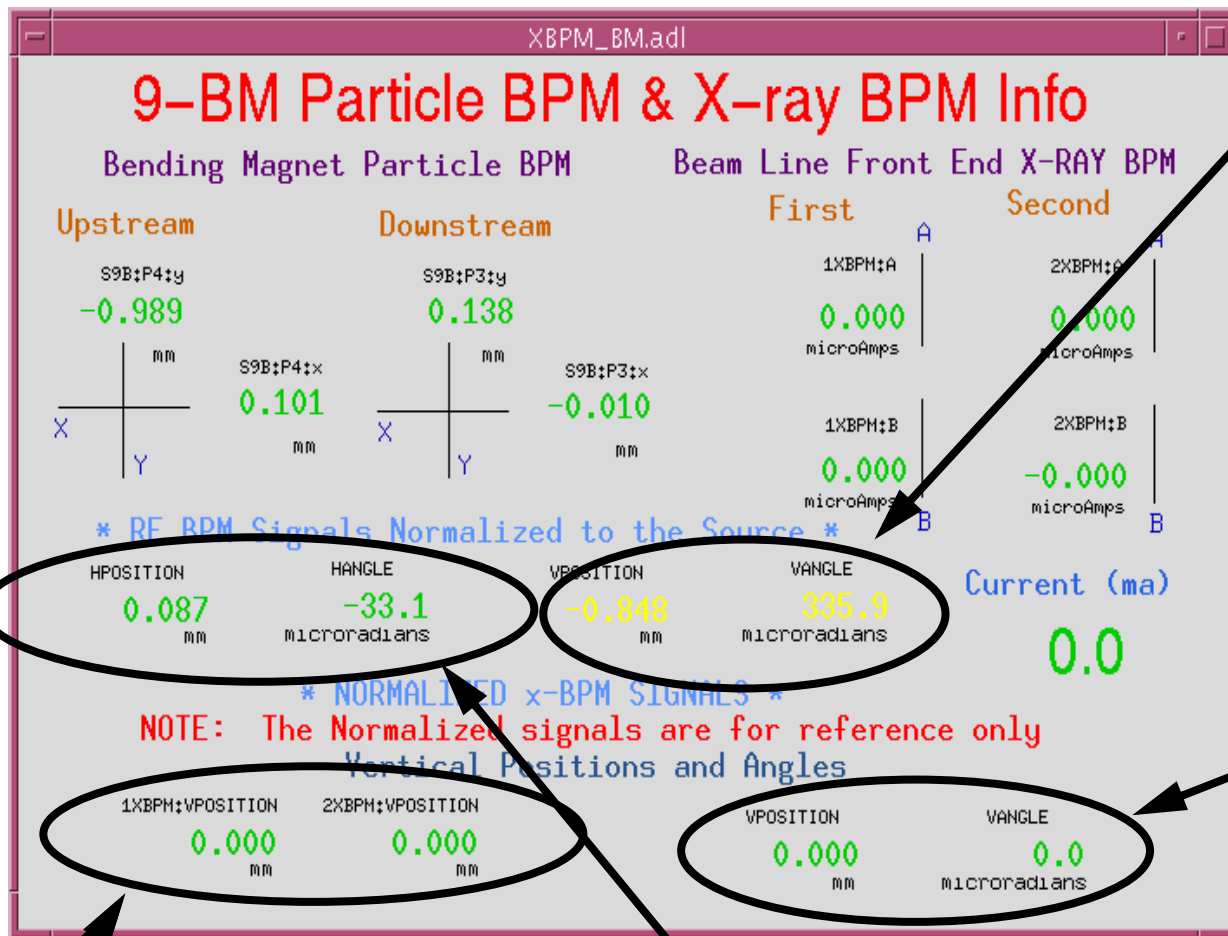# Bending Magnet Legacy PV's, or,

What I hate / don't hate about the legacy process variables / medm screens - G. Decker

VAngle, VPosition derived from broadband (monopulse) RF beam position monitors.

These readbacks suffer from the rogue microwave disease - resulting in hypersensitivity to small fill pattern variations, viz. what happens every two minutes during top-up. The numbers are yellow to siginify suspect data. If you don't do top-up and only observe for short periods of time, like less than an hour, these are ok for beam position. Other than that, they are crap. The problem is with the vacuum chamber internal geometry, not the electronics.
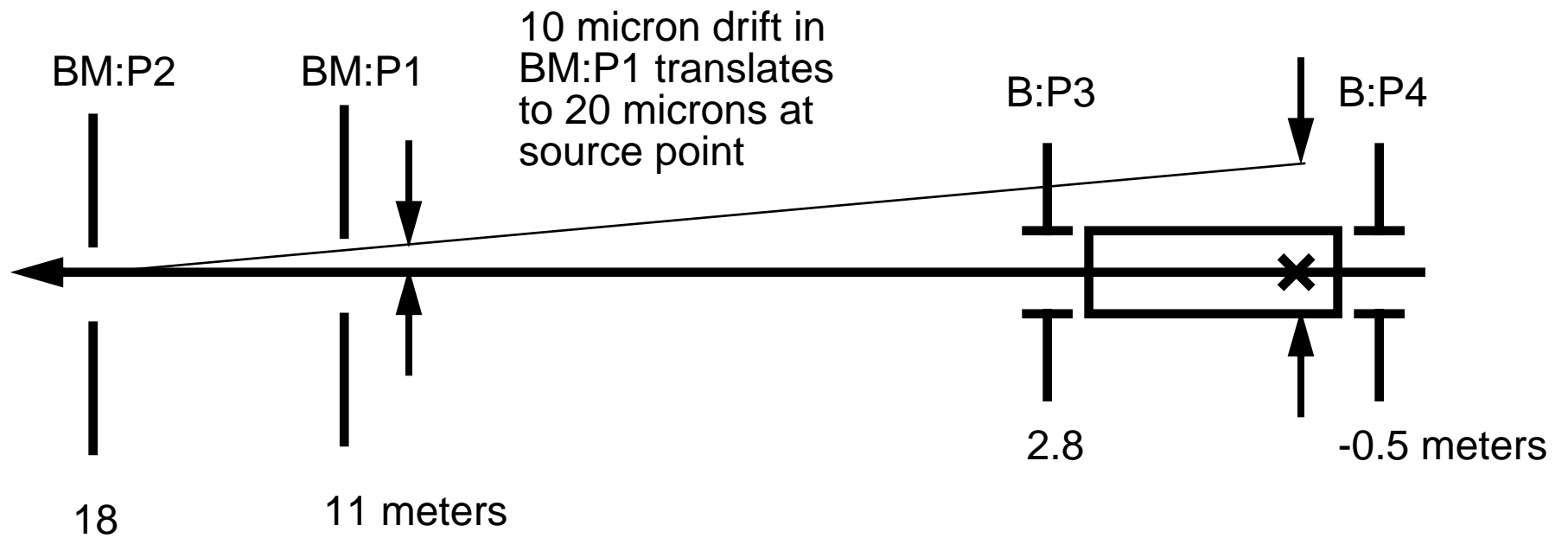
VAngle, VPosition, derived from x-ray bpm's, _extrapolated_ back to the source point. VAngle is ok, but VPosition will enhance every little burp made by either x-bpm due to the extrapolation. I hate that.

HAngle, HPosition derived from broadband (monopulse) RF beam position monitors

The best available, however they are susceptible to bunch pattern dependence, i.e. every 52 minutes in top-up mode (1+22 Singlets) an artificial step occurs in the readings. Orbit correction fits a smooth curve through many bpm's (eleven per betatron wavelength), so the beam isn't doing this - really. I promise.

Front-end x-ray beam position monitor raw read-backs. Our most reliable diag-nostic. Unfortunately, these PV names are archaic and better ones should be used.
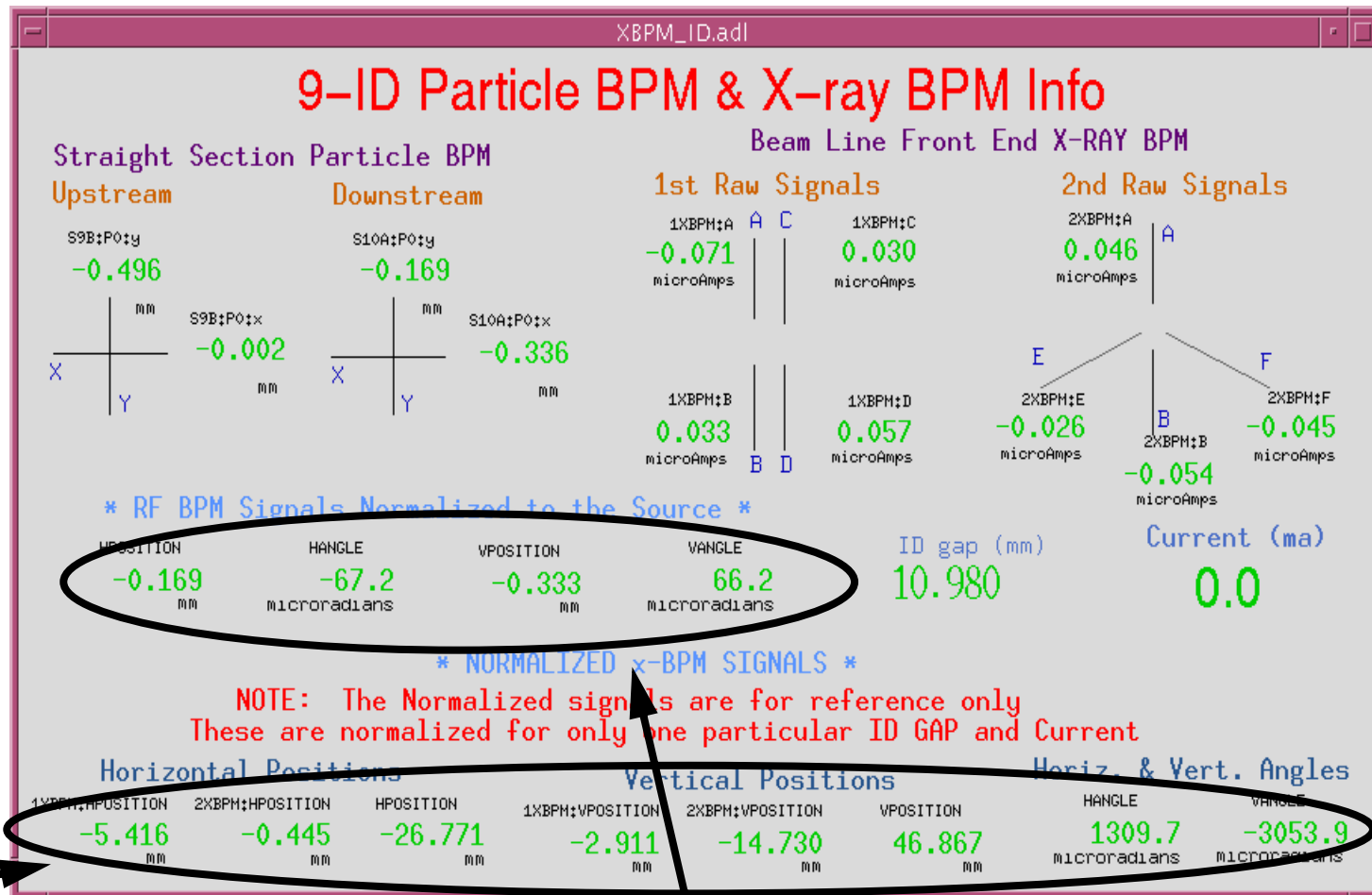
Extrapolation vs. Interpolation for defining source angle

BM:P2

BM:P1

10 micron drift in
BM:P1 translates
to 20 microns at
source point

B:P3

B:P4

2.8

-0.5 meters

18

11 meters

Insertion Device BPM Legacy PV's

9-ID Particle BPM & X-ray BPM Info

Straight Section Particle BPM

Upstream

S9B:P0:y
-0.496
mm

S9B:P0:x
-0.002
mm

Downstream

S10A:P0:y
-0.169
mm

S10A:P0:x
-0.336
mm

Beam Line Front End X-RAY BPM

1st Raw Signals

1XBPM:A A C
-0.071
microAmps

1XBPM:C
0.030
microAmps

1XBPM:B
0.033
microAmps   B D

1XBPM:D
0.057
microAmps

2nd Raw Signals

2XBPM:A   A
0.046
microAmps

E   F

2XBPM:E
-0.026
microAmps

B
2XBPM:B
-0.054
microAmps

2XBPM:F
-0.045
microAmps

* RF BPM Signals Normalized to the Source *

HPOSITION	HANGLE	VPOSITION	VANGLE
-0.169 mm	-67.2 microradians	-0.333 mm	66.2 microradians

ID gap (mm)
10.980

Current (ma)
0.0

* NORMALIZED x-BPM SIGNALS *

NOTE: The Normalized signals are for reference only
These are normalized for only one particular ID GAP and Current

Horizontal Positions

1XBPM:HPOSITION	2XBPM:HPOSITION	HPOSITION
-5.416 mm	-0.445 mm	-26.771 mm

Vertical Positions

1XBPM:VPOSITION	2XBPM:VPOSITION	VPOSITION
-2.911 mm	-14.730 mm	46.867 mm

Horiz. & Vert. Angles

HANGLE	VANGLE
1309.7 microradians	-3053.9 microradians

Insertion Device X-ray Beam Position Monitors: Very high resolution, very pathological systematic effects. Non-linear outside +- 0.5 mm, Feedforward required to compensate for gap dependent effects, useless for gaps larger than approx. 30 mm. My extrapolation comments also apply for the Position pv's.

Source parameters derived from narrowband rf beam position monitors (P0's). These are actually pretty good. These have a 20 second time constant, and are downstream of the intensity-dependence offset compensation feedforward. That's good.

By Popular Demand, the following screen for insertion device beamlines meets most requirements that I have heard:

Shutter Icon that moves when the shutter opens and closes!

InUse status (by orbit control algorithm)

Insertion Device Gap Status
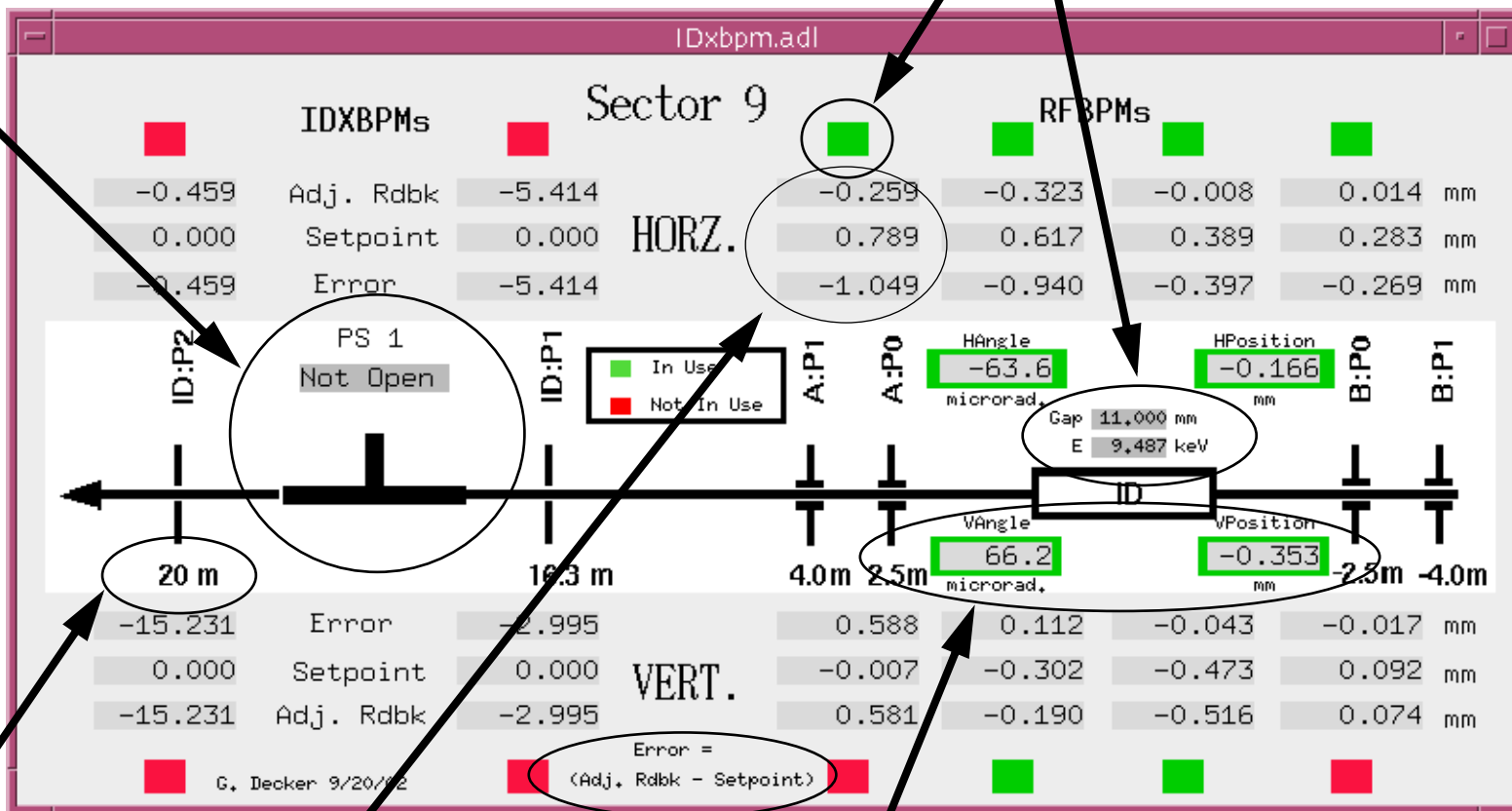
Process variables that are actually used by the orbit correction algorithm! (Background turns red if the device is hopelessly broken)
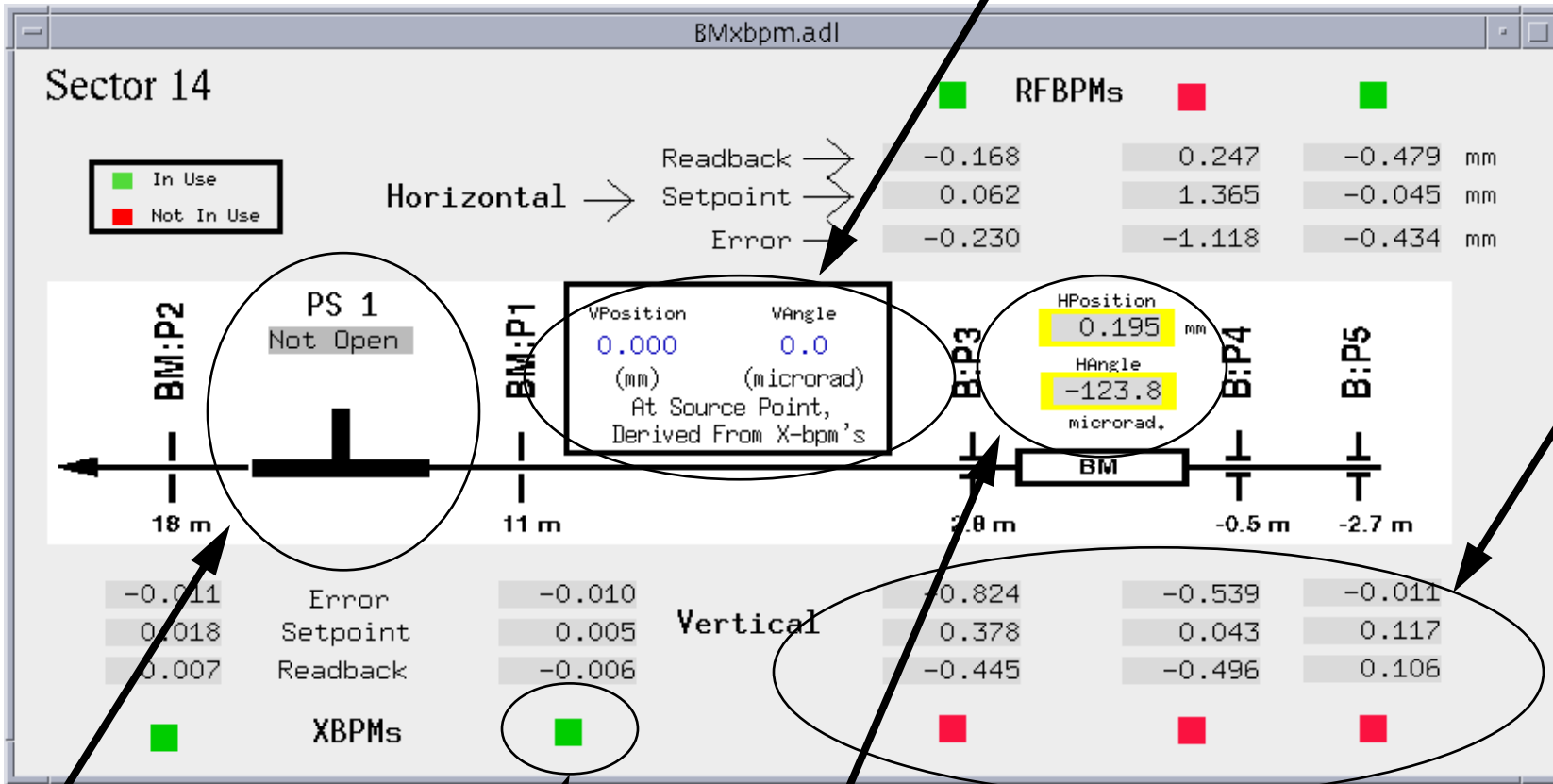
Distance from center of ID straight !

Source position and angle pv's that I won't complain about defending! (Background turns yellow if something is fishy).

Equation explaining what those three numbers are !

And, in addition, new screens for BM lines are also available:

Vertical Source Point Values Extrapolated from BM x-bpm's

BMxbpm.adl

Sector 14

RFBPMs

In Use
Not In Use

Horizontal → Readback → -0.168   0.247   -0.479 mm
Setpoint → 0.062   1.365   -0.045 mm
Error → -0.230   -1.118   -0.434 mm

PS 1
Not Open

BM:P2   BM:P1   B:P3   B:P4   B:P5

VPosition   VAngle
0.000   0.0
(mm)   (microrad)
At Source Point,
Derived From X-bpm's

HPosition
0.195 mm
HAngle
-123.8
microrad.

BM

18 m   11 m   ?.8 m   -0.5 m   -2.7 m

-0.011   Error   -0.010   -0.824   -0.539   -0.011
0.018   Setpoint   0.005   0.378   0.043   0.117
0.007   Readback   -0.006   -0.445   -0.496   0.106

Vertical

XBPMs

Flaky vertical RF bpm readbacks, provided for completeness

Shutter Status

InUse pv's make it easy to figure out what's going on here.

Horizontal Source Point Values Interpolated from RF bpm readbacks (It's yellow because S14B:P4:x is broken, but it is a simple matter to use B:P5 for an estimate of angle changes).