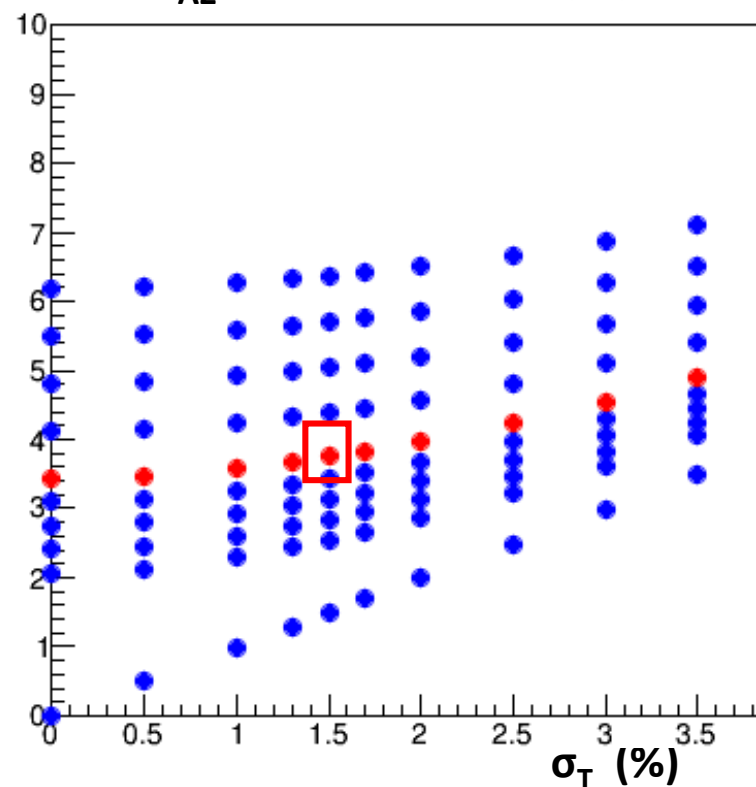
$\sigma_{\text{tof}} = 180$ ps

$\sigma_{\text{tof}} = 100$ ps

$\sigma_{\text{tof}} = 60$ ps

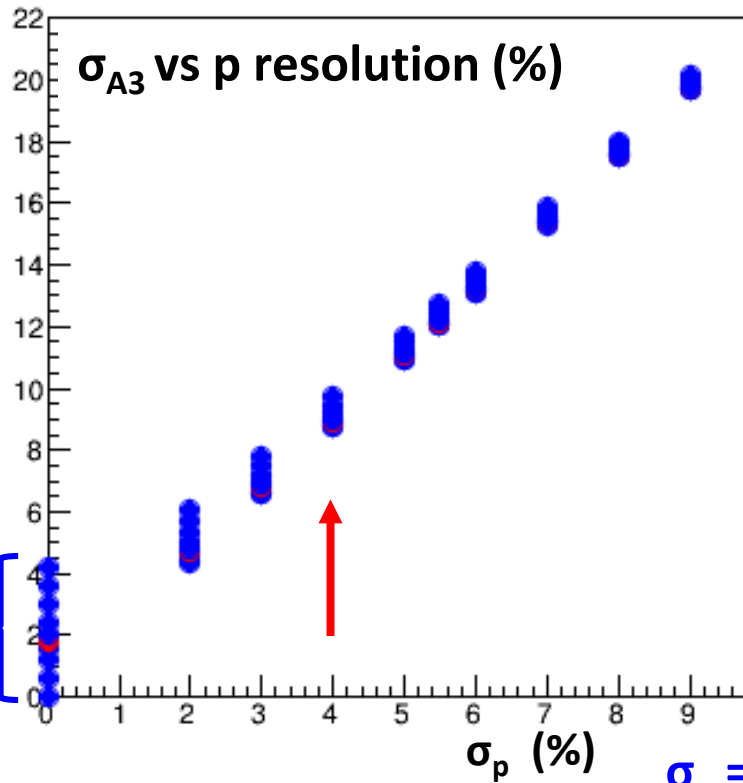
$\sigma_{\text{tof}} = 0$ ps

σ_{A2} vs T resolution (%)

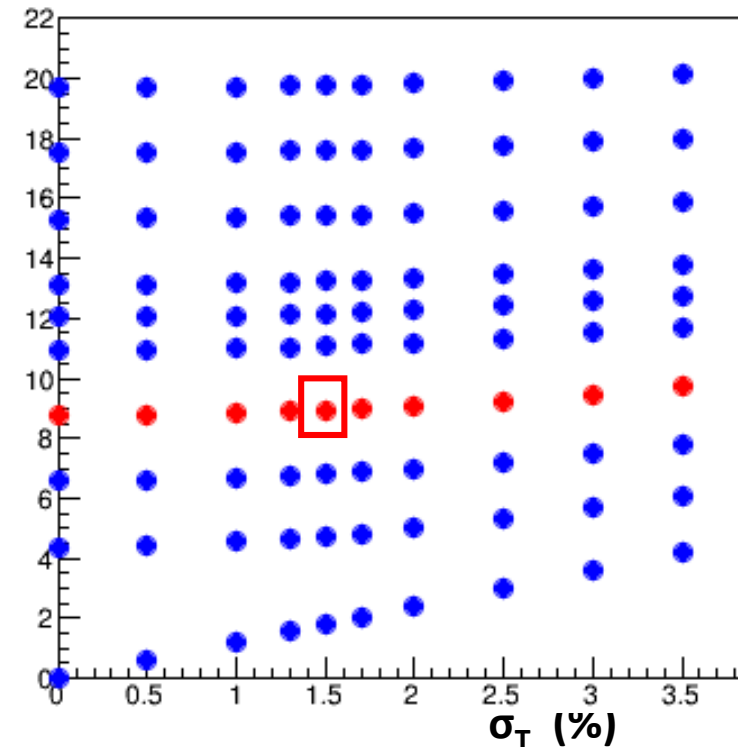


A₃ Resolution

σ_{A3} vs p resolution (%)



σ_{A2} vs T resolution (%)



σ_{A2} comparison

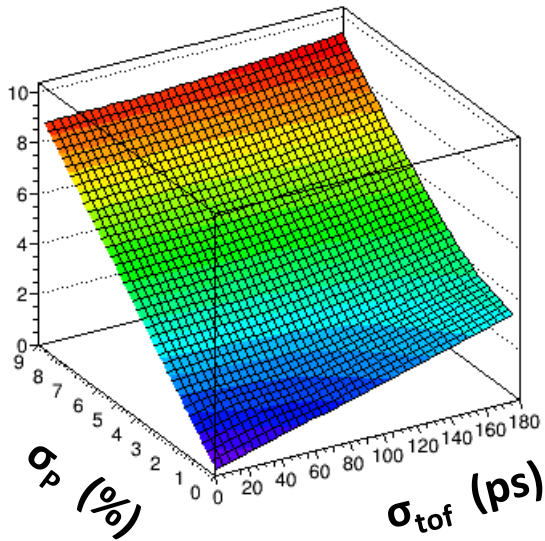
- CDR = 9.2%
- ANALITICAL = 8.9%
- (neutron energy loss?)

A3:

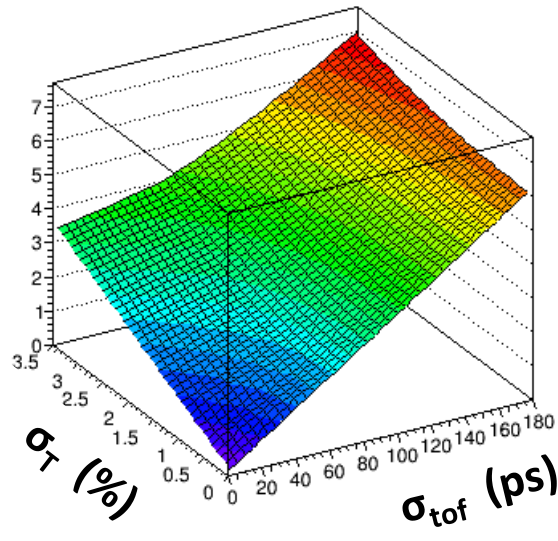
- Low dependence on σ_T
- High dependence on σ_p

A_1, A_2 and A_3 Conclusions

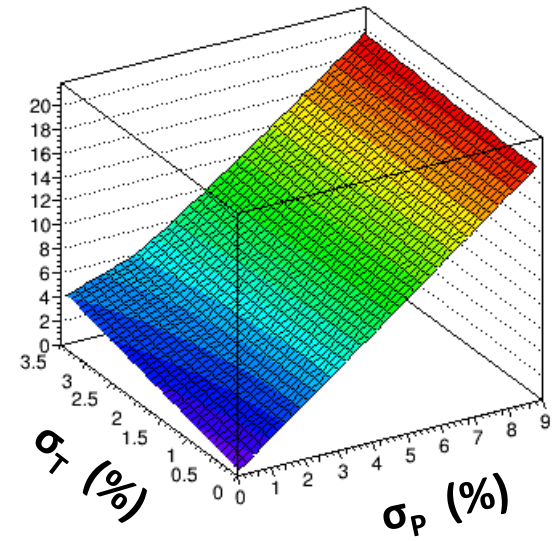
$\sigma(A_1)$



$\sigma(A_2)$



$\sigma(A_3)$



A1:

- Low depend on σ_{Tof}
- High depend on σ_p

A2:

- High depend on σ_{Tof}
- Low depend on σ_T

A3:

- Low depend on σ_T
- High depend on σ_p