Bpm status

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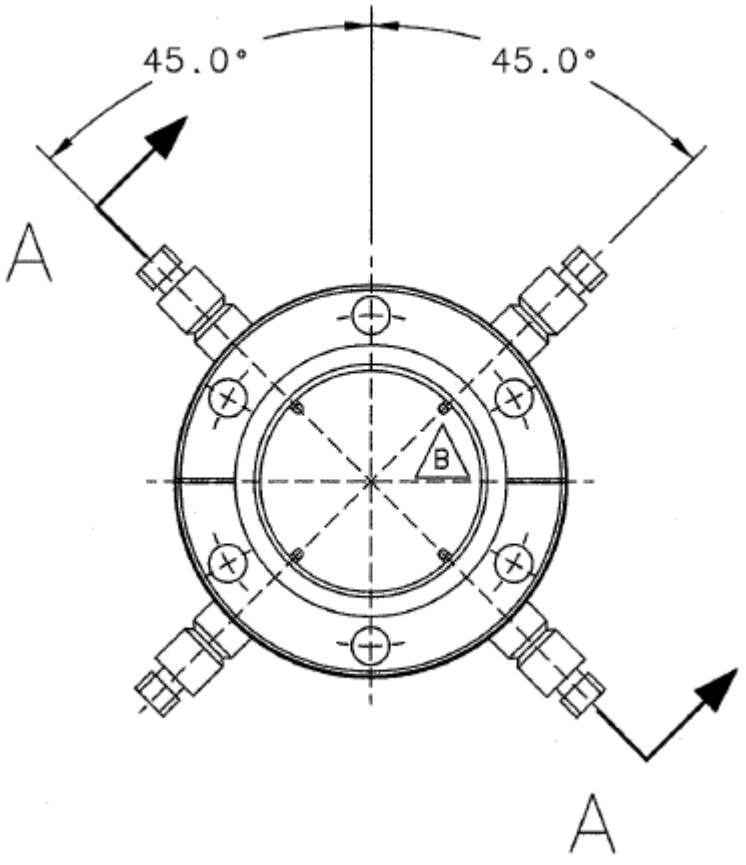
10/2/2012



Signal for each antenna:

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

link1

link2

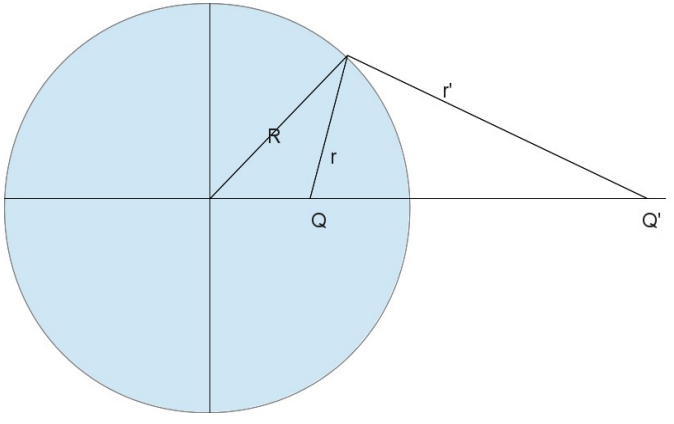
$\theta=\frac{\pi}{4}\quad\frac{3\pi}{4}\quad-\frac{3\pi}{4}\quad-\frac{\pi}{4}$ *angle for 4 antennas*

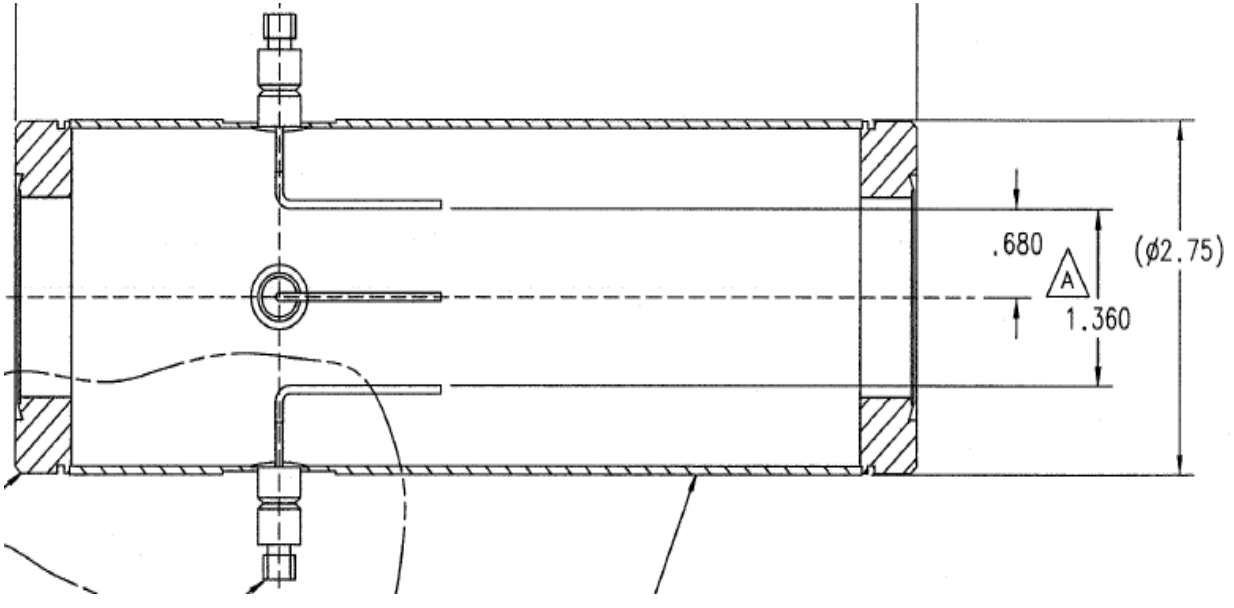
r: *BPM vacuum chamber radius*(17.3mm)

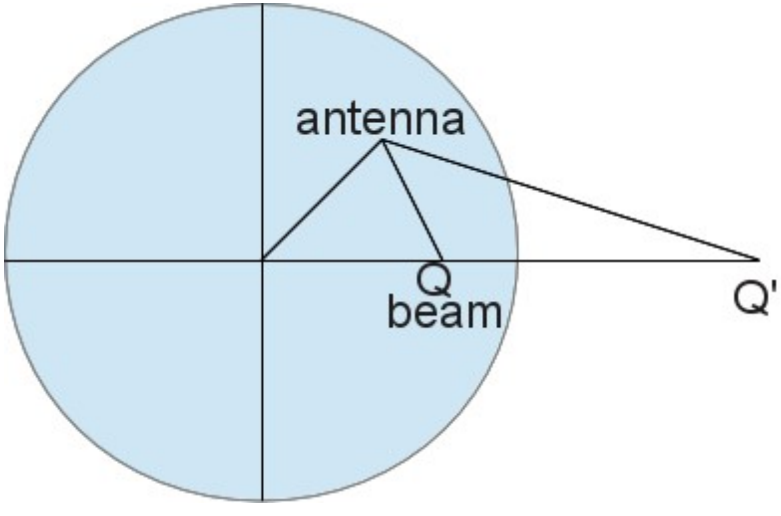
ρ: *radial position of beam*

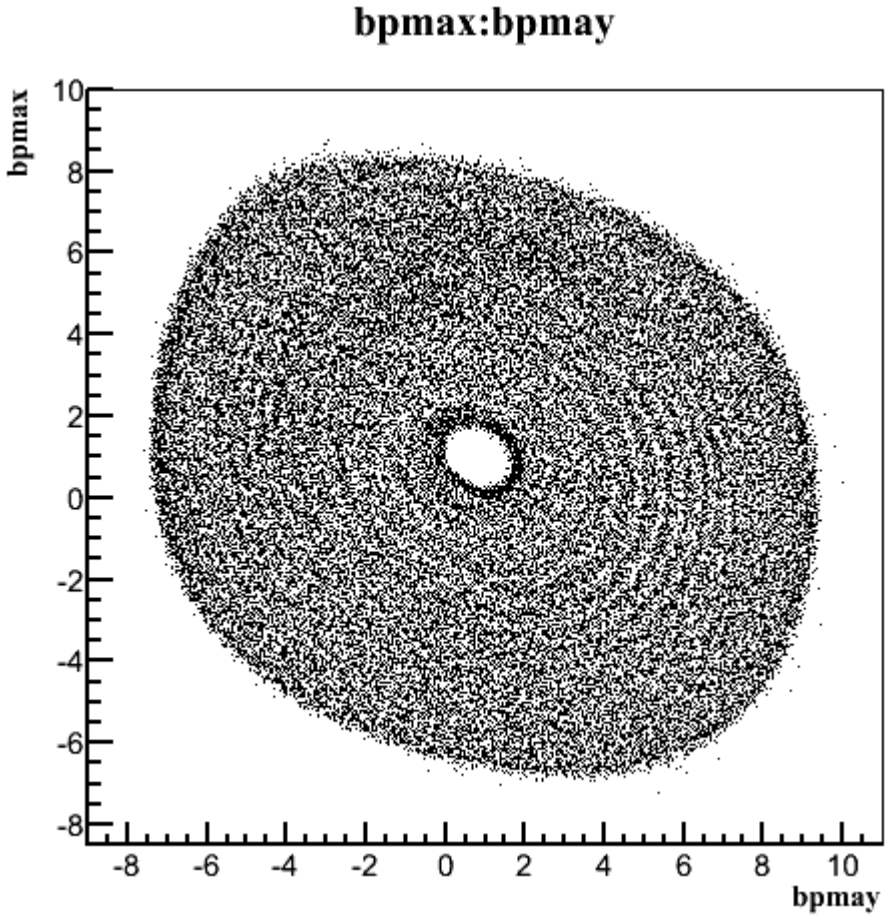
θ_0: *angle position of beam*

Assume:
Infinite chamber
Antenna small enough









g_x,g_y calculated by the middle point

r: use diagram 34.925mm

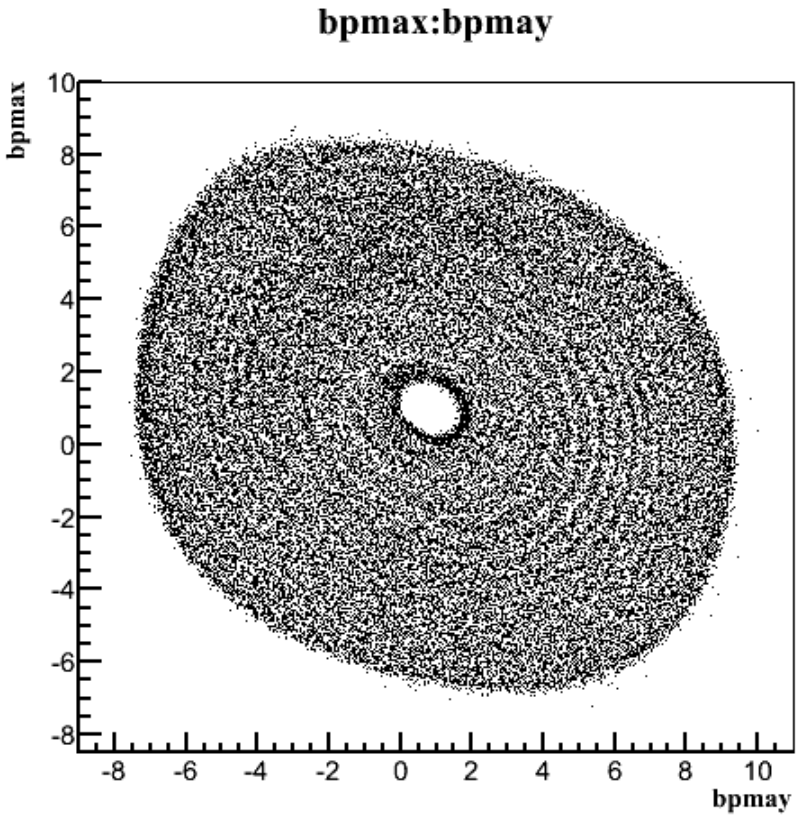
$$x_b = \frac{A_+ - g_x A_-}{A_+ + g_x A_-}$$

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

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

a,b,c For x: [-0.896455496460689 7, 0.0351812488846204 5, 2.39346236573286 53]
a,b,c For y:[0.0643993246596377 8, 1.0248894628221328, -0.0848721779565382 2]

Angle deflection: ~ 2.5 deg



gx=0.706871725914766
gy=0.943301248780548

Wrong gx and gy

gx=1.706871725914766
gy=0.943301248780548