

# Bpm study

-- check beam position

Jie Liu

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# BPM pedestal Study

□ Goal: To help resolve the yields drift problems

□ Today

- Study the jump - calibrated position changed while yields not change

# Recall BPM Calibration

□ The calculation of beam position (pengjia technote):

$$x_b = \frac{(A_+ - A_{+ped} + b_+) - g_x(A_- - A_{-ped} + b_-)}{(A_+ - A_{+ped} + b_+) + g_x(A_- - A_{-ped} + b_-)}$$

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

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



Beam pos



$$x_{BPMreal_{BPM}} = c_0 + c_1x + c_2y$$

$$y_{BPMreal_{BPM}} = c'_0 + c'_1x + c'_2y$$

- $A_+, A_-$ : bpm raw signal for + and - channel
- $A_{+ped}, A_{-ped}$ : bpm pedestal for + and - channel
- $b_+, b_-$ : offset, calibration constant
- $g_x, c_0, c_1, c_2, c'_0, c'_1, c'_2$ : calibration constant

□  $b_+, b_-$ : offset (Pengjia assumed it to be constant)  
got from the linear fitting -- raw signal versus current

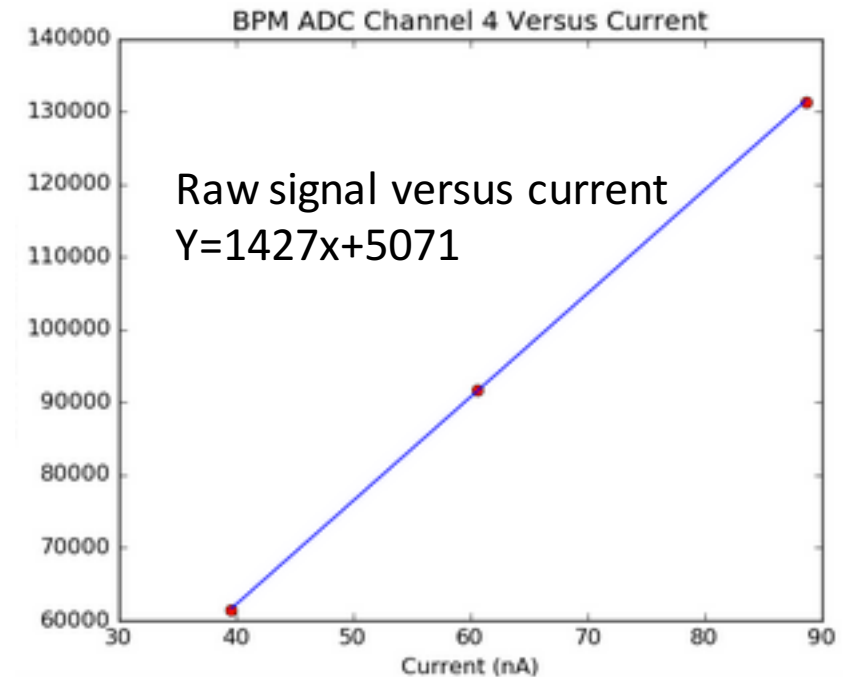
Will  $b_+, b_-$  has position dependence? not real constant?

# BPM pedestal Study

- Check with harp scan runs
- same bpm gain settings, same position, with different current

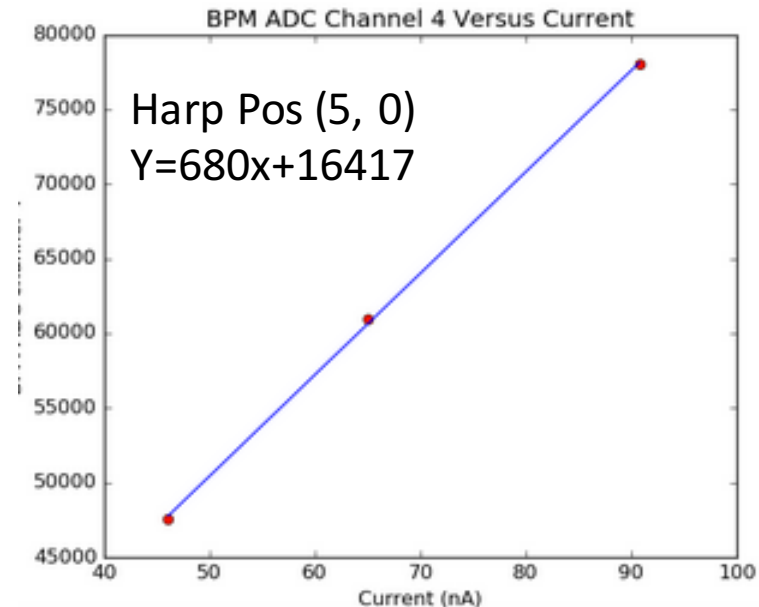
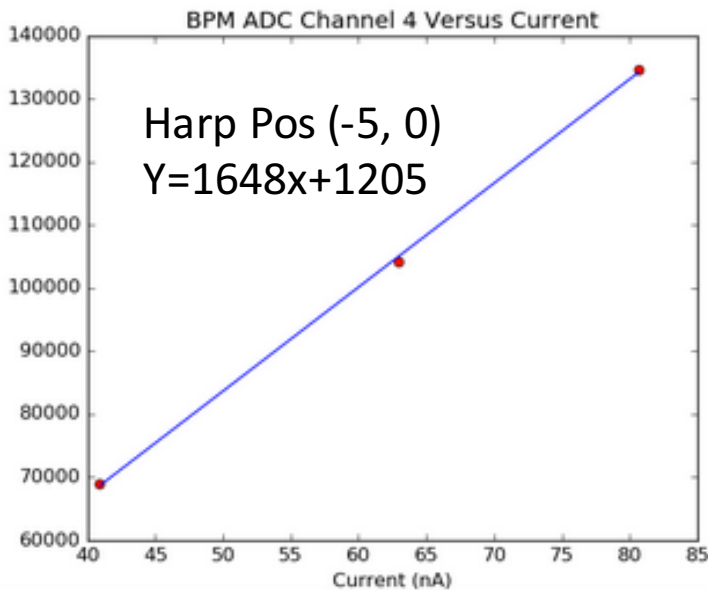
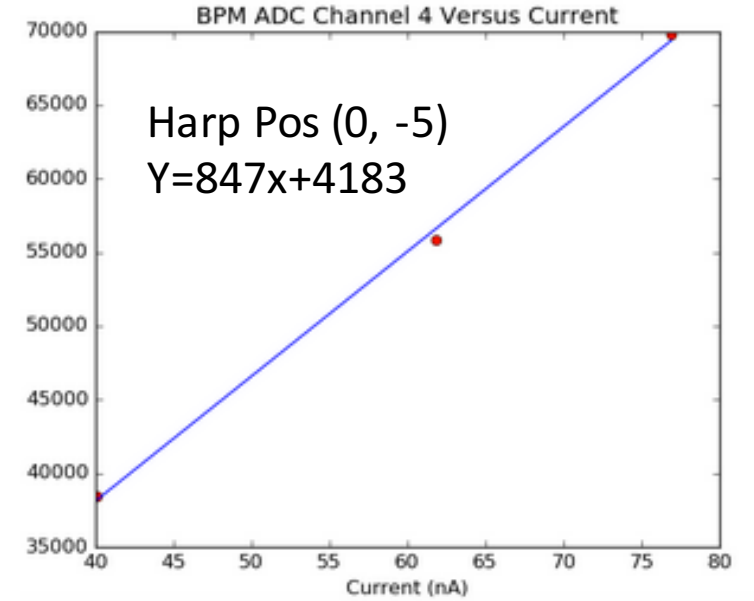
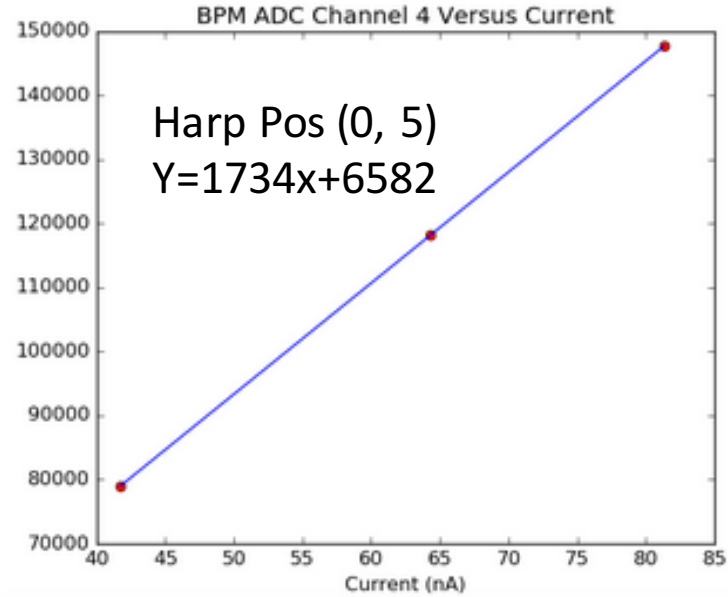
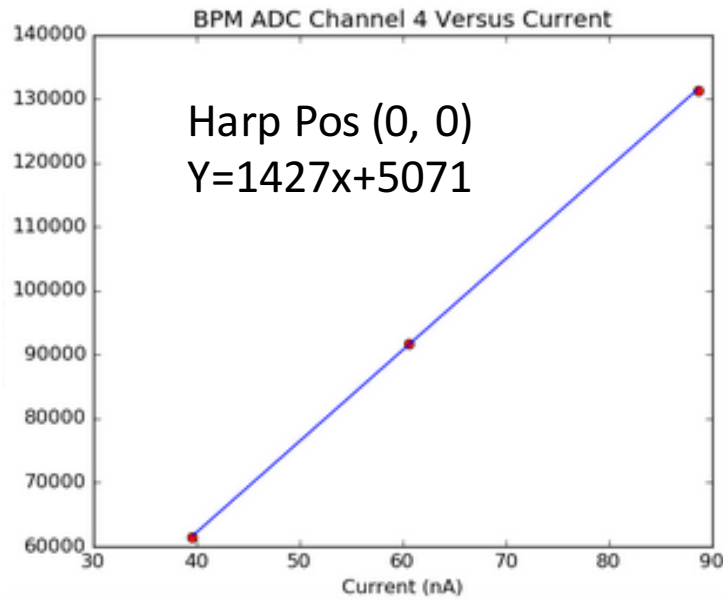
Run Number	Harp pos (x, y) mm	Current setting (nA)
5490	(0, 0)	100
5491	(0, 0)	75
5494	(0, 0)	50

Offset: 5071



- Then compare the offset got from different position

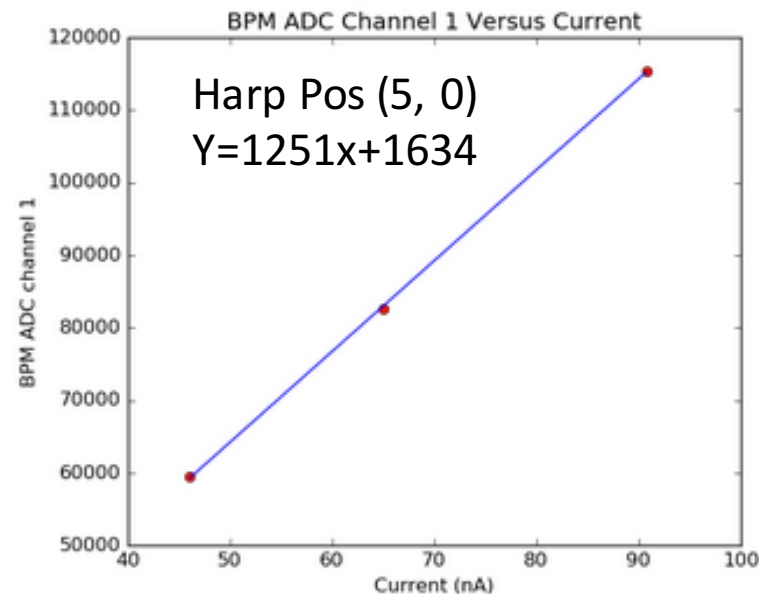
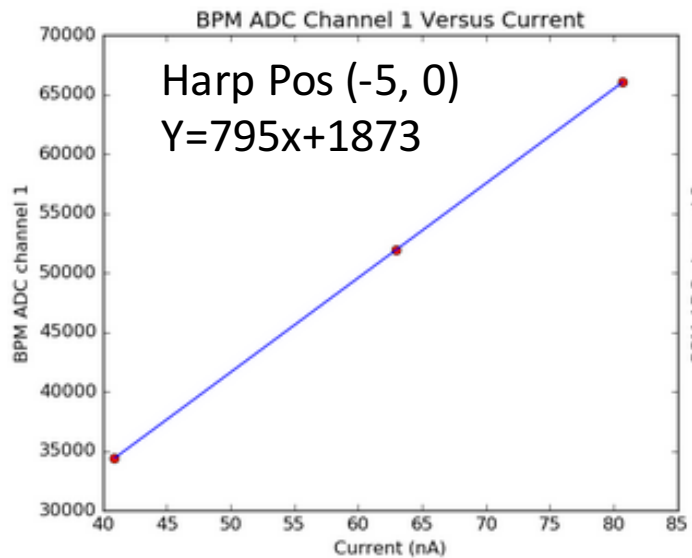
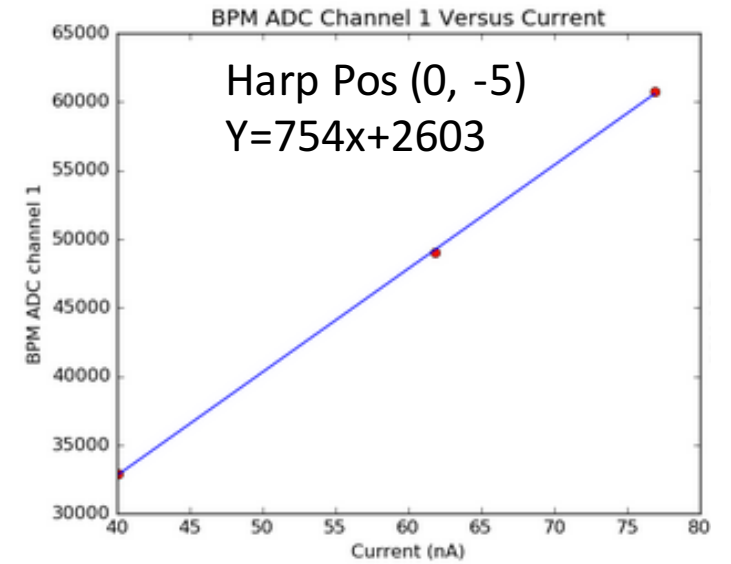
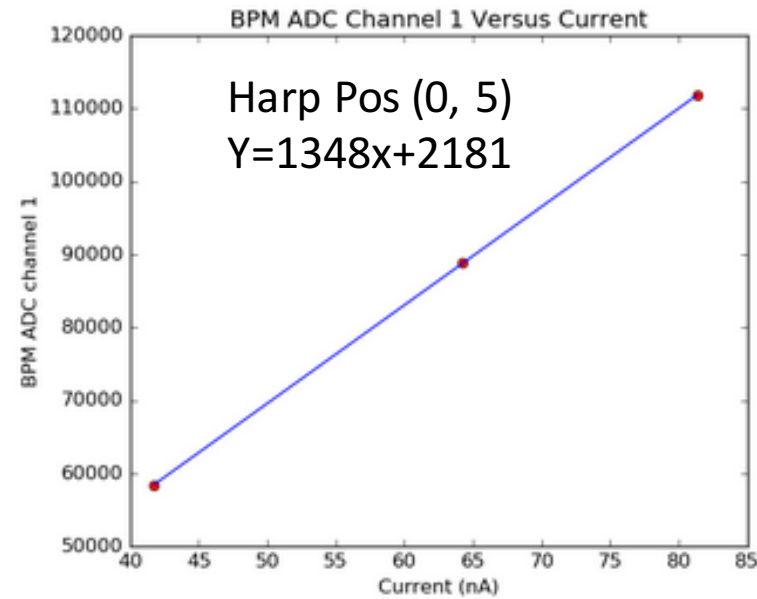
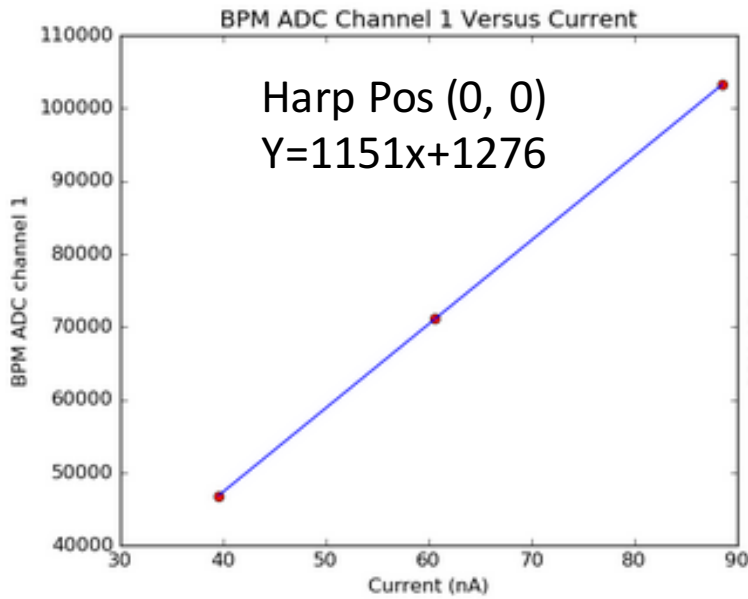
# Fitting Offset for Channel 4 (BPMA)



This offset has a very strong position Dependence

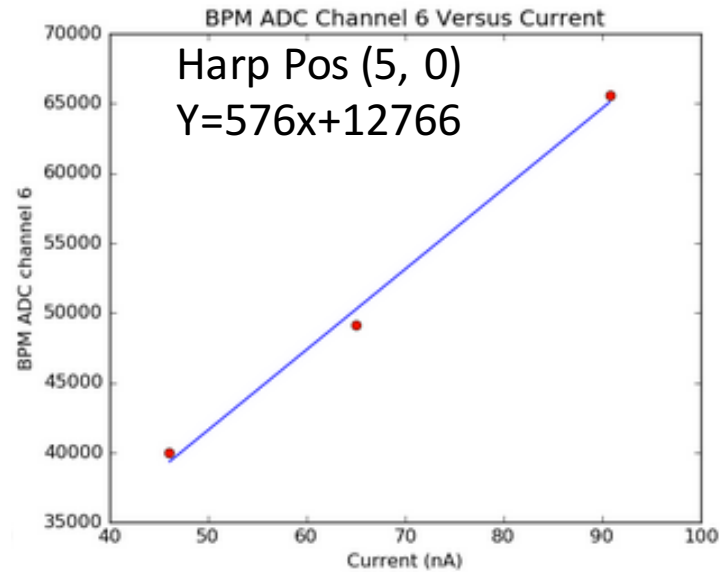
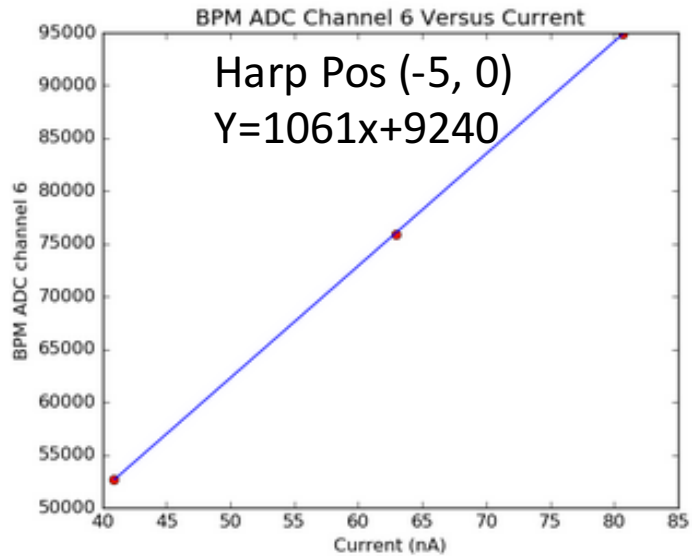
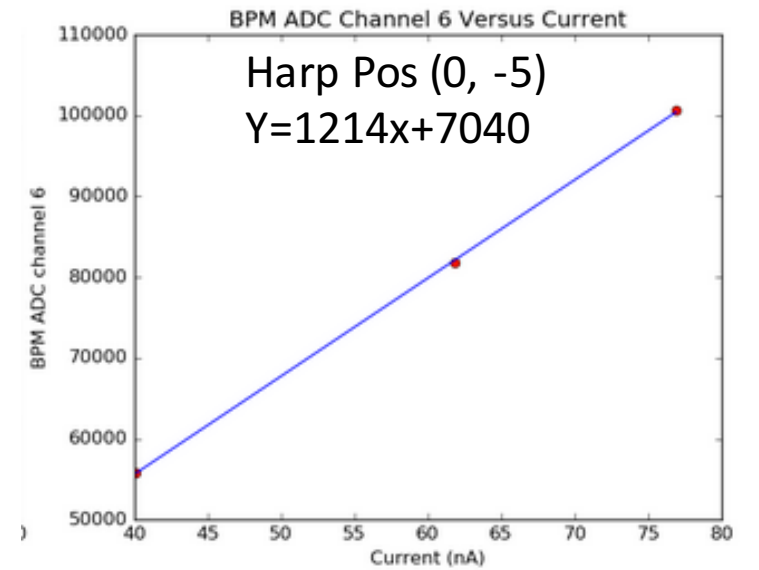
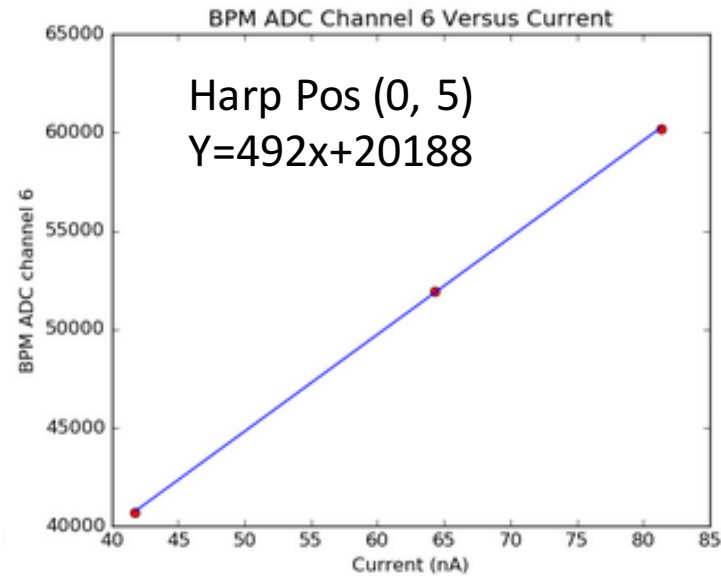
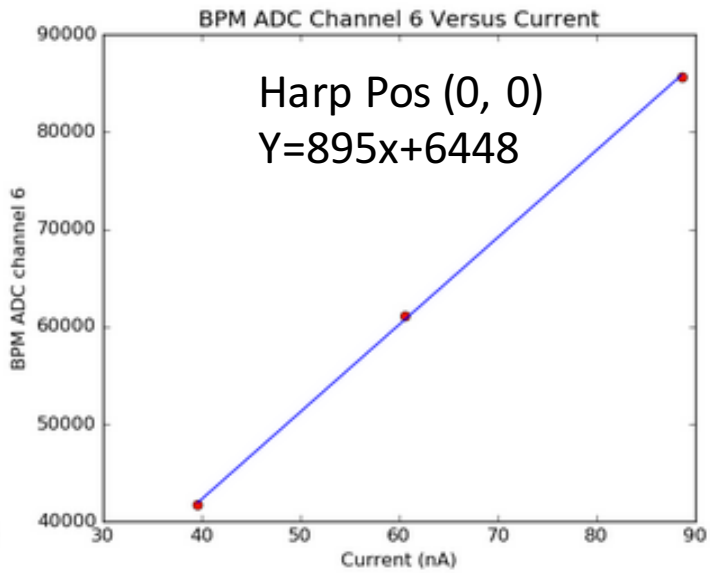
Why?

# Fitting Offset for Channel 1 (BPMA)



This offset has a very strong position Dependence

# Fitting Offset for Channel 6 (BPMB)



This offset has a very strong position Dependence

- The offset has a strong position dependence
- It may cause the previous current dependence (we observed before)
- Seems need redo calibration?
  
- Calculate the real position will be more complicated, do not know position first, the offset may also not know, especially if position slow drifting
  
- Any suggestions?