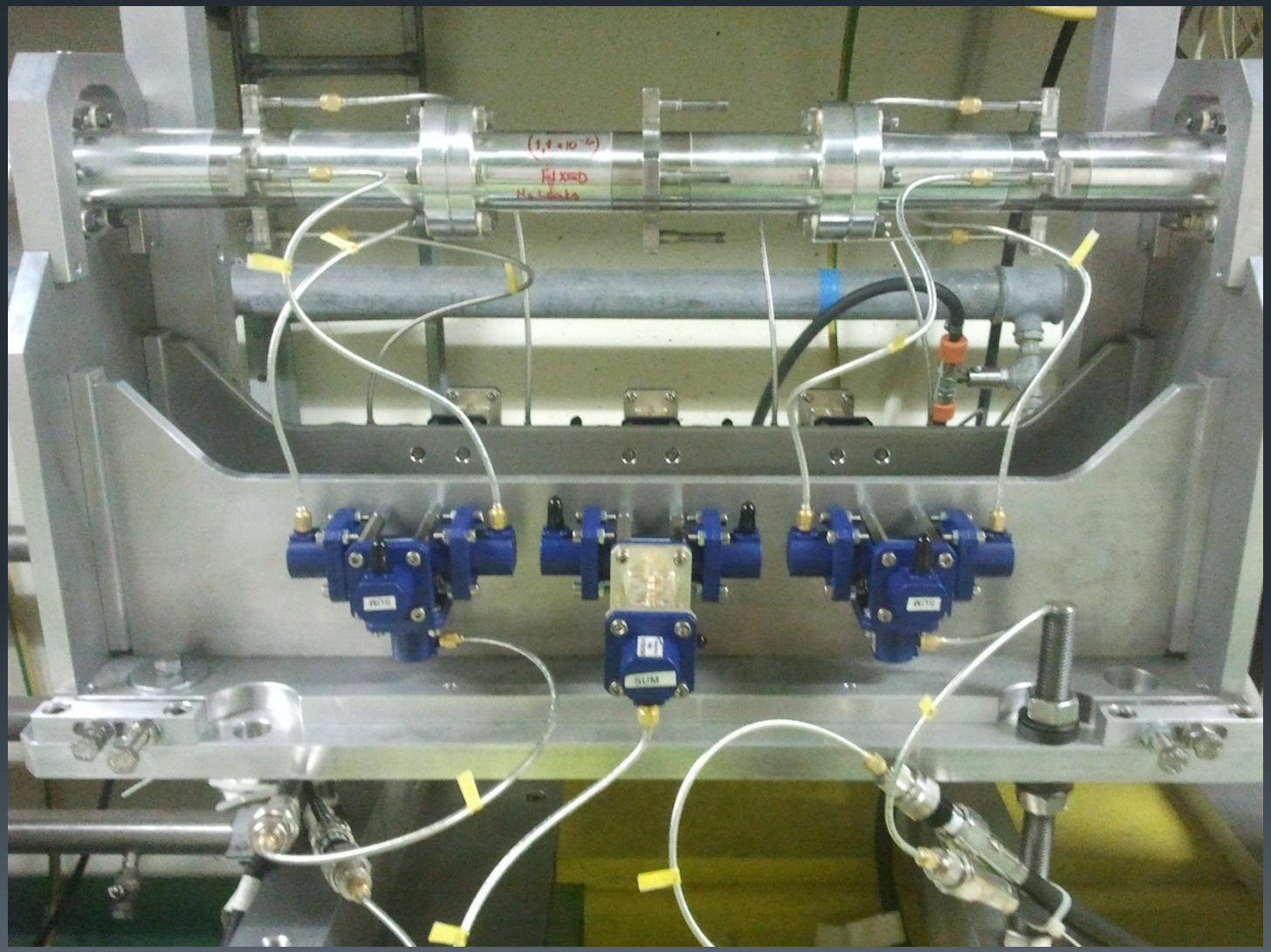
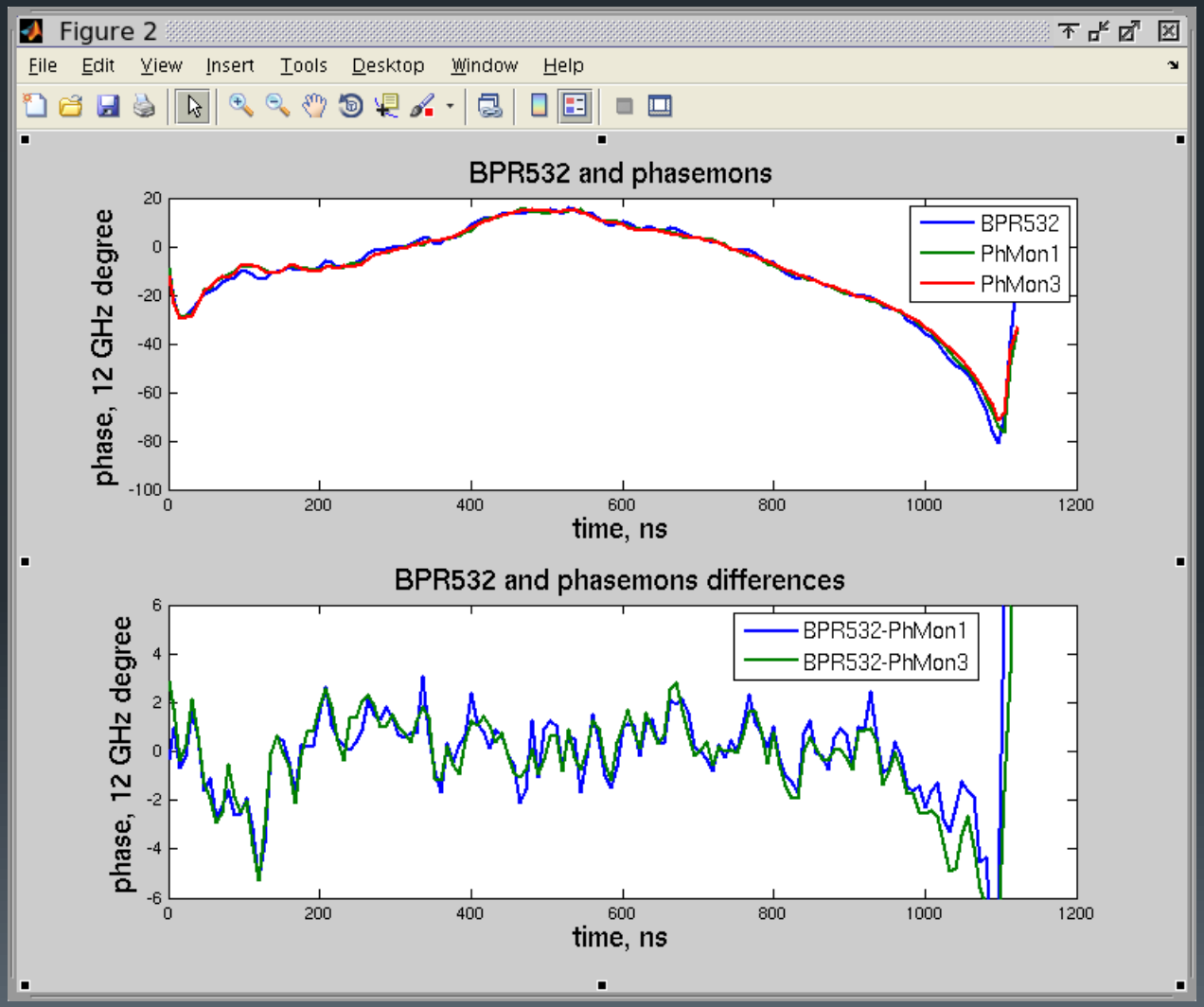
D.B. Phase Monitor performance

Alexandra Andersson

Three monitors installed in Linac



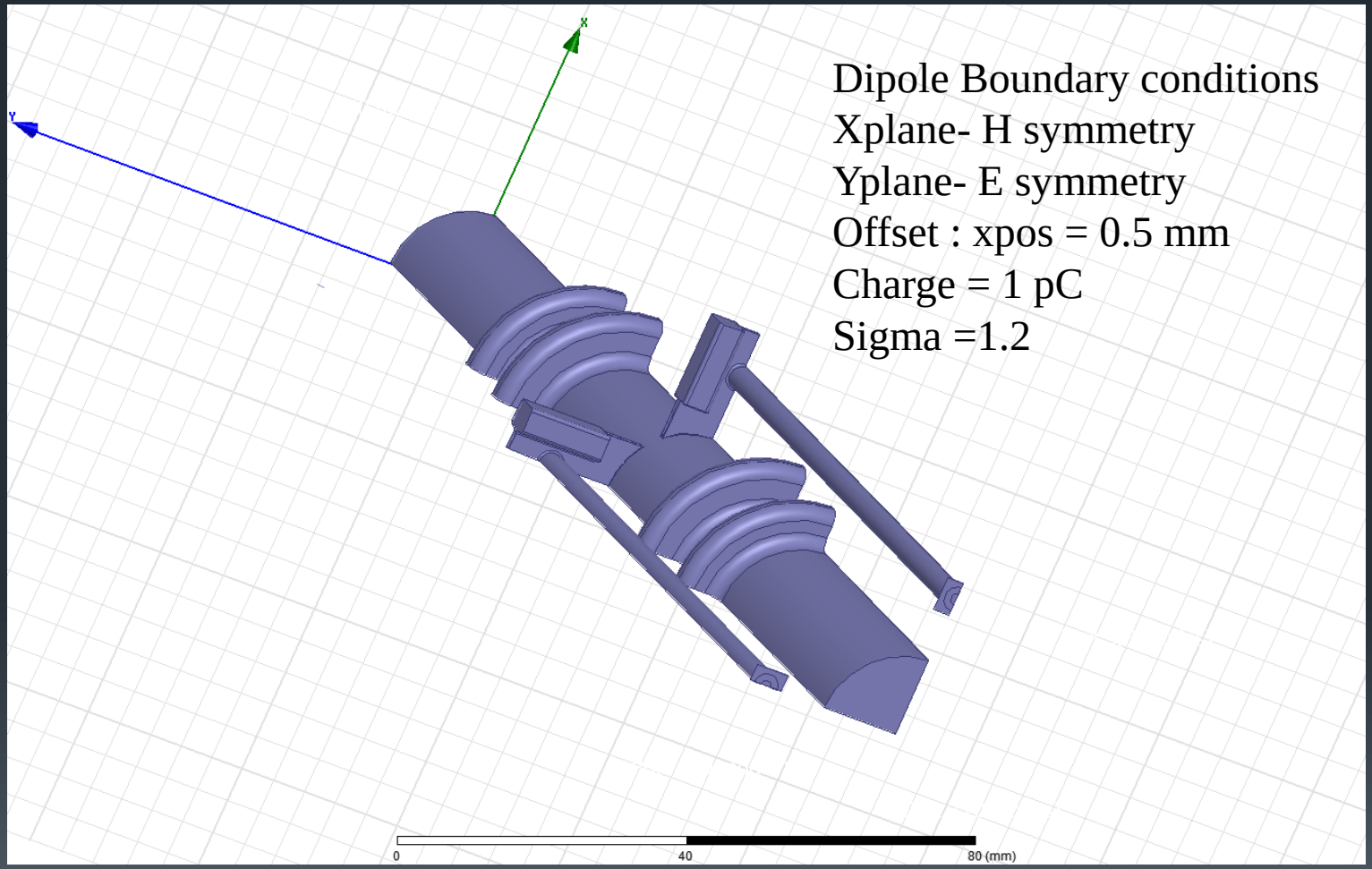
First Beam through the monitors



Dipole mode, 3 GHz beam

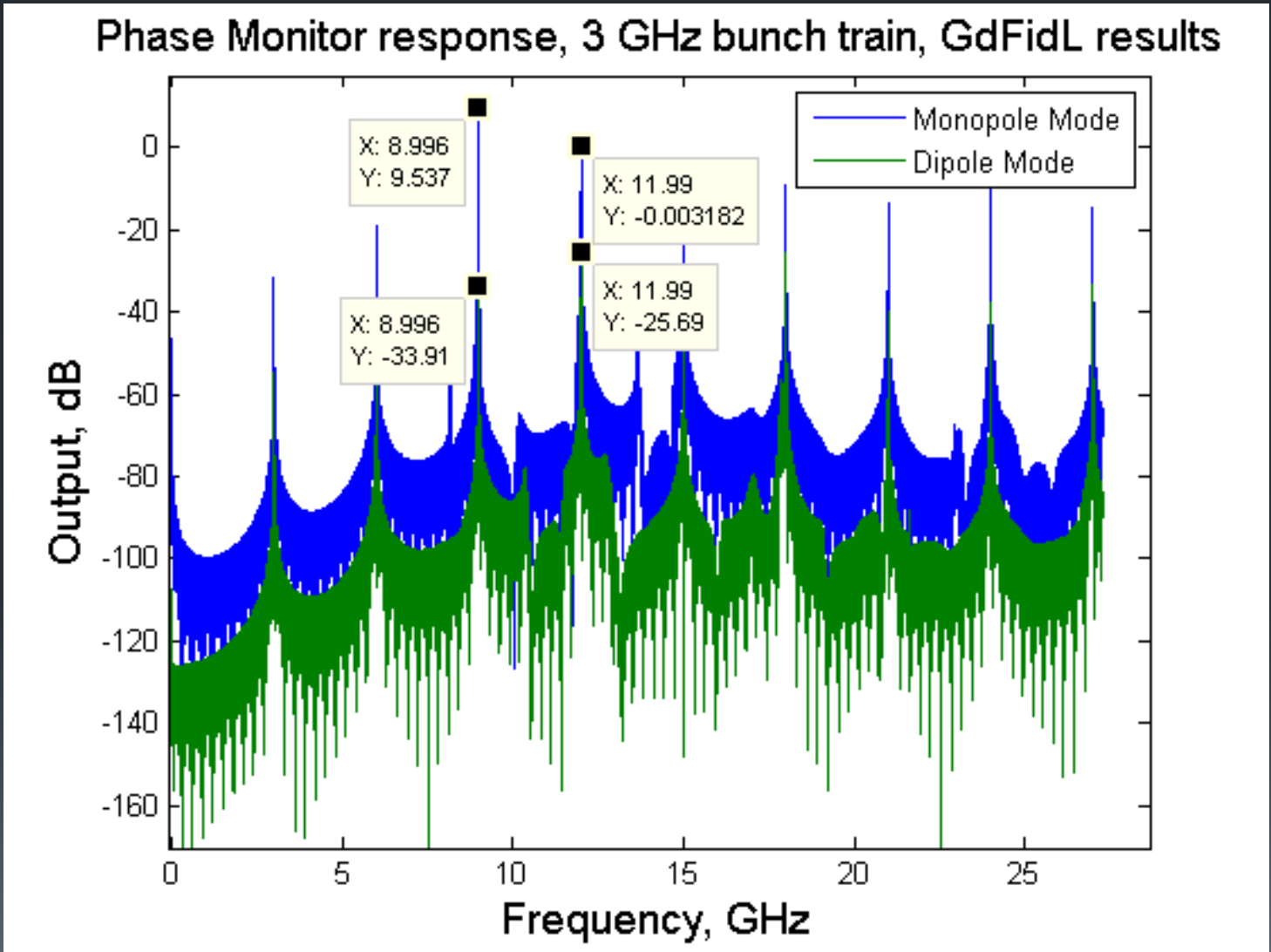
- The monitors seem to have a dipole mode also at 12 GHz, according to GdFidl simulations
- It sits about 25 dB down from the monopole mode
- If nothing is done, a 1mm beam excursion would yield 2.8 degrees of phase offset
- So, we add some hybrids

Dipole mode simulation

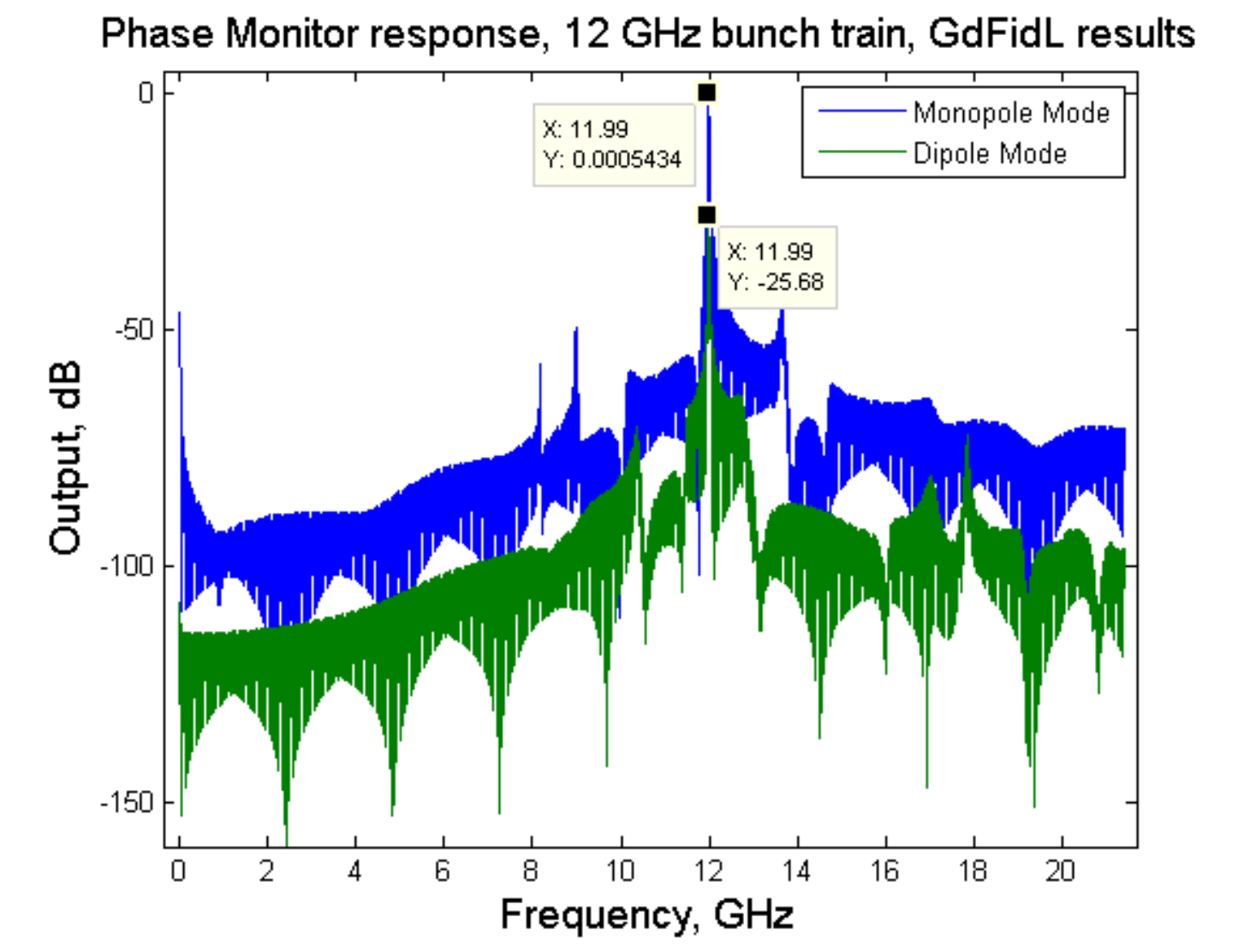


Thanks to Vasim Khan

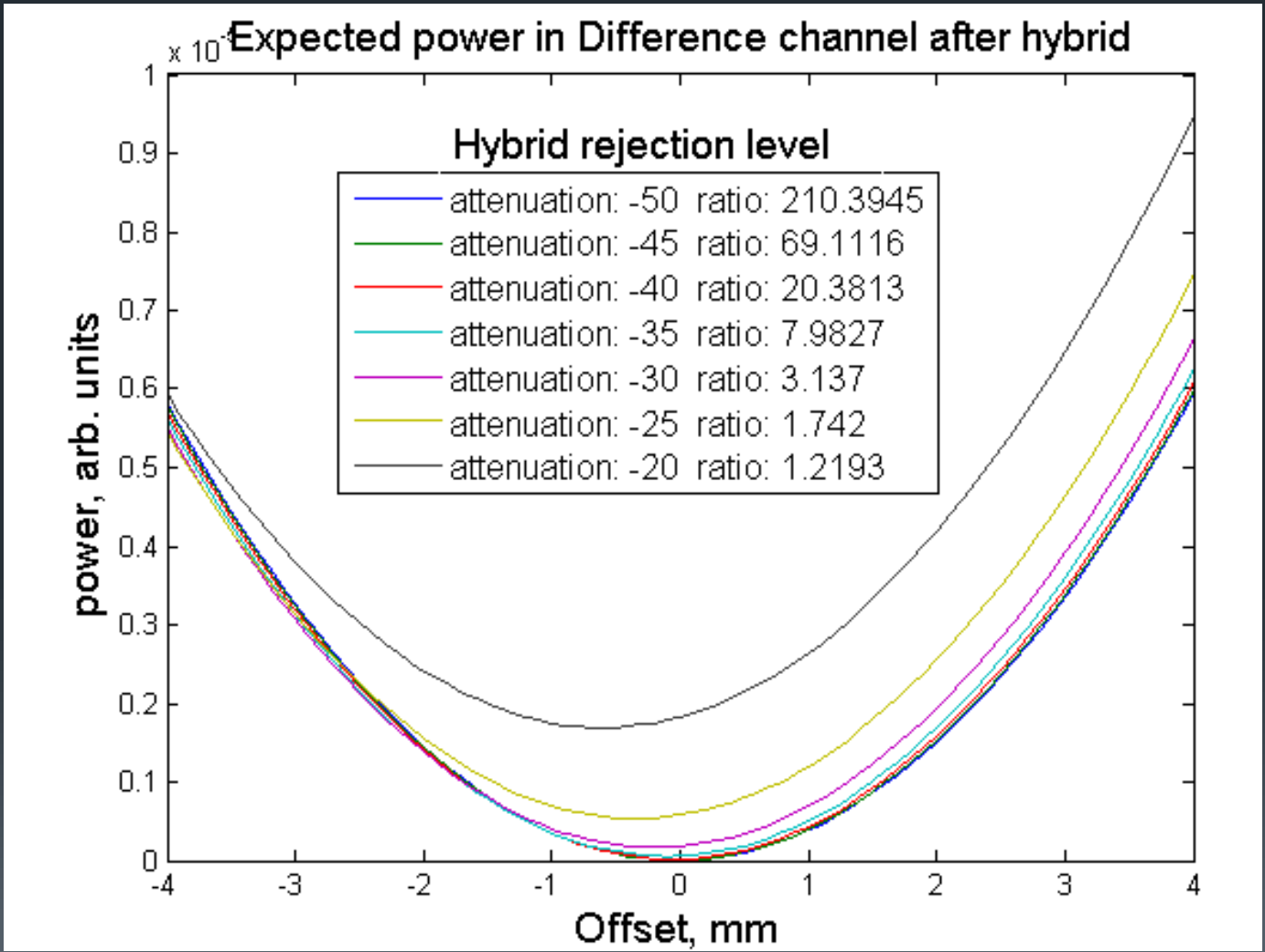
Dipole mode, 3 GHz beam



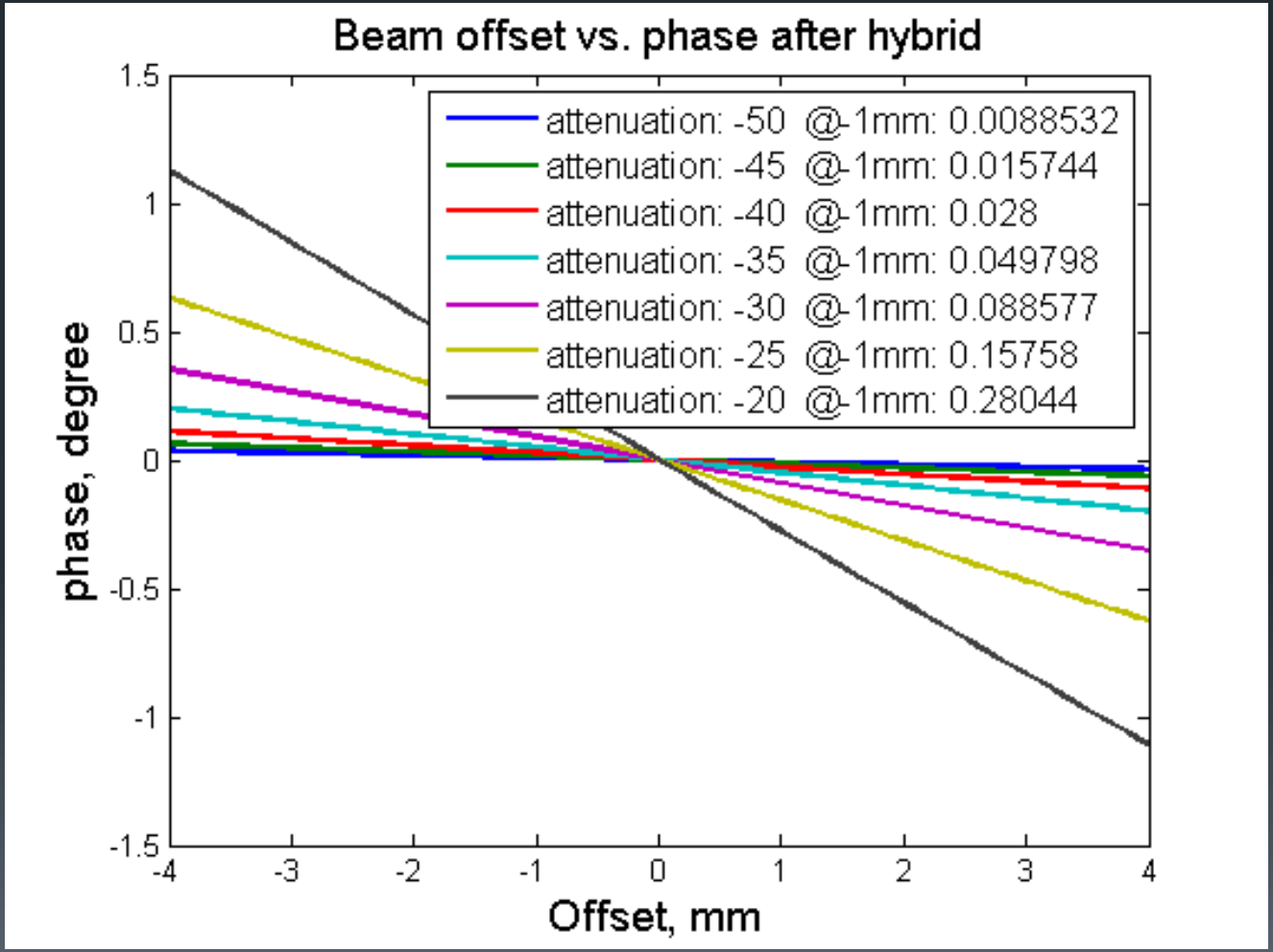
Dipole mode, 12 GHz beam



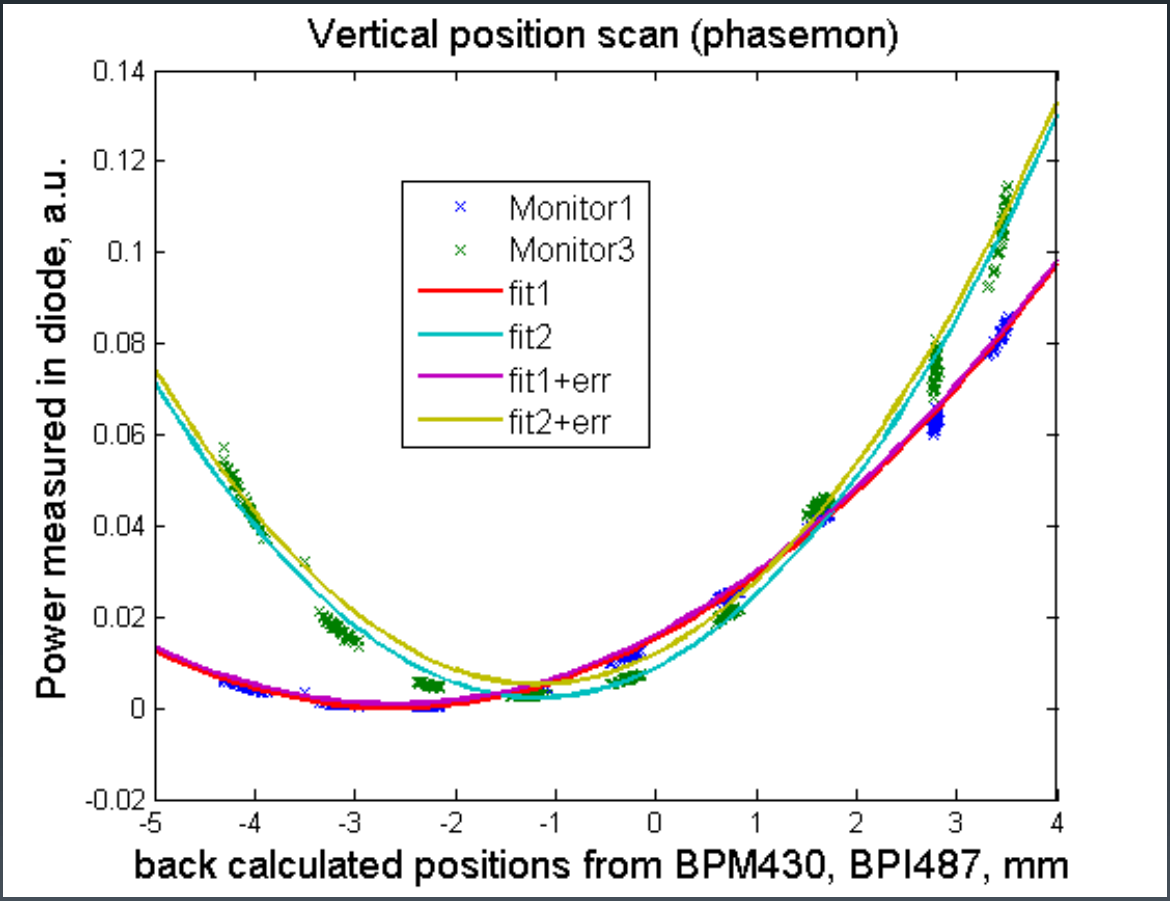
Expected offset channel signals



Influence on phase of offset



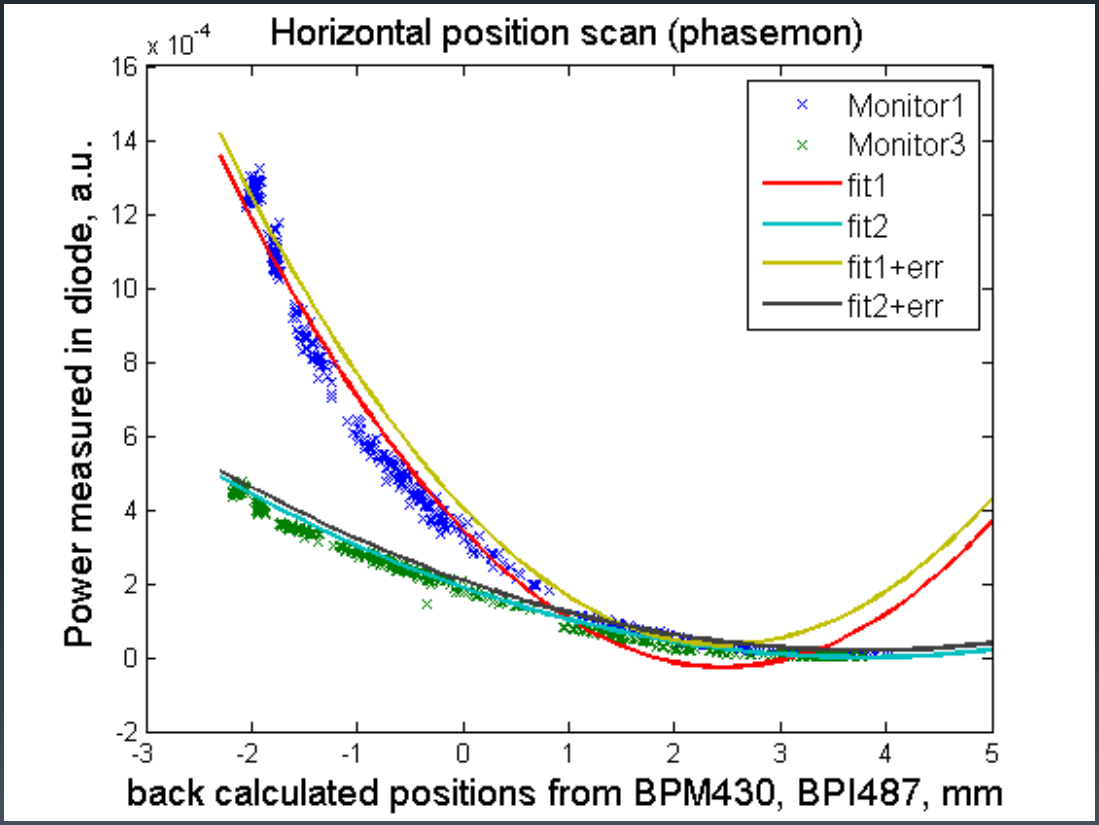
Vertical position scan, quads off



Mon1: >-30 dB

Mon3: -25 to -30 dB

Horizontal position scan, quads off

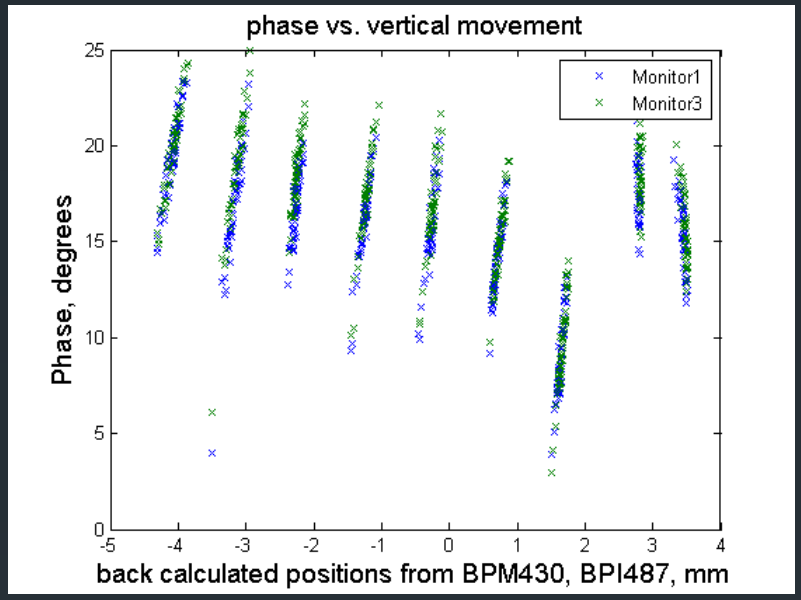


Mon1: >-28 dB

Mon3: >-24

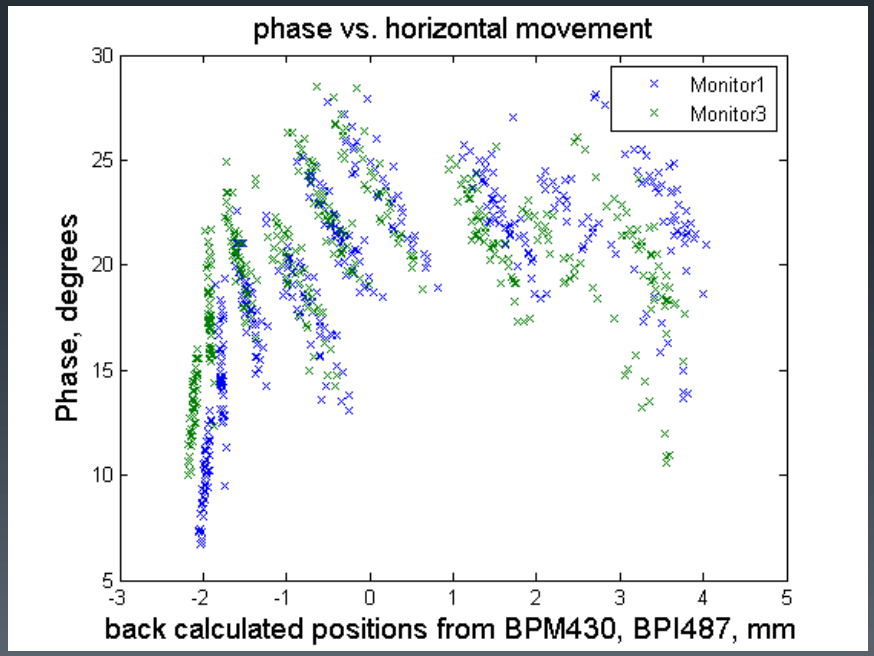
But not very well
Fitting polynomials

Phase vs. position

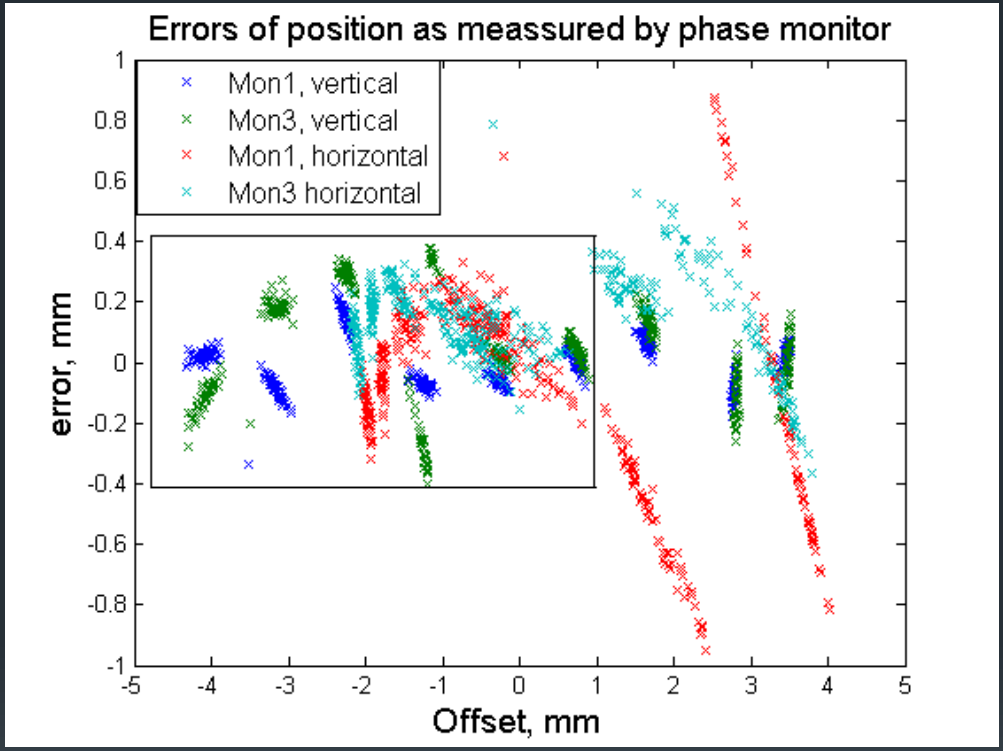


There is some large correlation between phase and position while not moving the beam. Probably via energy.

We can't expect to see some small correlation monitor driven hidden within this

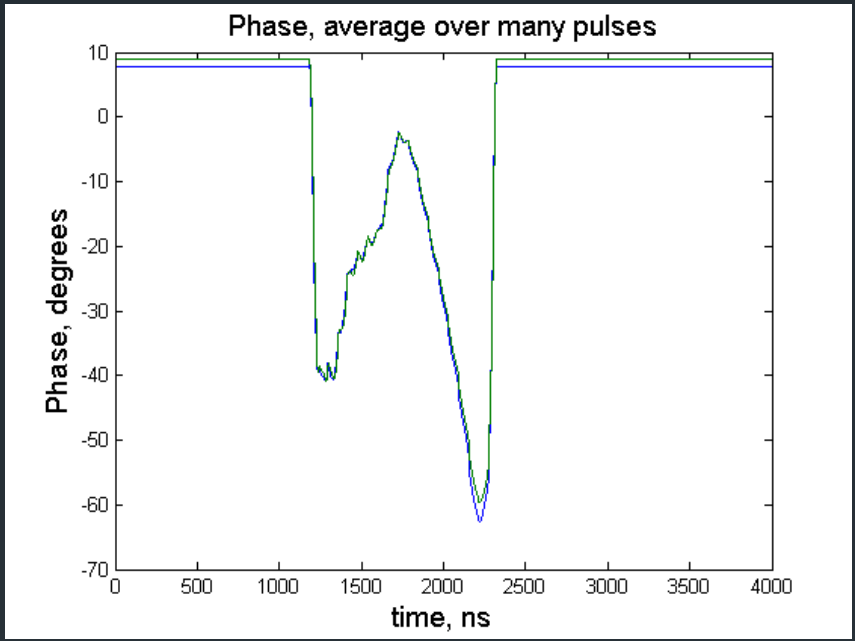


BPM performance

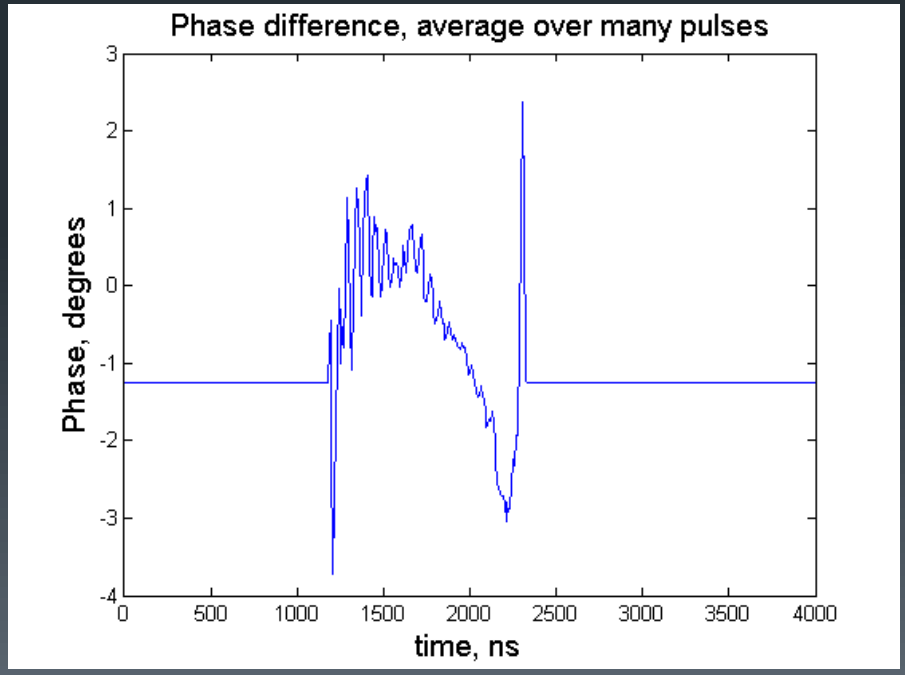


Monitor 1, vertical: 0.083 mm
Monitor 3, vertical: 0.18 mm
Monitor 1, horizontal: 0.14 mm
Monitor 3, horizontal: 0.16 mm

Comparing the two monitors



Residual noise after removing systematics: 0.55 degrees
No beam noise ~0.3 degrees



We are not at optimal power level, thermal noise should get better
Have to look into systematic error issue

Thank you for your attenuation