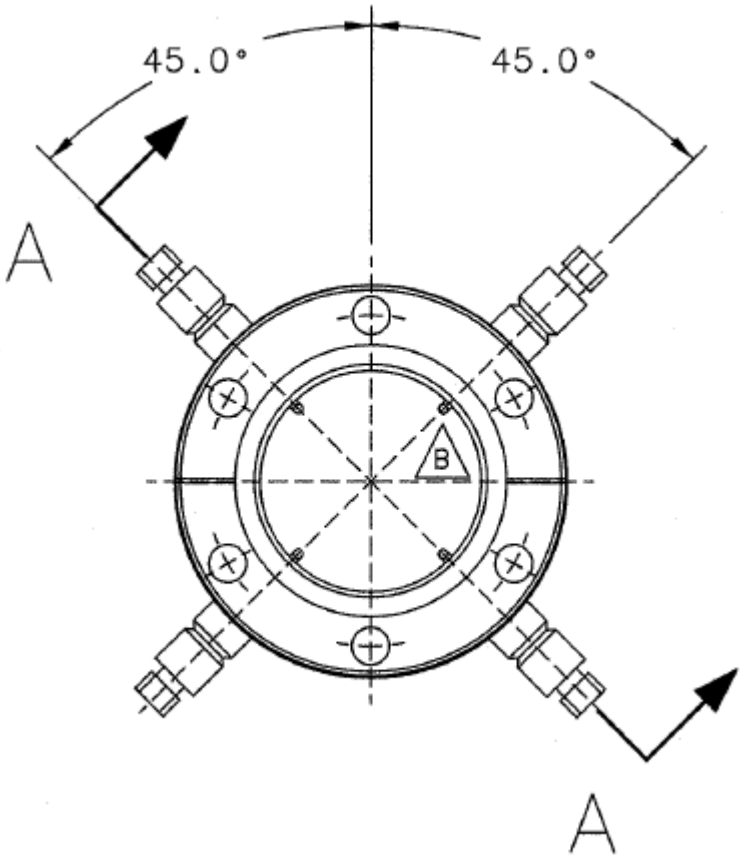
BPM Status

Pengjia



Signal for each antenna:

$$\varphi=\varphi_0\frac{r^2-\rho^2}{r^2+\rho^2-2r\rho\cos(\theta-\theta_0)}$$

link1

link2

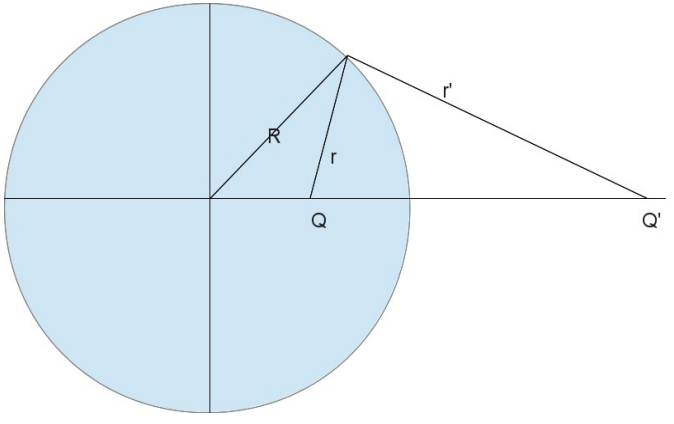
$\theta=\frac{\pi}{4}\quad\frac{3\pi}{4}\quad-\frac{3\pi}{4}\quad-\frac{\pi}{4}$ *angle for 4 antennas*

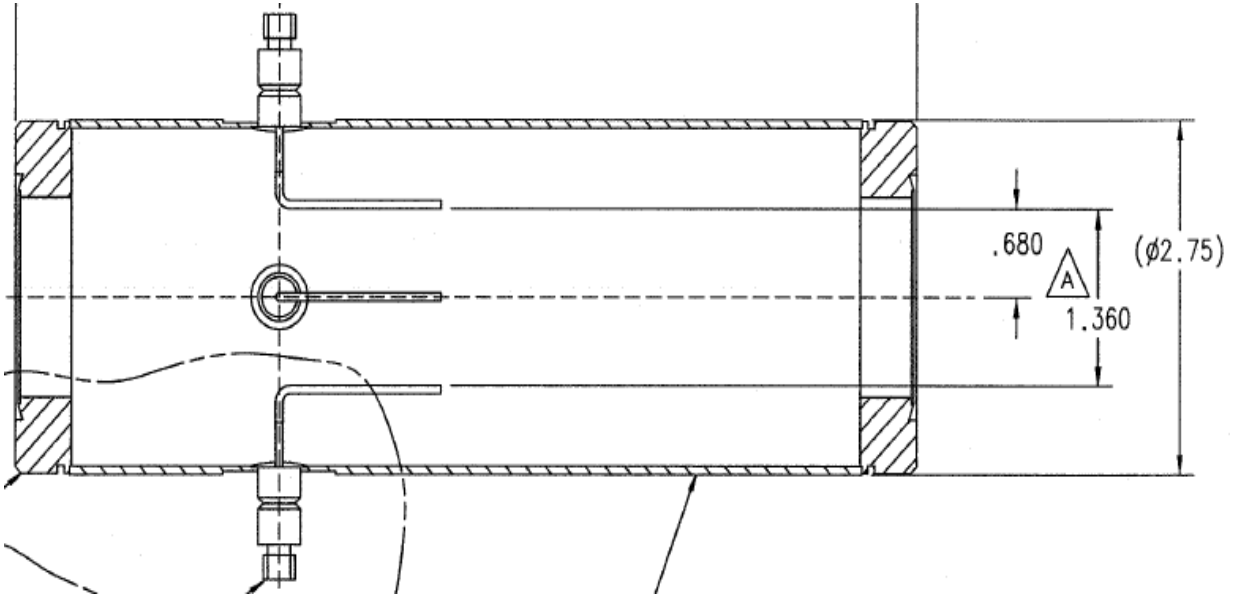
r: *BPM vacuum chamber radius*(17.3mm)

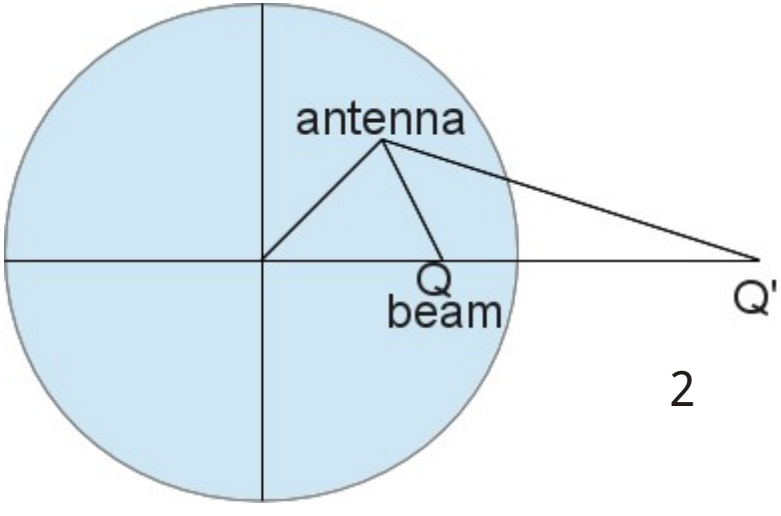
ρ: *radial position of beam*

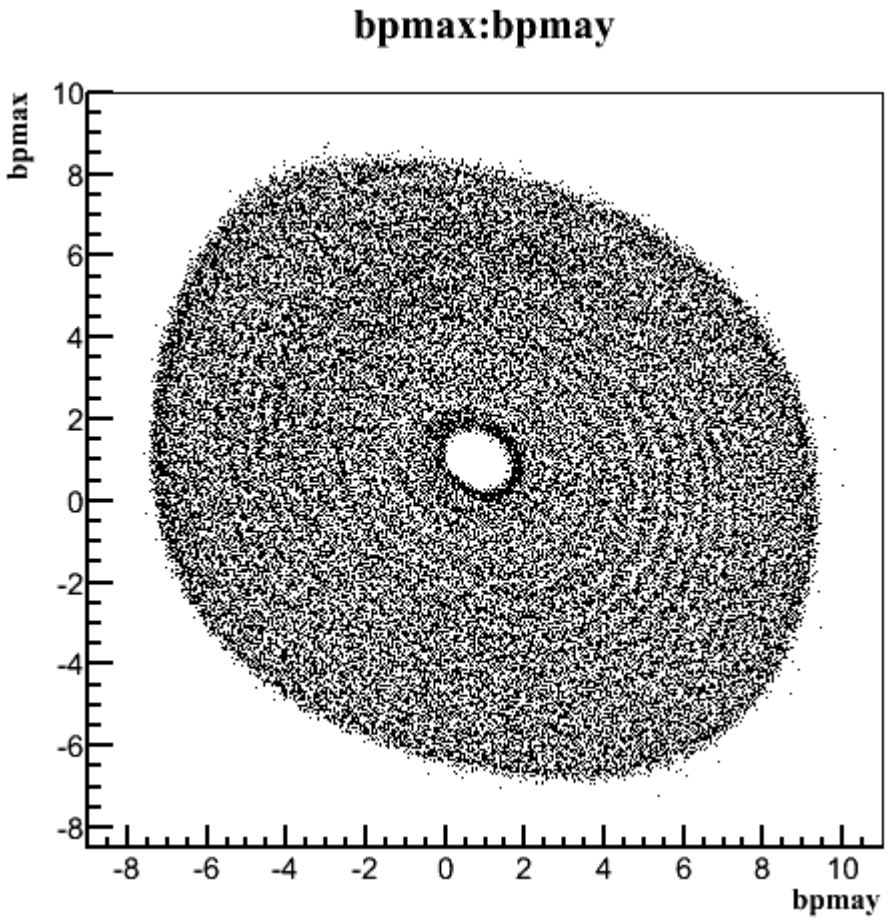
θ_0: *angle position of beam*

Assume:
Infinite chamber
Antenna small enough









g_x,g_y calculated by the middle point

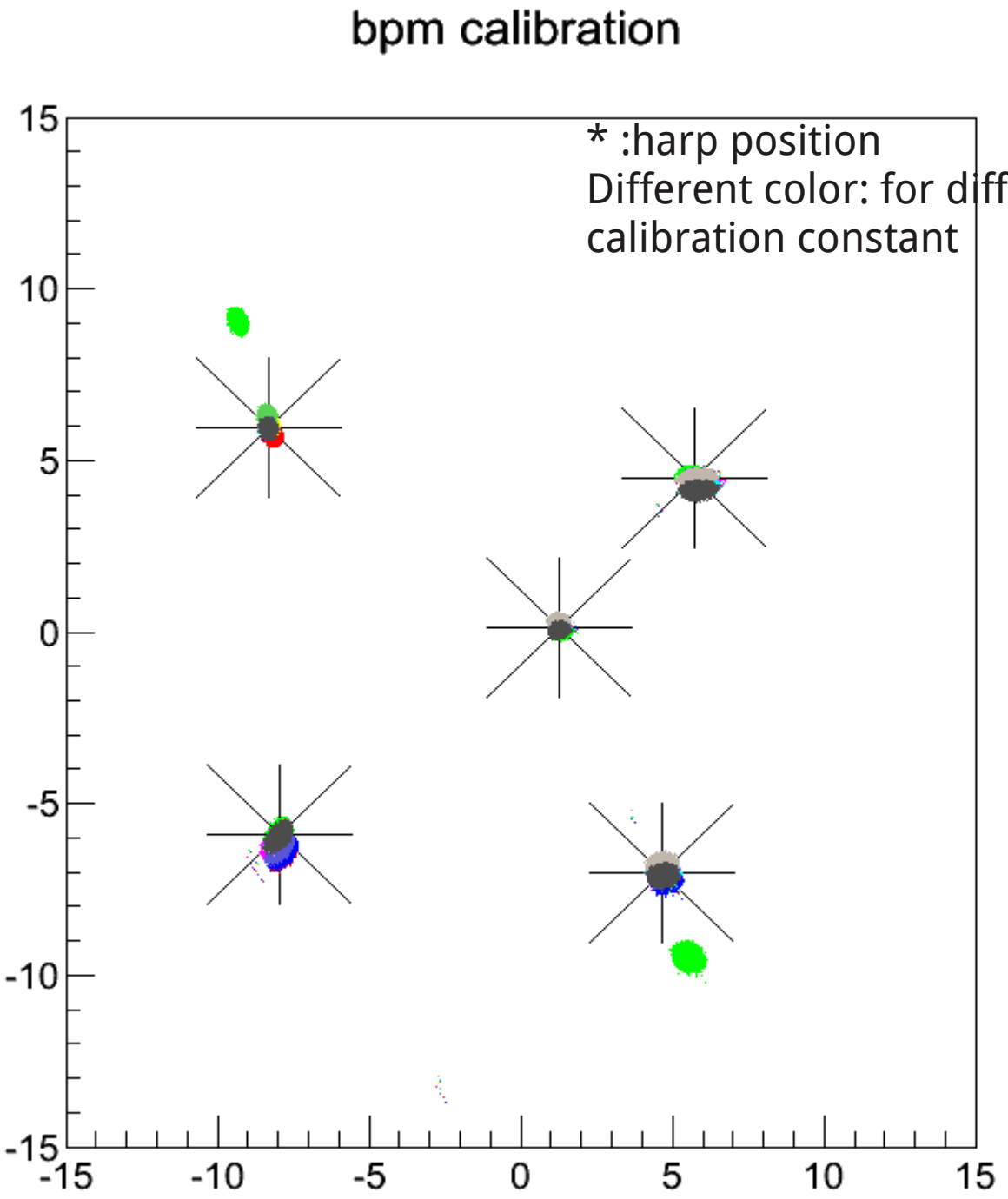
r: use diagram 34.925mm

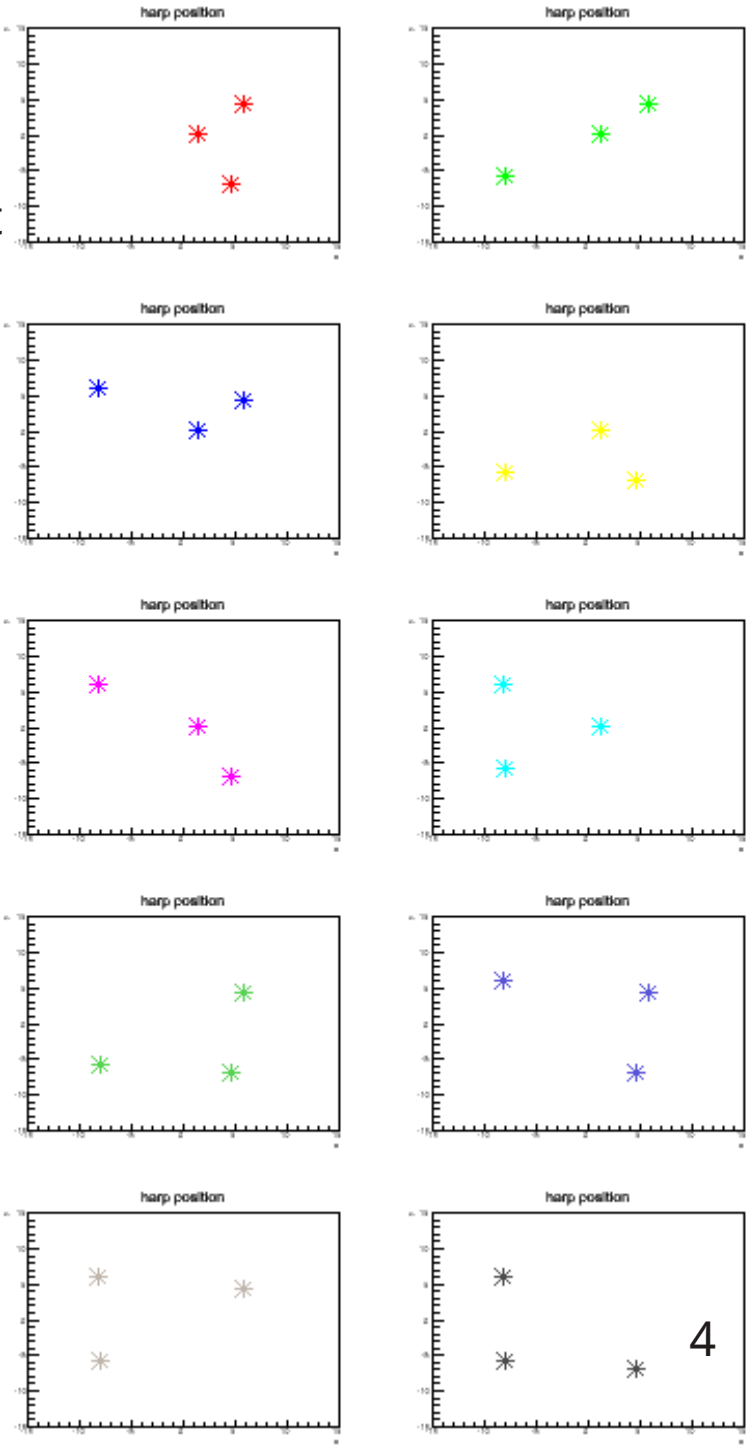
$$x_b = \frac{A_+ - g_x A_-}{A_+ + g_x A_-}$$

$$x = r x_b \left(\frac{1}{x_b^2 + y_b^2} - \frac{1}{\sqrt{x_b^2 + y_b^2}} \sqrt{\frac{1}{x_b^2 + y_b^2} - 1} \right)$$

$$\begin{bmatrix} x_{harp1} \\ x_{harp2} \\ x_{harp3} \end{bmatrix} = \begin{bmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix}$$

May 3,Straight Through,100nA





Average the parameters

Weight:

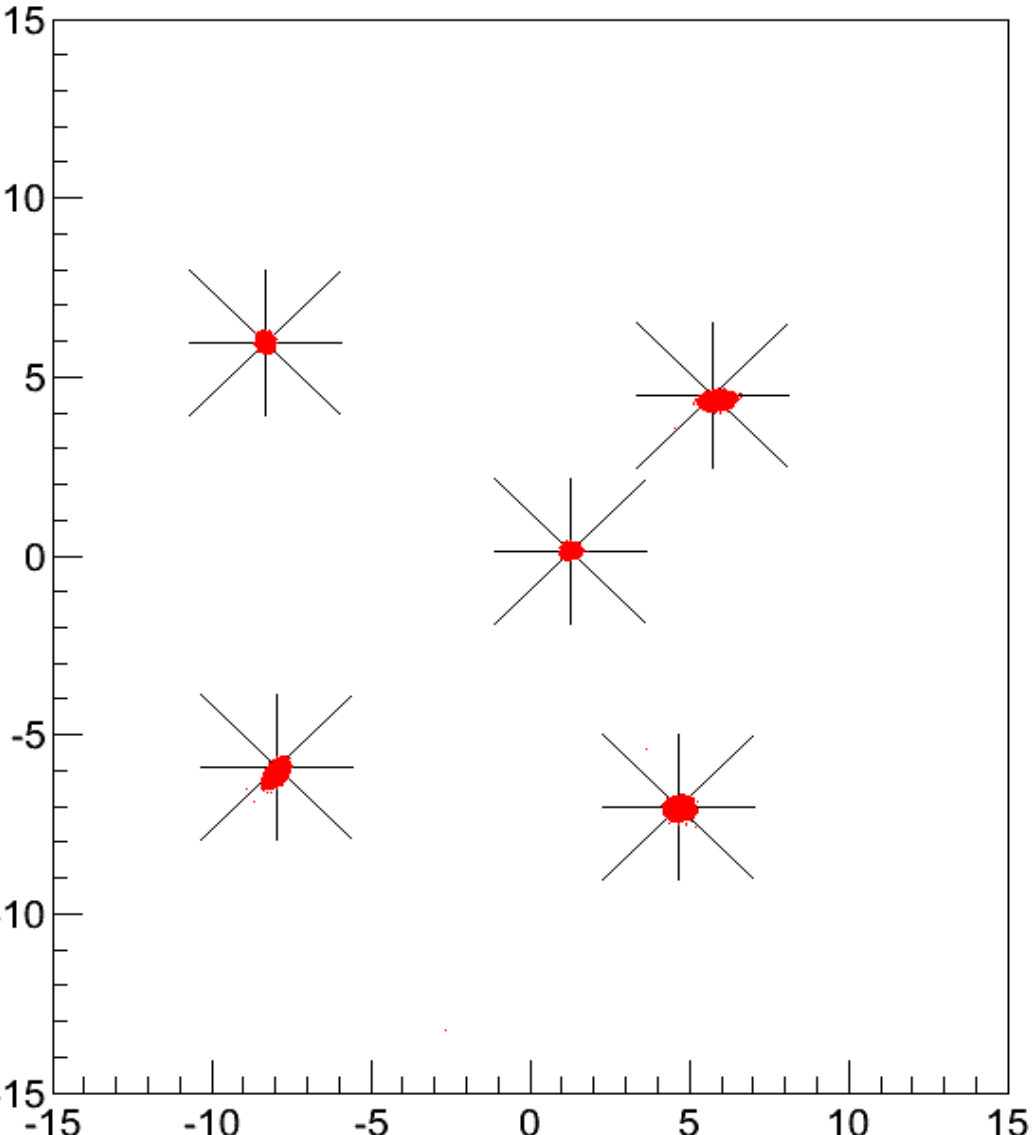
$$\frac{1}{\Delta^2}, \Delta = \sqrt{(X_{harp} - X_{data})^2 + (y_{harp} - y_{data})^2}$$

Use TMinuit fit(calculated position by using peak value and method in 3rd page VS harp data)

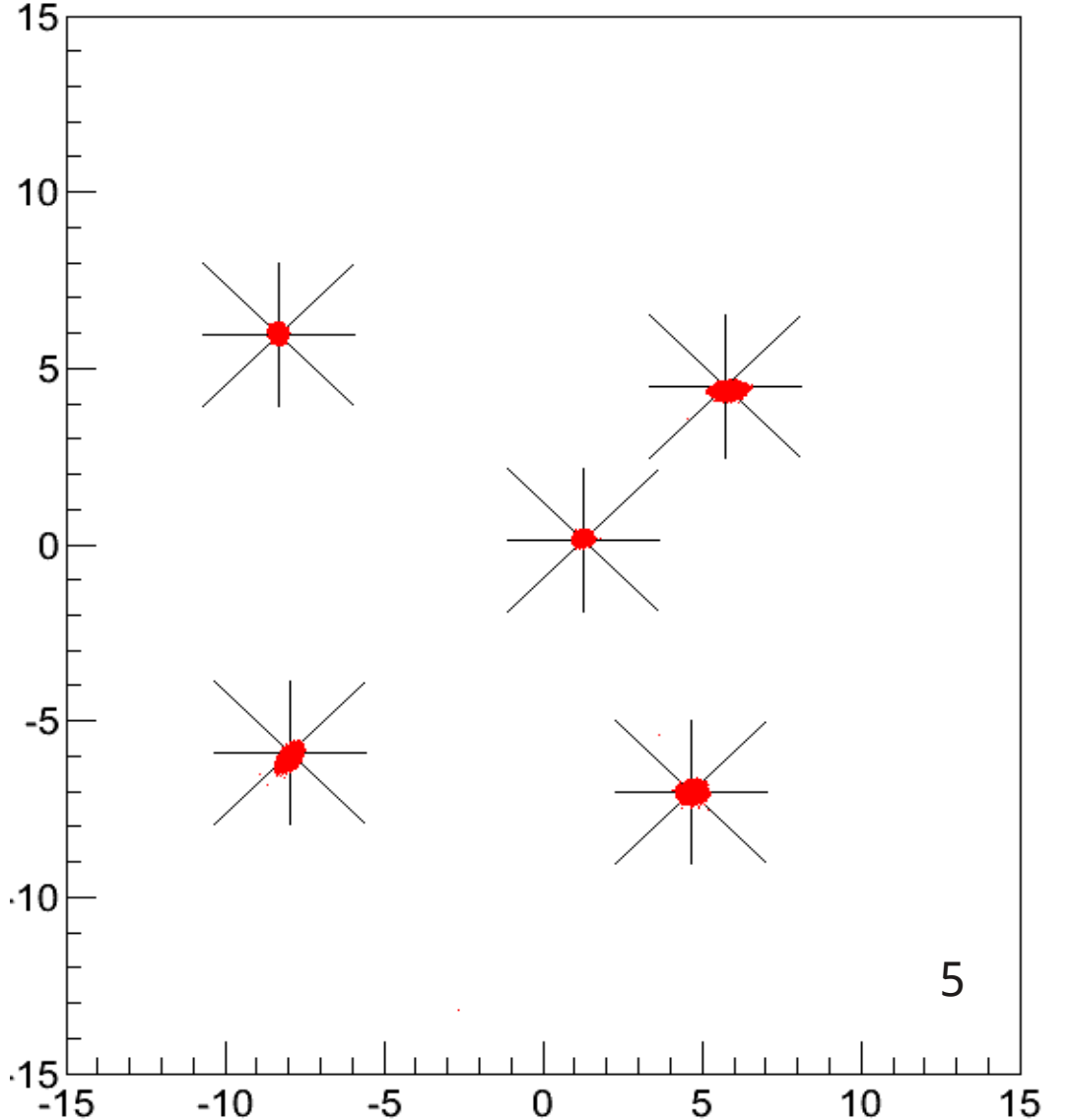
No weight added $X_{real} = a_1 x_{data} + b_1 y_{data} + c_1$

$Y_{real} = a_2 x_{data} + b_2 y_{data} + c_2$

bpm calibration



bpm calibration

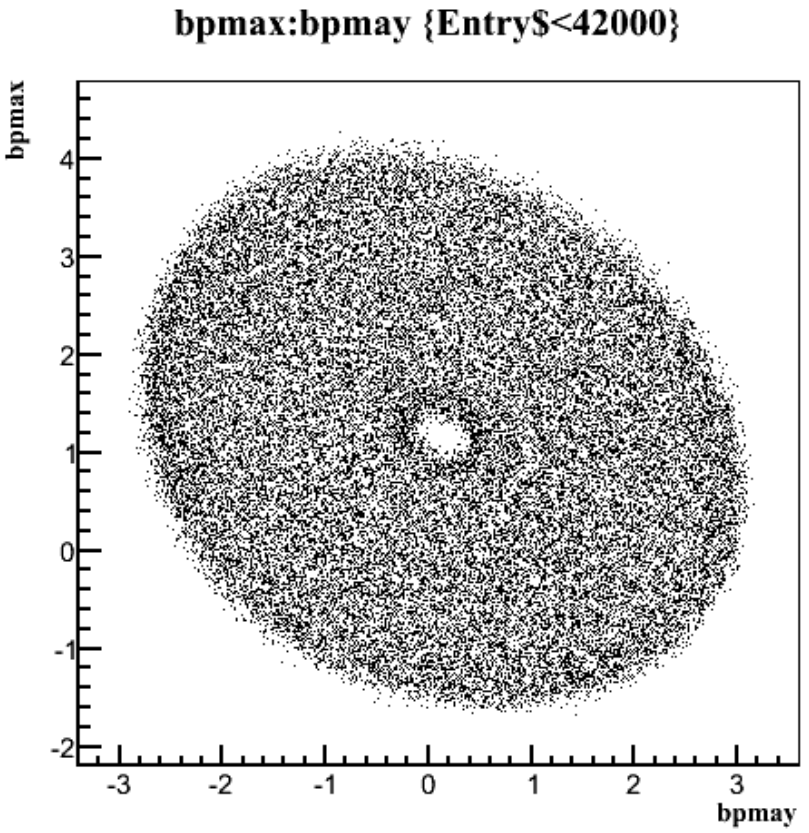


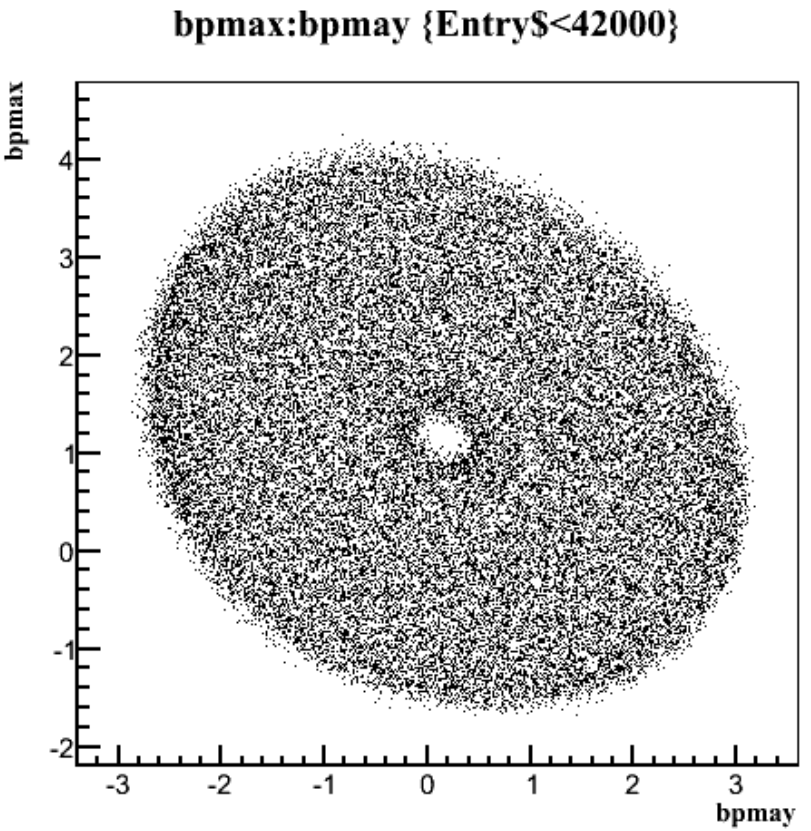
Average the parameters
Weight:

$$\frac{1}{\Delta^2}, \Delta = \sqrt{(X_{harp} - X_{data})^2 + (y_{harp} - y_{data})^2}$$

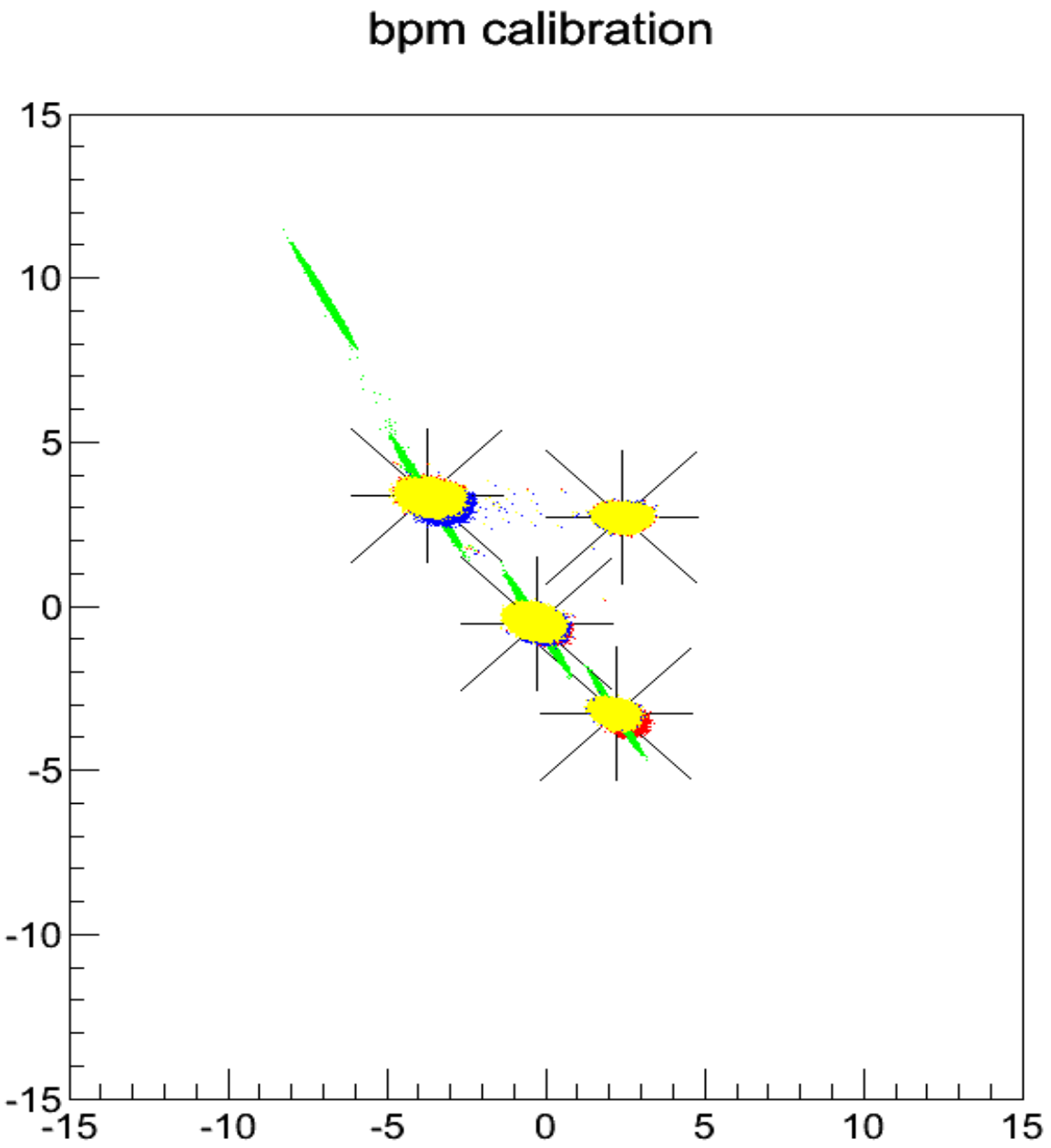
Use TMinuit fit
No weight added

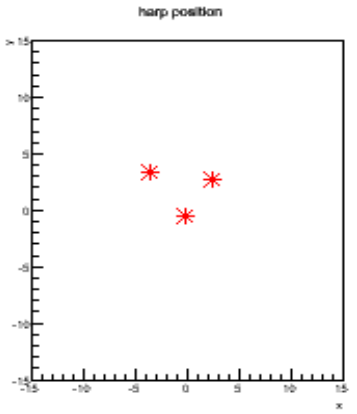
$$X_{real} = a_1 x_{data} + b_1 y_{data} + c_1$$
$$Y_{real} = a_2 x_{data} + b_2 y_{data} + c_2$$

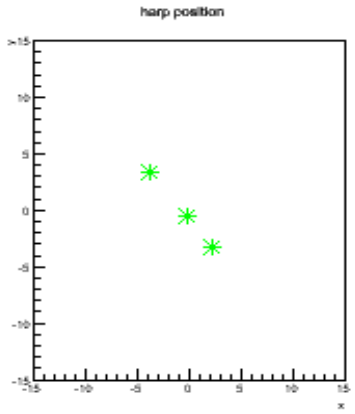


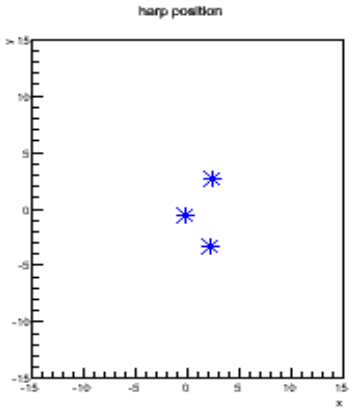


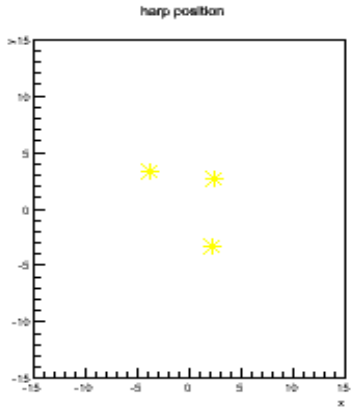
March 13,Straight Through,100nA









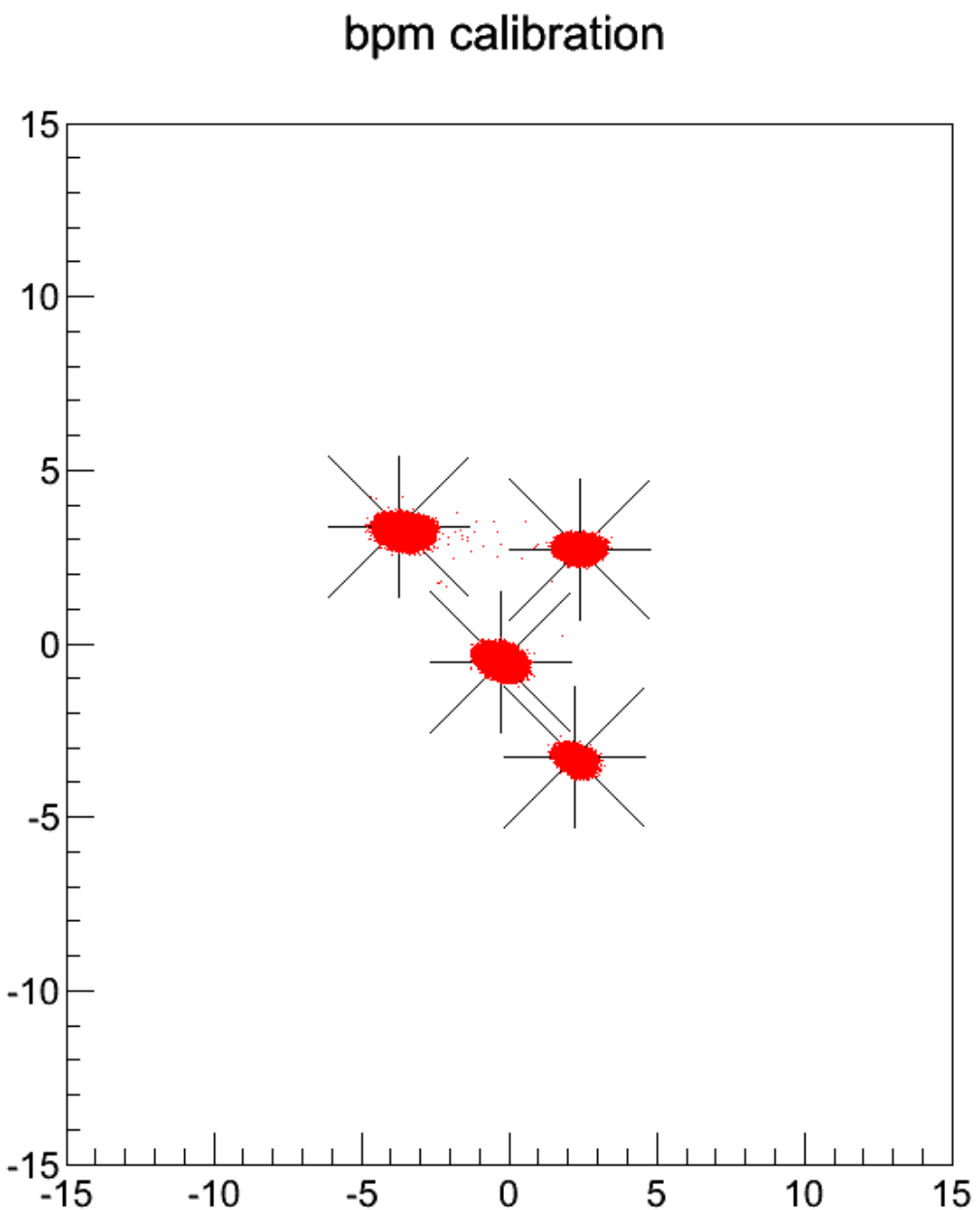


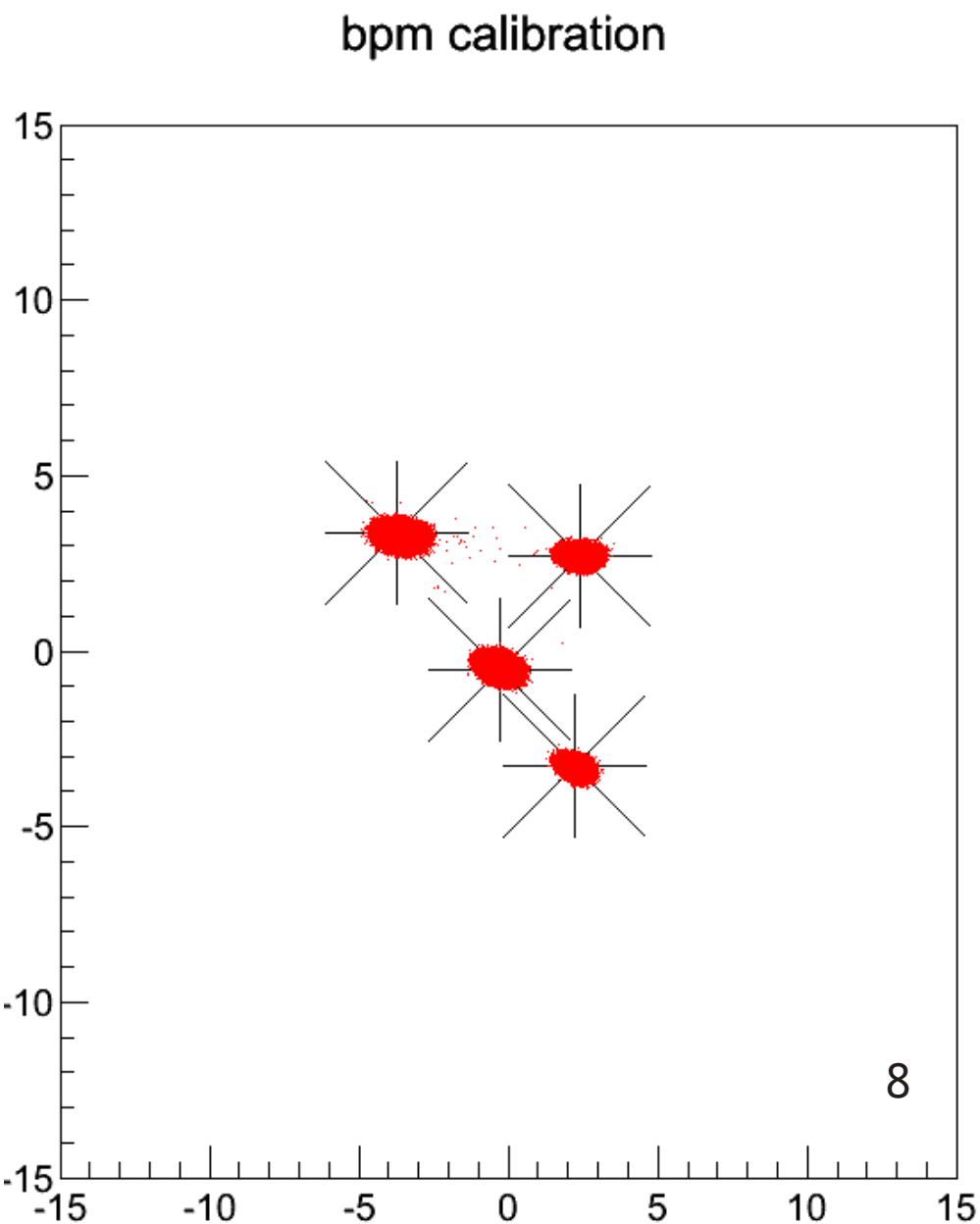
Average the parameters
Weight:

$$\frac{1}{\Delta^2}, \Delta = \sqrt{(X_{harp} - X_{data})^2 + (y_{harp} - y_{data})^2}$$

Use TMinuit fit
No weight added

$$X_{real} = a_1 x_{data} + b_1 y_{data} + c_1$$
$$Y_{real} = a_2 x_{data} + b_2 y_{data} + c_2$$





Average the parameters
Weight:

$$\frac{1}{\Delta^2}, \Delta = \sqrt{(X_{harp} - X_{data})^2 + (y_{harp} - y_{data})^2}$$

Use TMinuit fit
No weight added

$$X_{real} = a_1 x_{data} + b_1 y_{data} + c_1$$
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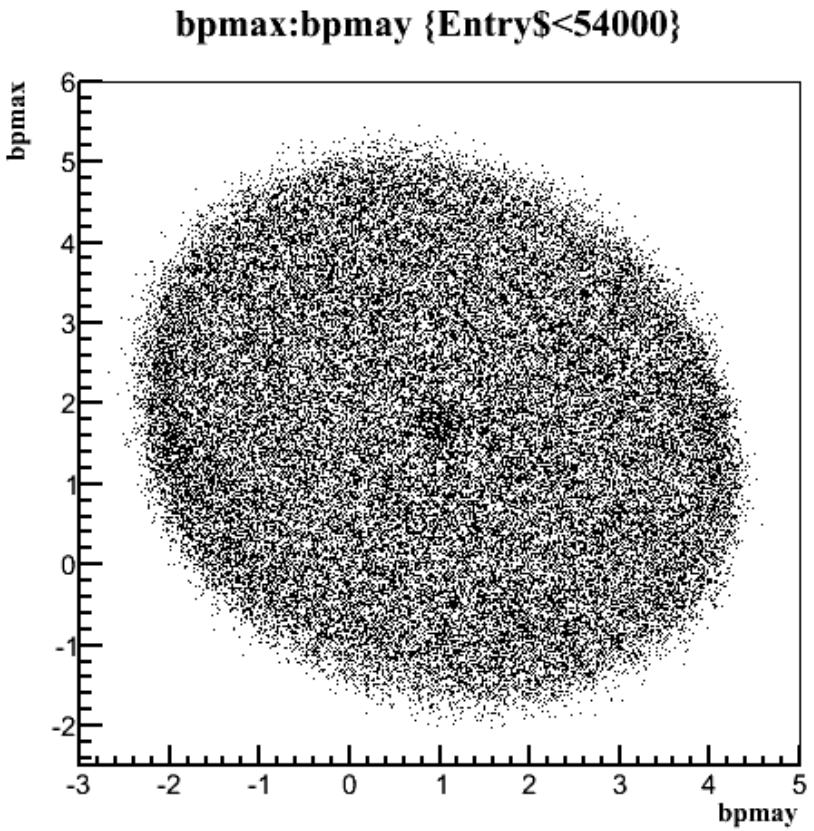
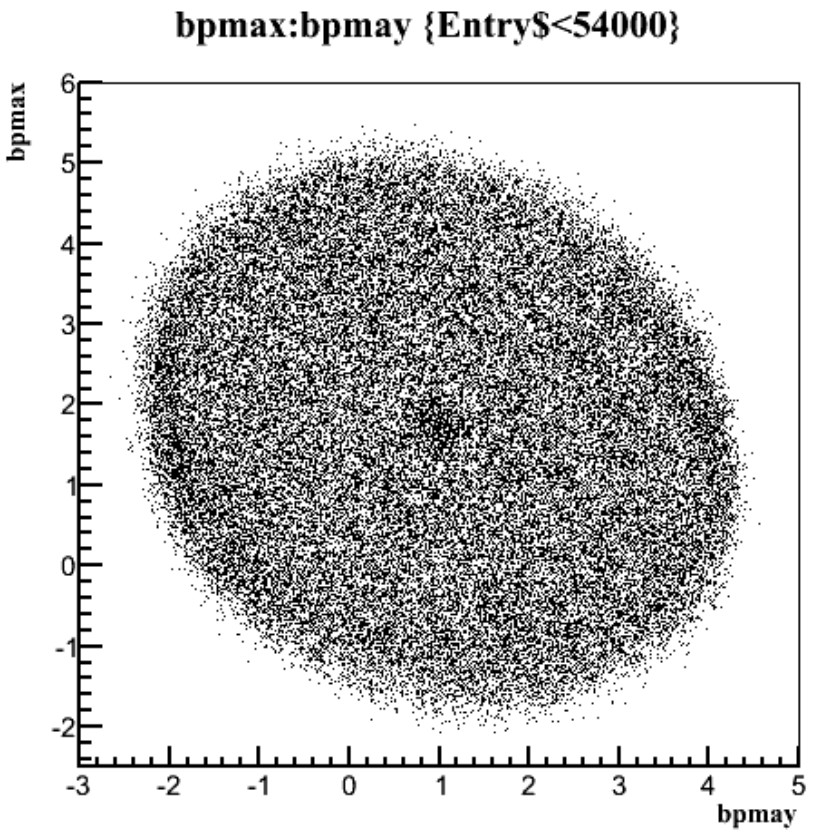
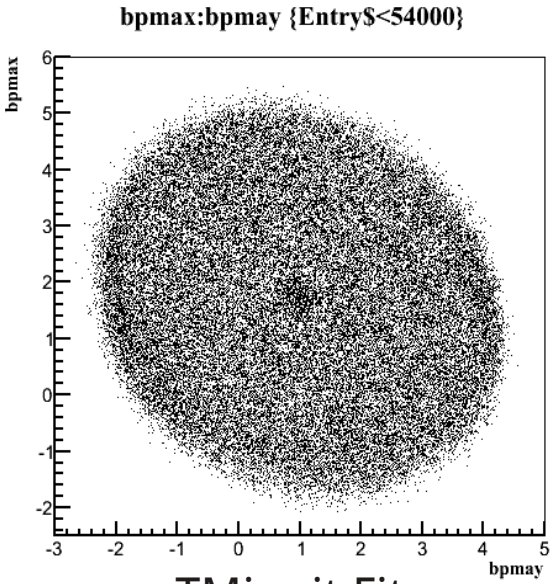
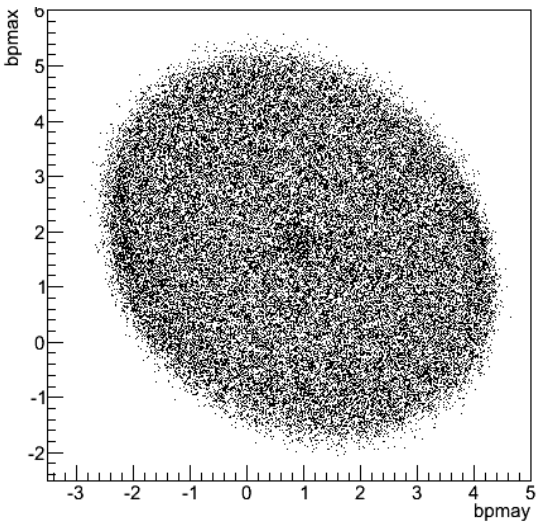


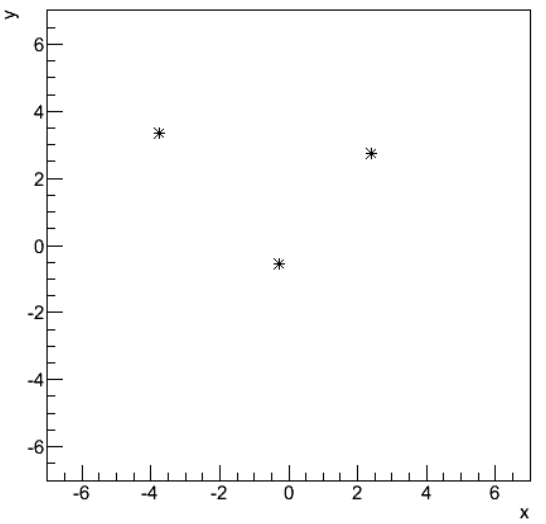


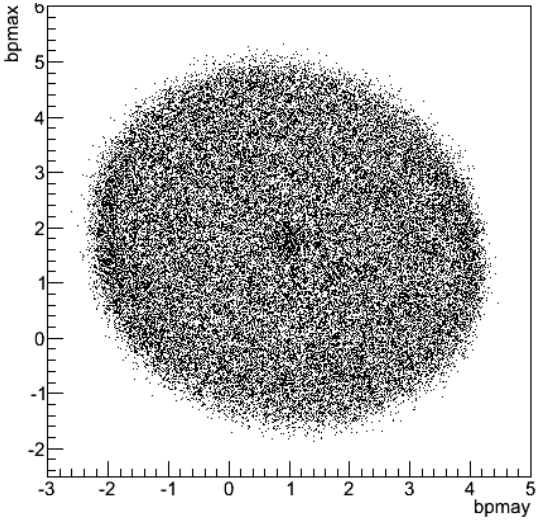
Compare:

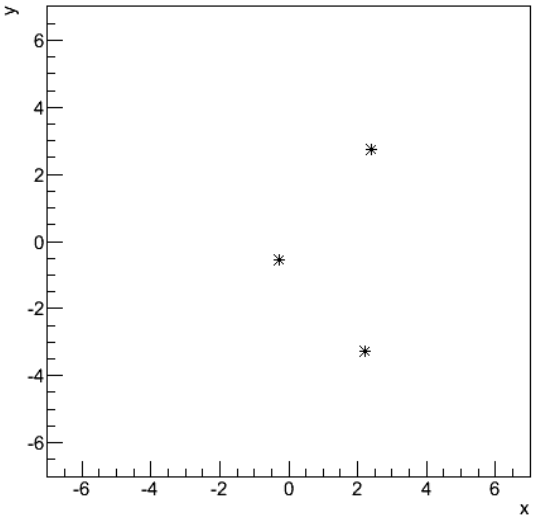


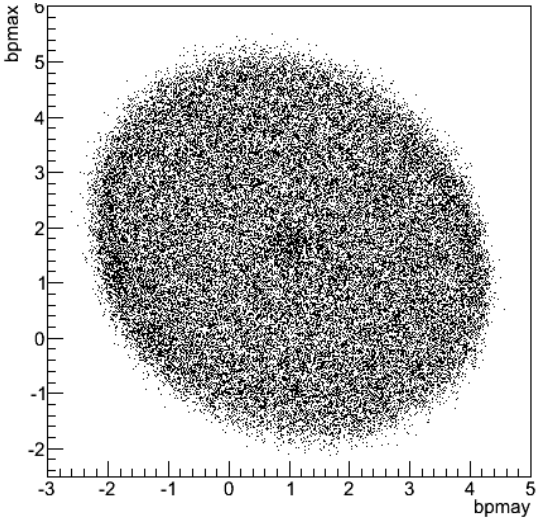
TMinuit Fit

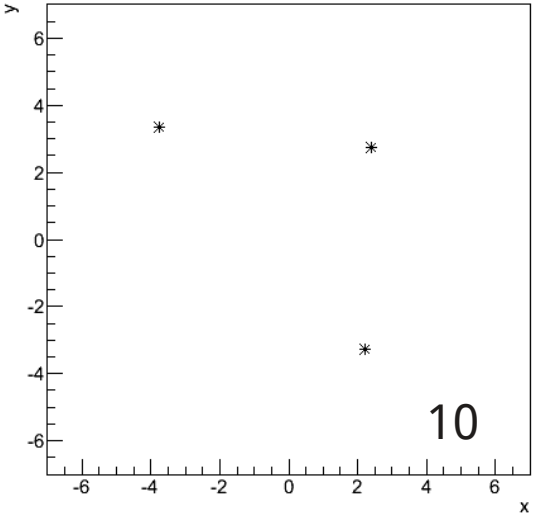












Next Step

- Calculate position in target area to see if it is circle
- Draw Picture with Carbon Hole

- Add weight for TMinuit fit
- Use raw data for TMinuit fit