report for analysis

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Contents

1 analysis of PPAC

1.1 principle

PPAC is composed of two cathode plates and one anode one. Cathode plate is strip type and from both side signals on one strip, projectile position of the beam can be read. To say that , I can measure the position by the time difference of both side signals. And accounting for above explanation, by using 2 plates,X strip and Y that,I can measure the angle of projectile beam and I can analyze momentum vector of that from beam momentum. Anode is used for measuring timing at projectile beam. But in this experiment, the time resolution is less than F2PL. So this value is not used on my analyses but only for reference. In this section, I analyze by using ^{26}Ne,$\Delta p/p = \pm 2\%$. I explain detail information for principle of PPAC in following.

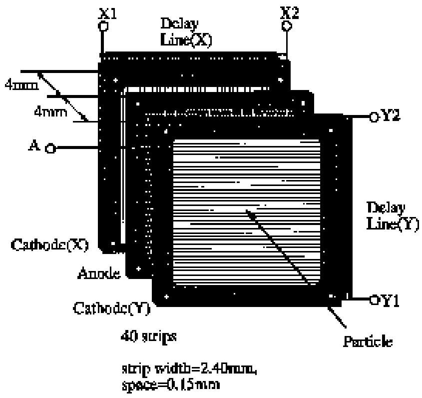


Figure 1: picture of the PPAC

$$\theta_{\rm X} = \tan^{-1}\frac{\rm dX}{\rm Z_{PPACb} - Z_{PPACa}} \tag{1}$$

$$\theta_{\rm Y} = \tan^{-1}\frac{\rm dY}{\rm Z_{PPACb} - Z_{PPACa}} \tag{2}$$

v:velocity of the current at strip of projectile beam detection
L:length of strip
x:position of projectile beam detection

$$(\rm T_{left} - T_{right}) = \frac{x}{v} - \frac{L - x}{v} \propto x \tag{3}$$

1.2 efficiency

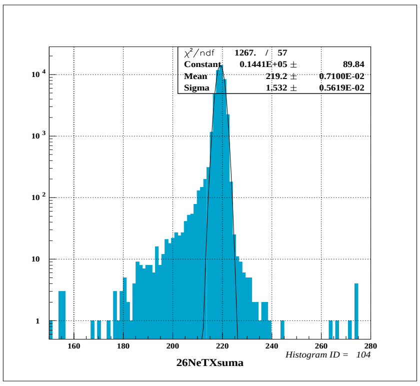
I calculate efficiency of PPAC.

$$(T_{left} + T_{right}) = \frac{x}{v} + \frac{L - x}{v} = L/v \propto constant \tag{4}$$

If signal is correct,sum of two signals is constant. Thus I analyze efficiency by using following equation.

$$\text{efficiency(PPAC)}=\frac{^{26}\text{Ne}_{\text{F2}}\otimes(\text{T}_{\text{right}}+\text{T}_{\text{leght}}=\text{constant})_{\text{PPAC}}}{^{26}\text{Ne}}$$

efficiency	
PPACa	96.9%
PPACb	96.1%
PPACa⊗	93.4%



1.3 position and momentum distribution of projectile at target

From measured value, θ_x,θ_y distribution of projectile beam at target is evaporated.

$$\mathrm{X_{tgt}} = \mathrm{X_{PPACa}} + \mathrm{dX}\frac{\mathrm{Z_{tgt}} - \mathrm{Z_{PPACa}}}{\mathrm{Z_{PPACb}} - \mathrm{Z_{PPACa}}} \tag{5}$$

$$\mathrm{Y_{tgt}} = \mathrm{Y_{PPACa}} + \mathrm{dY}\frac{\mathrm{Z_{tgt}} - \mathrm{Z_{PPACa}}}{\mathrm{Z_{PPACb}} - \mathrm{Z_{PPACa}}} \tag{6}$$

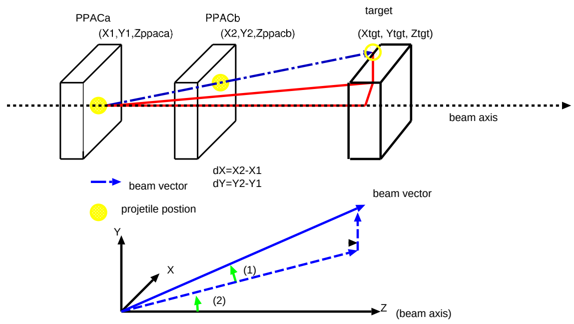


Figure 2: PPAC definition (1) θx (2)θy

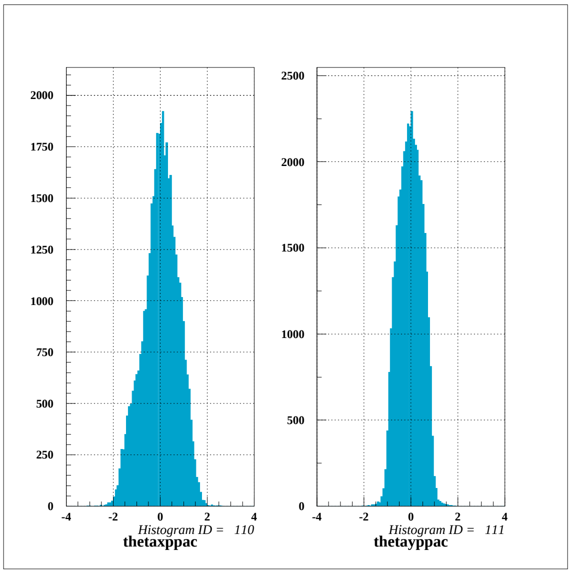


Figure 3: θ at target

1.4 momentum vector of projectile beam on target

I show the distribution of momentum of each axis of projectile beam. To measure that, I show procedure in below/

$$P_{\mathrm{X}} = P_{\mathrm{beam}} \frac{\tan\theta_{\mathrm{X}}}{\sqrt{1+\tan\theta_{\mathrm{X}}^2+\tan\theta_{\mathrm{Y}}^2}} \tag{7}$$

$$P_{\mathrm{Y}} = P_{\mathrm{beam}} \frac{\tan\theta_{\mathrm{Y}}}{\sqrt{1+\tan\theta_{\mathrm{X}}^2+\tan\theta_{\mathrm{Y}}{}^2}} \tag{8}$$

$$P_{\mathrm{Z}} = \sqrt{P_{\mathrm{beam}}^2 - P_{\mathrm{X}}{}^2 - P_{\mathrm{Y}}{}^2} \tag{9}$$

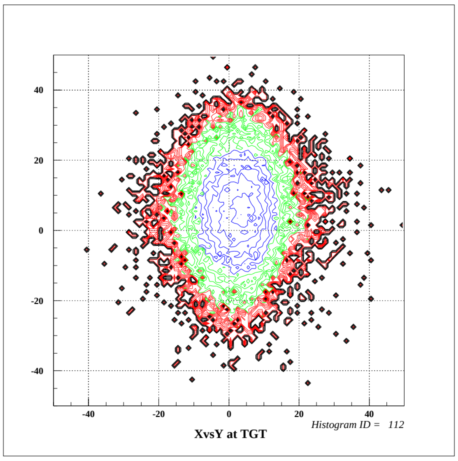


Figure 4: image on target

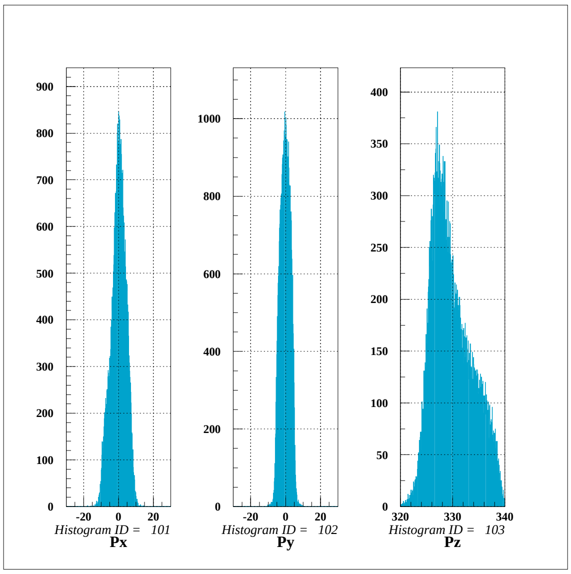


Figure 5: each momentum vector of the beam