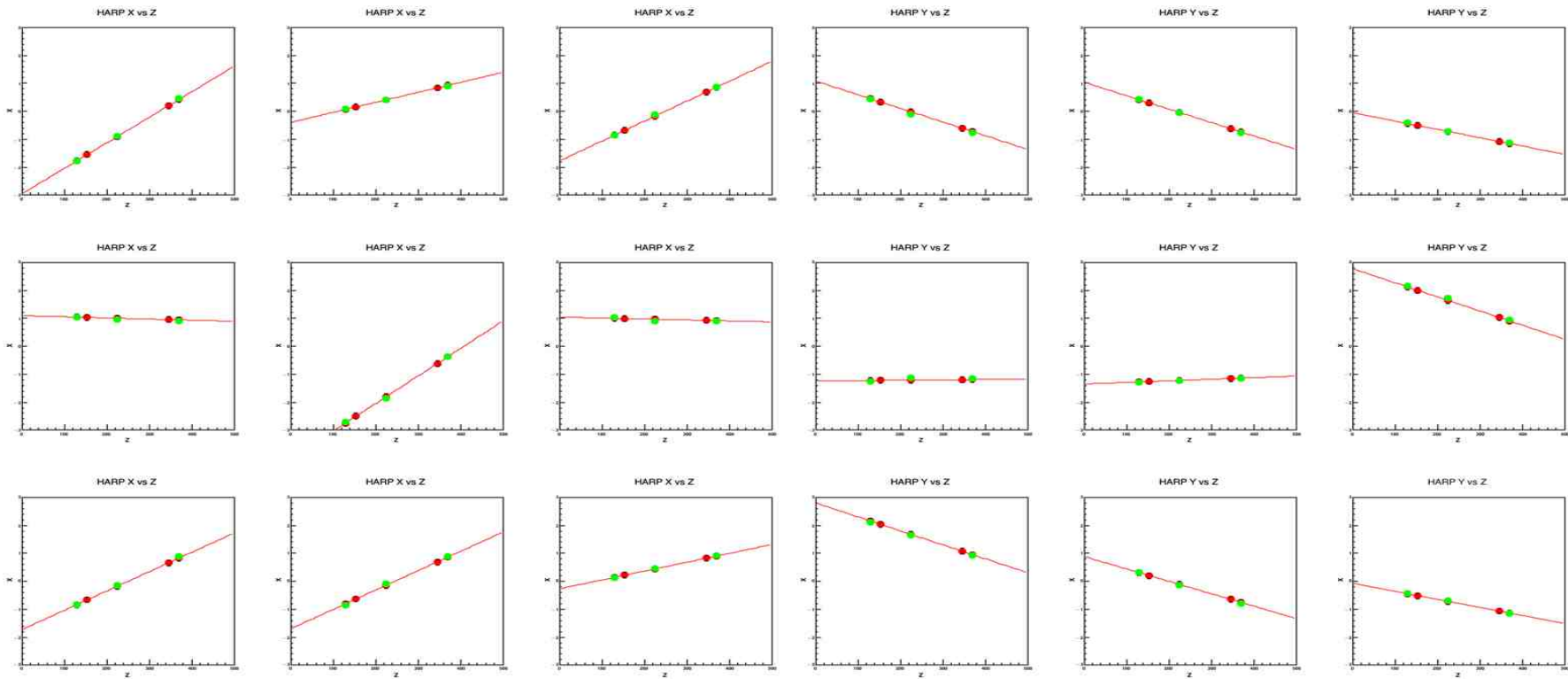


# BPM Calibration Update

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# Sanity Checks for Internal Consistency



# Gains and Offsets

- Projected X/Y Position = **slope** \* Raw EPICS BPM X/Y Position + **offset**
- A calibration script now exists in hallc\_replay to calculate these parameters, which can then be added to ~/PARAM/GEN/gbeam.param

```
BPM Ax: Slope = -1.00111 +/- 0.278043
BPM Ax: Constant = -0.123099 +/- 0.255359

BPM Bx: Slope = -1.24023 +/- 0.126607
BPM Bx: Constant = -0.061674 +/- 0.0863716

BPM Cx: Slope = -0.940987 +/- 0.058928
BPM Cx: Constant = -1.00727 +/- 0.0792616

BPM Ay: Slope = 0.957734 +/- 0.133041
BPM Ay: Constant = -0.44177 +/- 0.114019

BPM By: Slope = 1.19394 +/- 0.100589
BPM By: Constant = 0.190897 +/- 0.0863716

BPM Cy: Slope = 0.842772 +/- 0.052127
BPM Cy: Constant = 0.549773 +/- 0.076011
```

## Beam Position at Target ( $z = 0$ )

$$X(z) = m_x * z + b_x \text{ and } Y(z) = m_y * z + b_y$$

Calculate slopes from A and C BPM's (longest lever arm):

$$m_x = (A_x - C_x)/(A_z - C_z) \text{ and } m_y = (A_y - C_y)/(A_z - C_z)$$

Then calculate  $b_x$  and  $b_y$  (positions at target):

$$b_x = A_x - m_x * A_z \text{ and } b_y = A_y - m_y * A_z$$

Finally, add raster X and Y values to these offsets to get rastered beam position at the target.

## EPICS data in detector classes

- The previous algorithm requires the BPM information event by event (as the raster information is event by event).
- Need the calibrated BPM information from (last) EPICS event in the THcRaster class.
- Steve Wood has added the capability to get the EPICS event handler to the THaAnalyzer class
- Requires creating an instance of the THcAnalyzer object in the detector class, and then one can use the various THaAnalyzer Get\* methods to get the THaEpicsEvtHandler event handler object, and in turn one can use then the various THaEpicsEvtHandler Get\* methods to get the EPICS data of interest.

## THcRaster.h

```
#include "THaEpicsEvtHandler.h"
protected:
    THaEpicsEvtHandler* fEpicsHandler;
```

## THcRaster.cxx

(in somewhere like the ReadDatabase method ... )

```
THcAnalyzer *analyzer = dynamic_cast<THcAnalyzer*>(THcAnalyzer::GetInstance());
fEpicsHandler = analyzer->GetEpicsEvtHandler();
```

(in the Decode method ... )

```
if (fEpicsHandler) {
    if (fEpicsHandler->IsLoaded("IPM3H07A.XRAW")){
        BPMXA_raw = atof(fEpicsHandler->GetString("IPM3H07A.XRAW"));
    }
}
```

**N.B. Need to be careful with units!!! BPM calibrations are in mm, raster is in cm currently!!**

