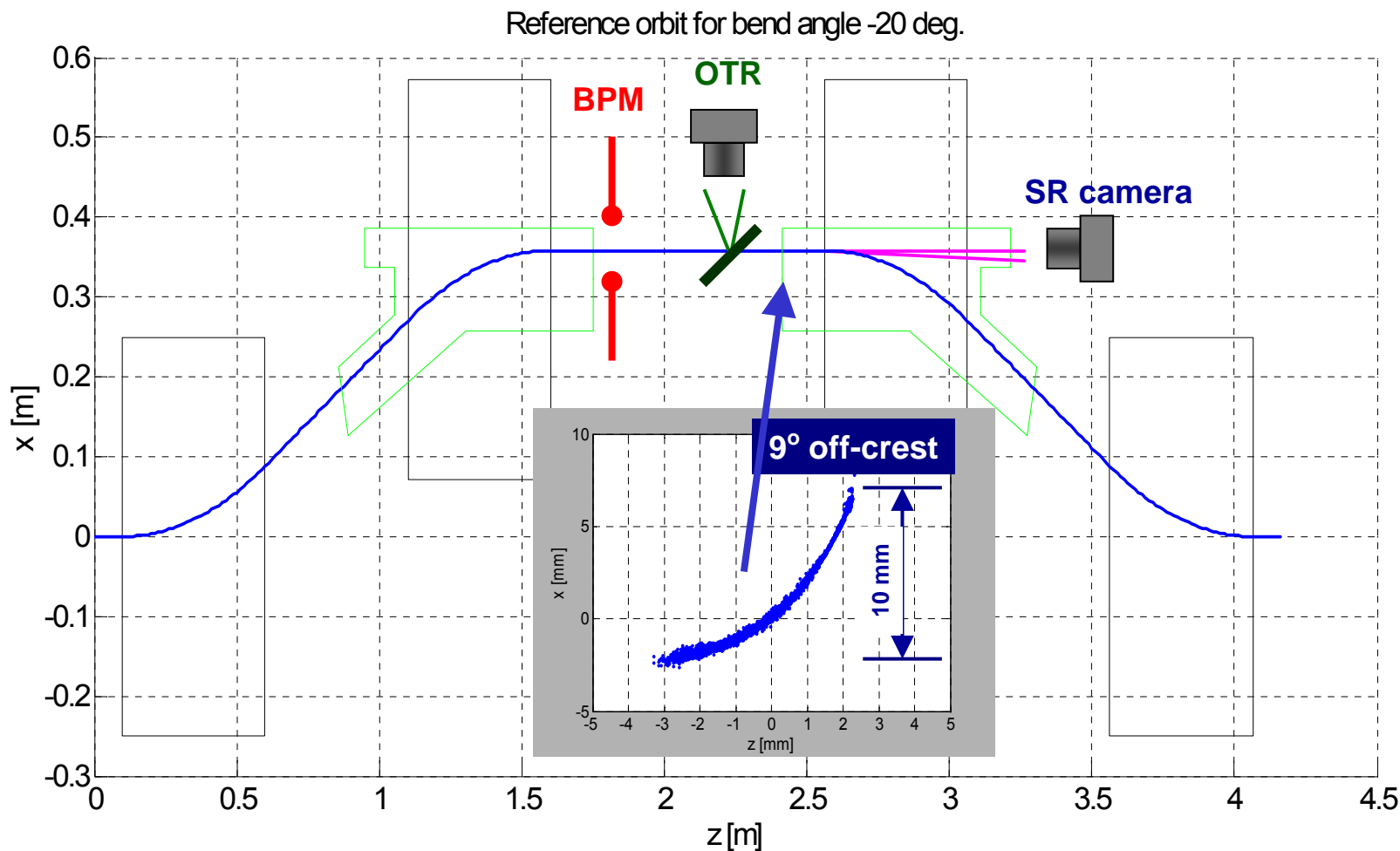


Update on Analysis and Simulations of Beam Tilt Measurements in BC2 - Part 1 -

Christopher Gerth, Kirsten Hacker, Eduard Prat

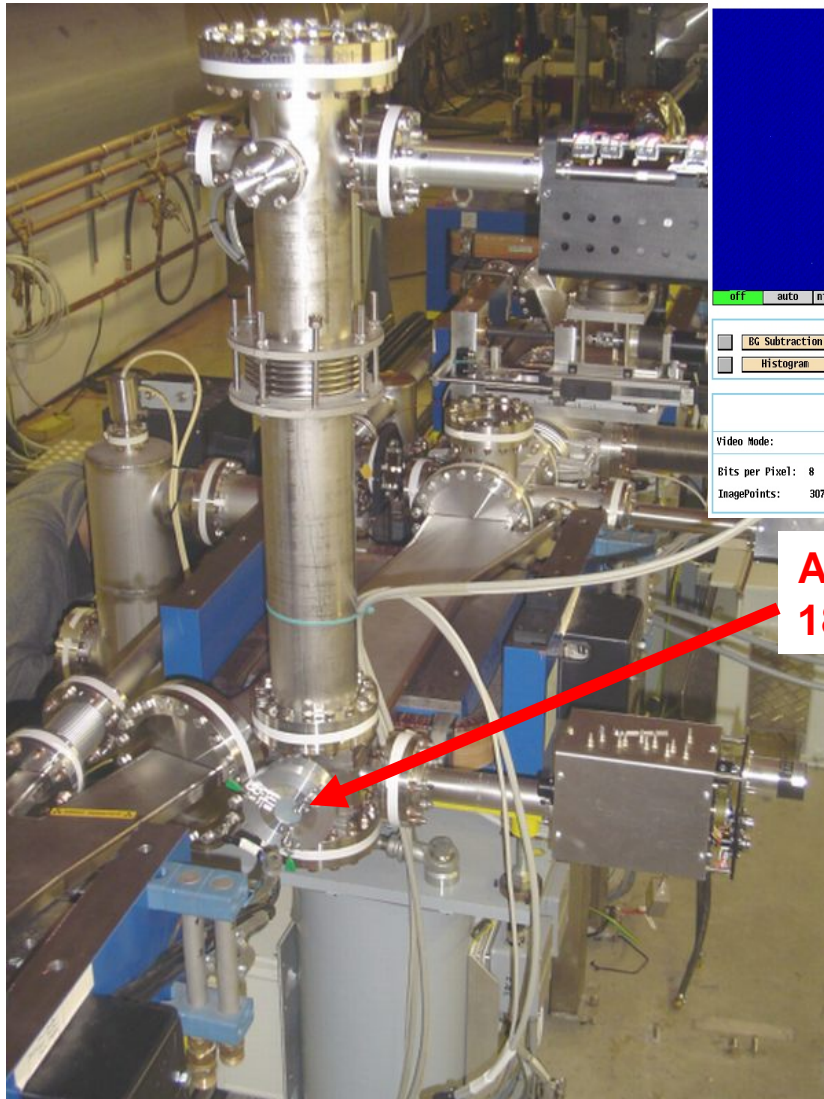
1. Introduction / Experimental Setup
2. On-crest operation
3. Bunch tilt measurements



Horizontal position of the electron beam is related to the beam energy
 $x = R_{16} * \Delta E/E$ ($x = 10 \text{ mm} \cong \Delta E/E = 3\%$)

At location of SR camera bunch appears as if 'streaked horizontally'

1) New SR Port and Camera



3BC2

Info: Online TCP: disconnected Camera: 0

Images: STOP Help

Brightness: +0

Gain: +213

Shutter: +3

Trigger: Grab Mode

Rate [Hz]: 5

RAW Image: Image

DAQ: send Data -> DAQ

Expert: Server Fining

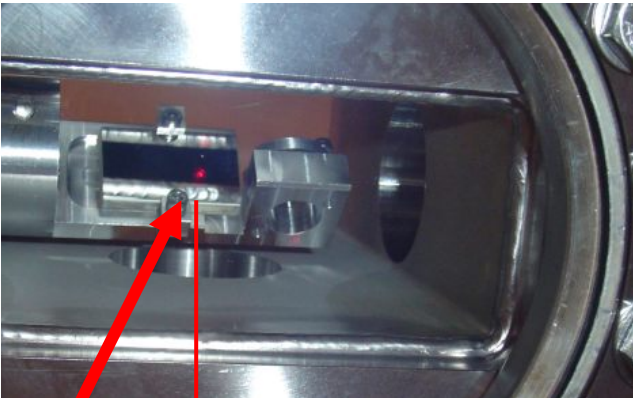
Tool Box: BG Subtraction X & Y Spectrum Histogram Region of Interest Camera Toolbox

Status:

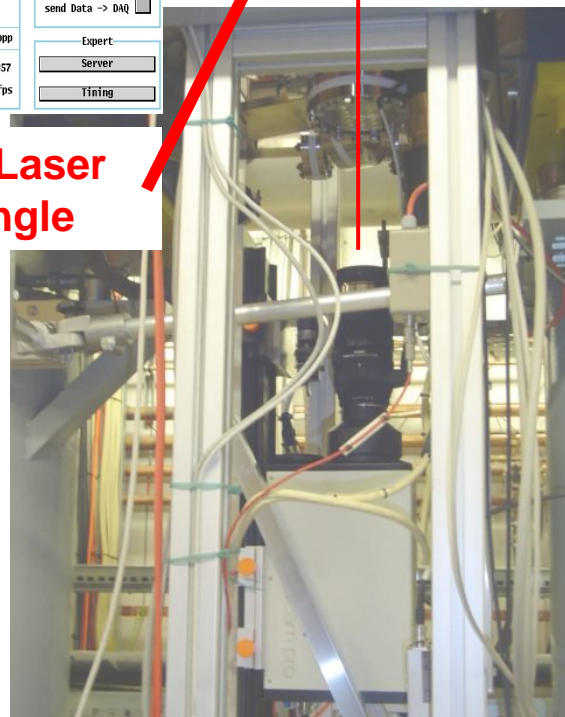
Video Mode: Format_0, Mode_5: 640x480 Mono 8bpp

Bits per Pixel: 8 Height: 480 Frame: 857

ImagePoints: 307200 Width: 640 7.5 fps



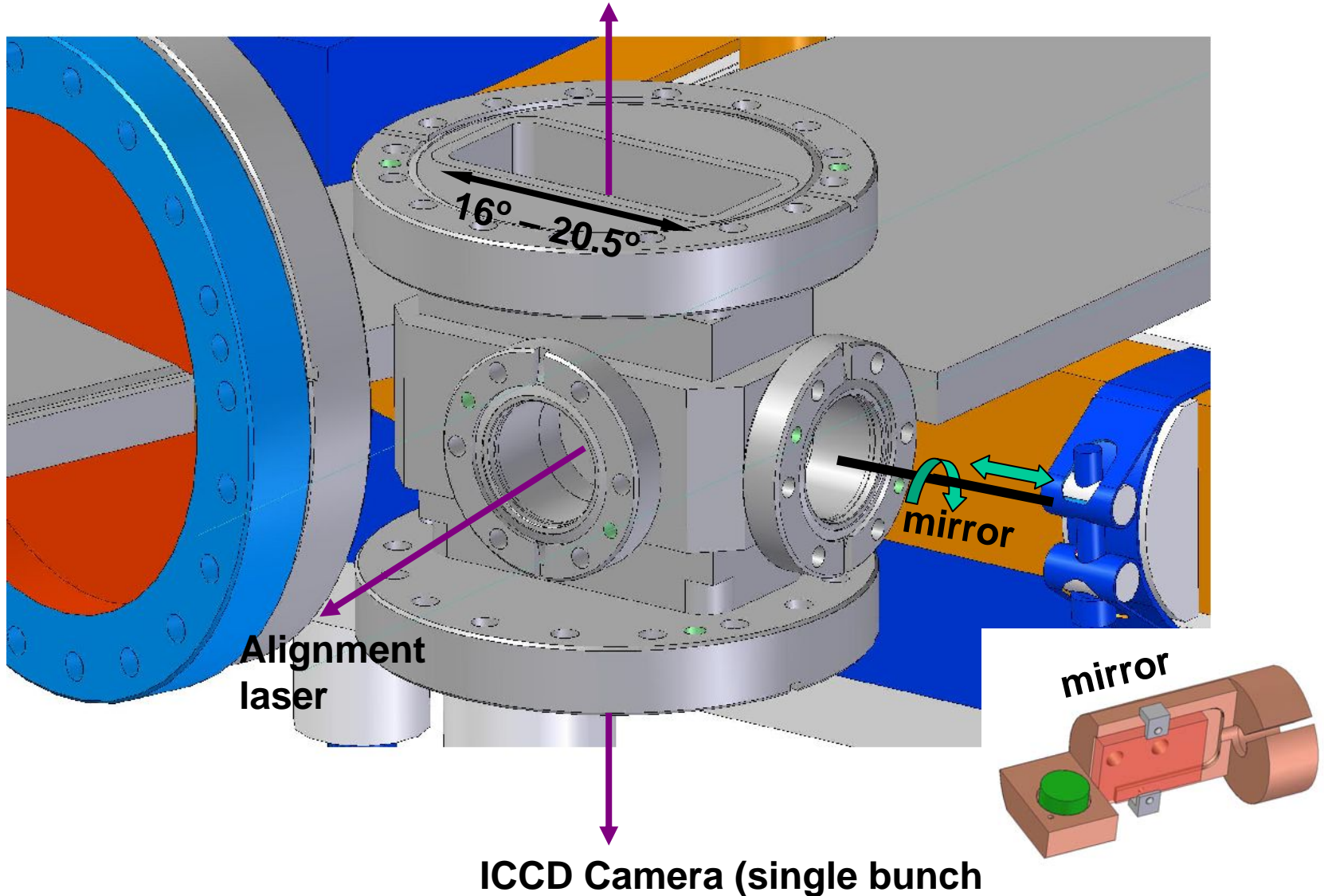
**Alignment Laser
18° bend angle**



Movement of mirror and camera needs to be automated

1) Layout New SR port

Fast MCP Detector (single bunch resolution)



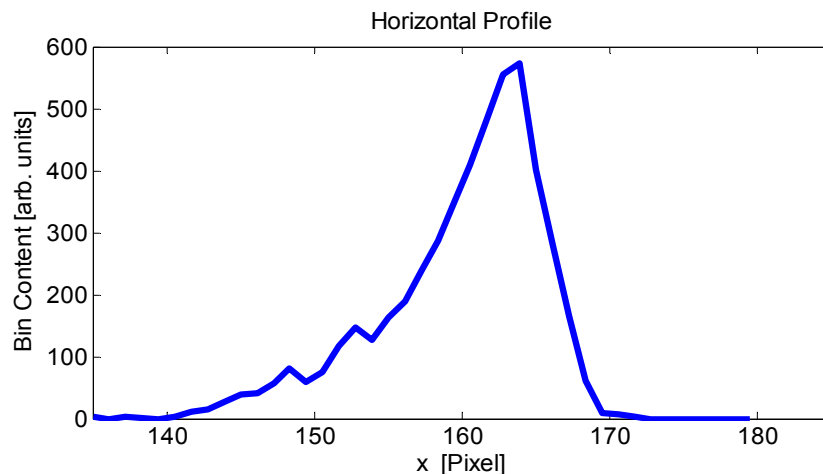
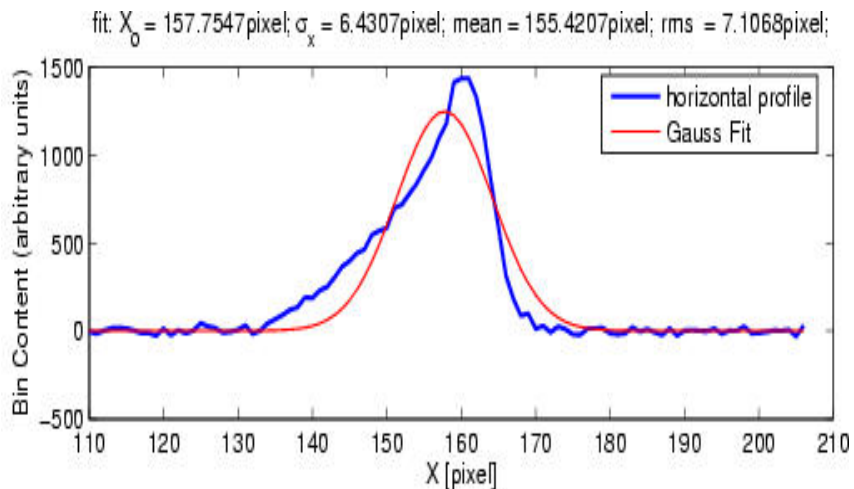
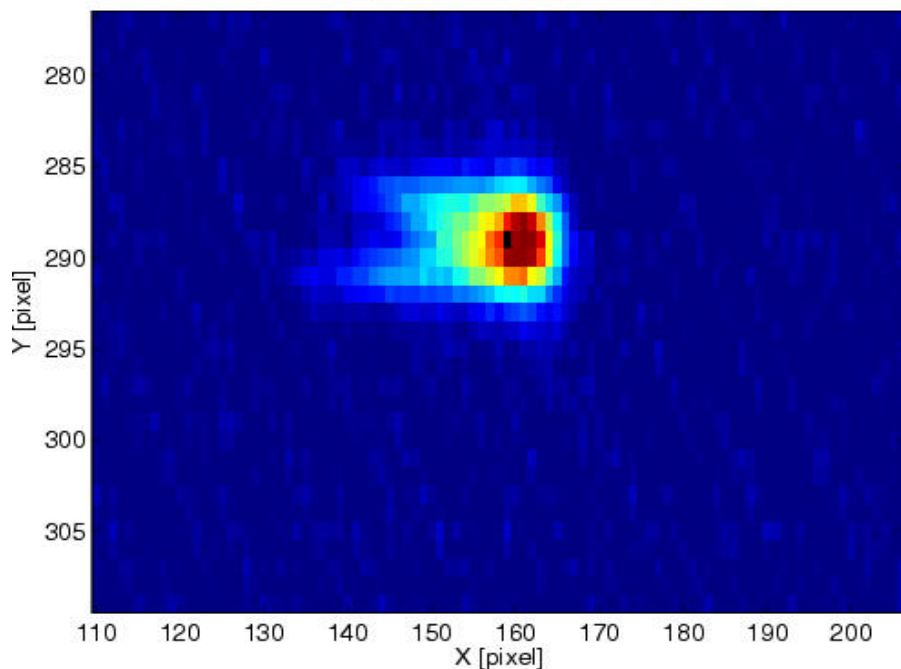


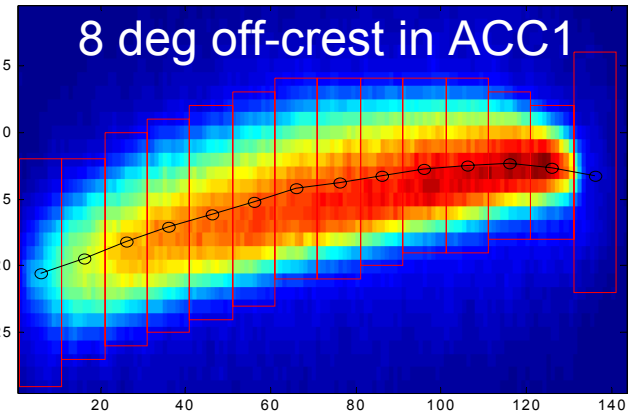
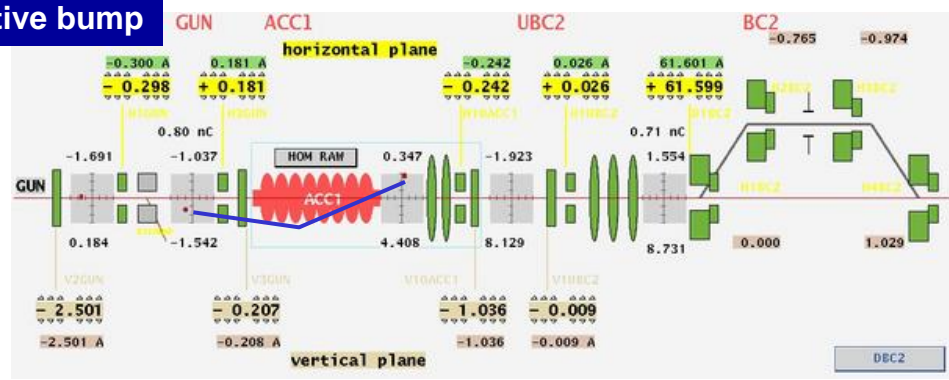
Image of beam at screen 4BC2



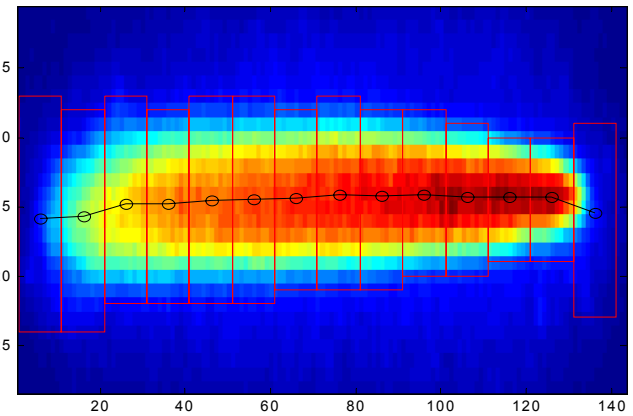
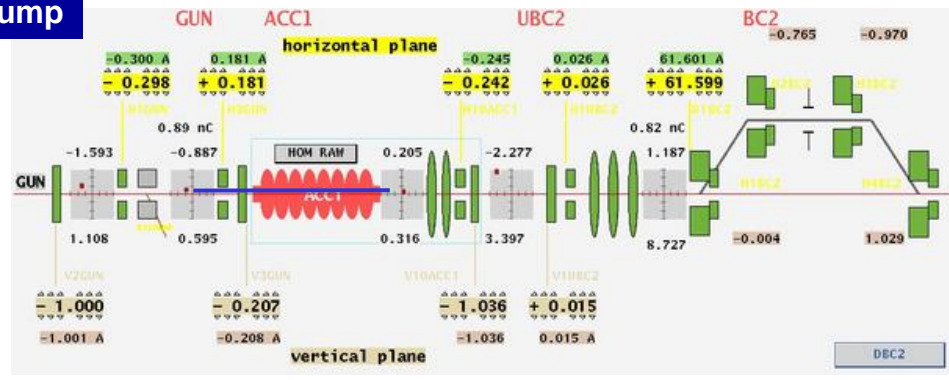
Simulation:
Off-crest phase: 2deg

Image of old test camera:
Pronounced C shape!

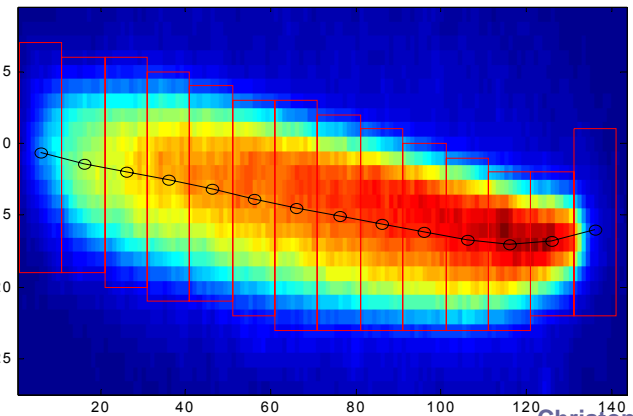
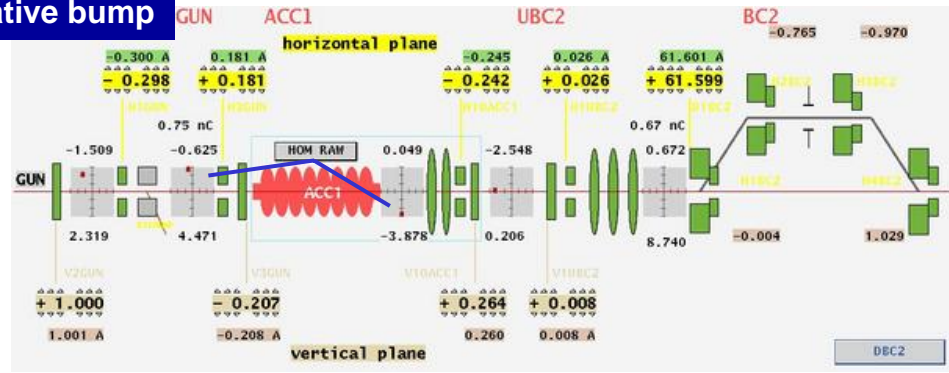
Positive bump



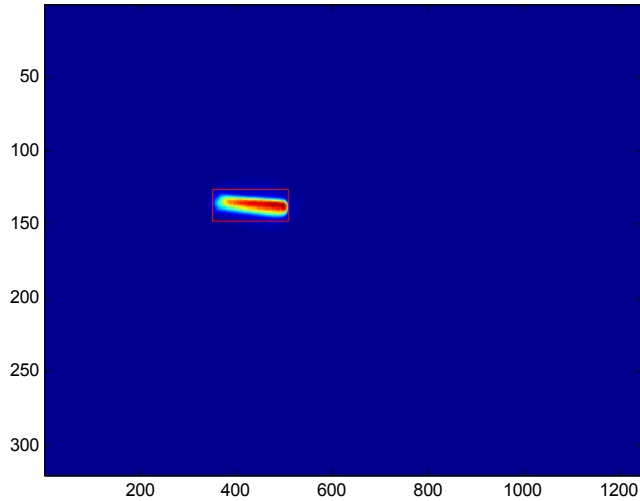
No bump



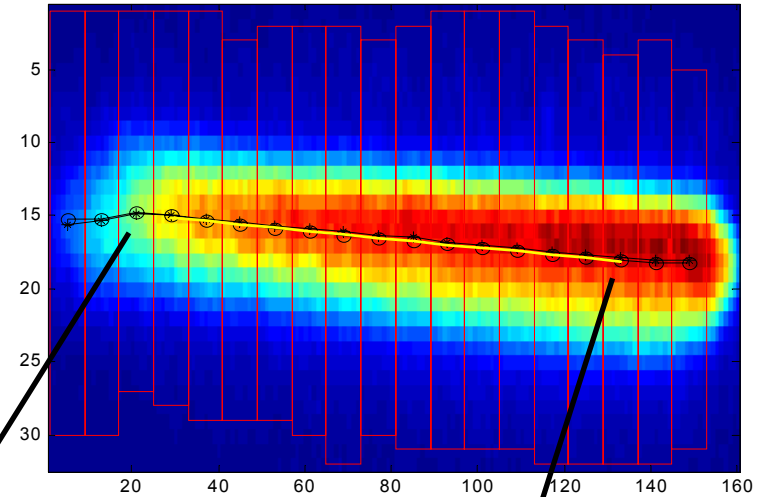
Negative bump



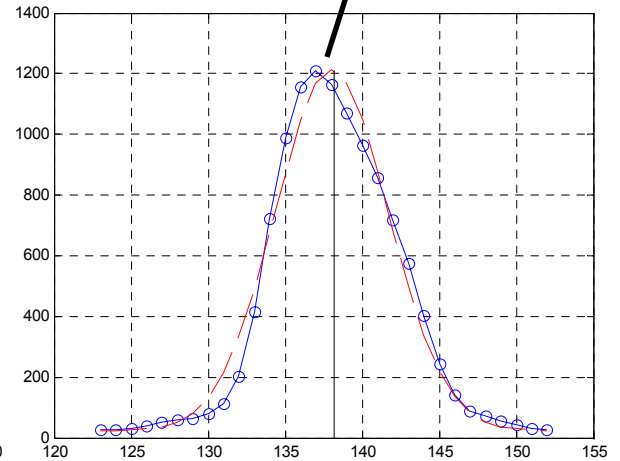
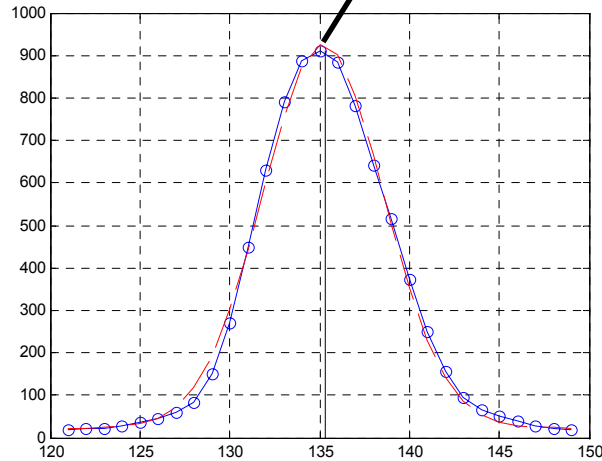
Step 1) Find region of interest



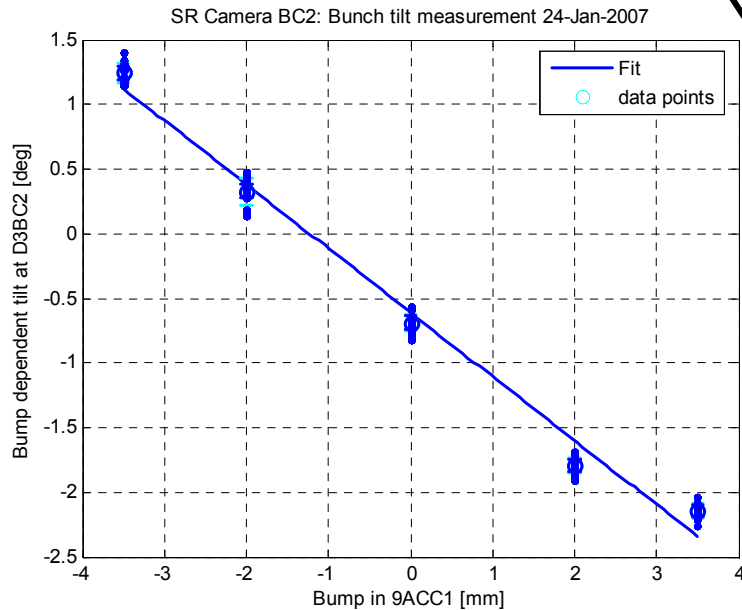
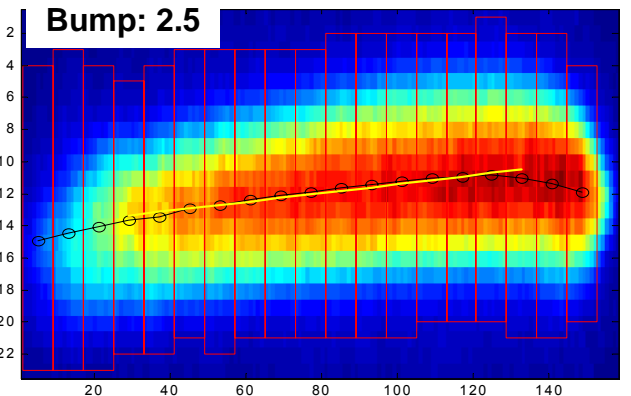
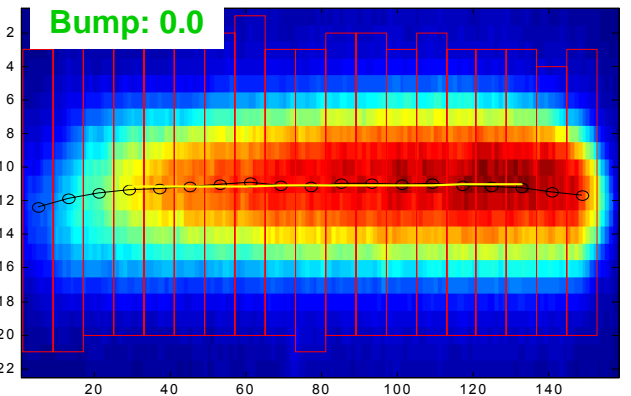
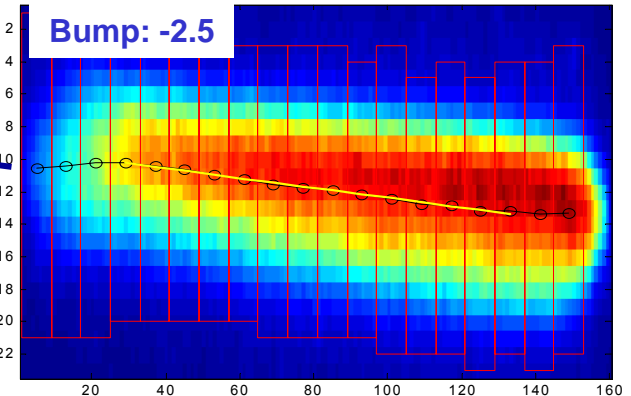
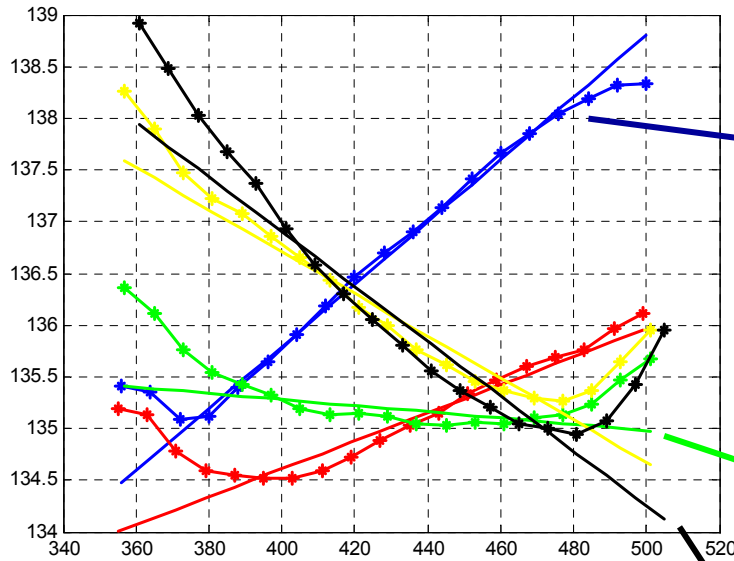
Step 2) Find region of interest



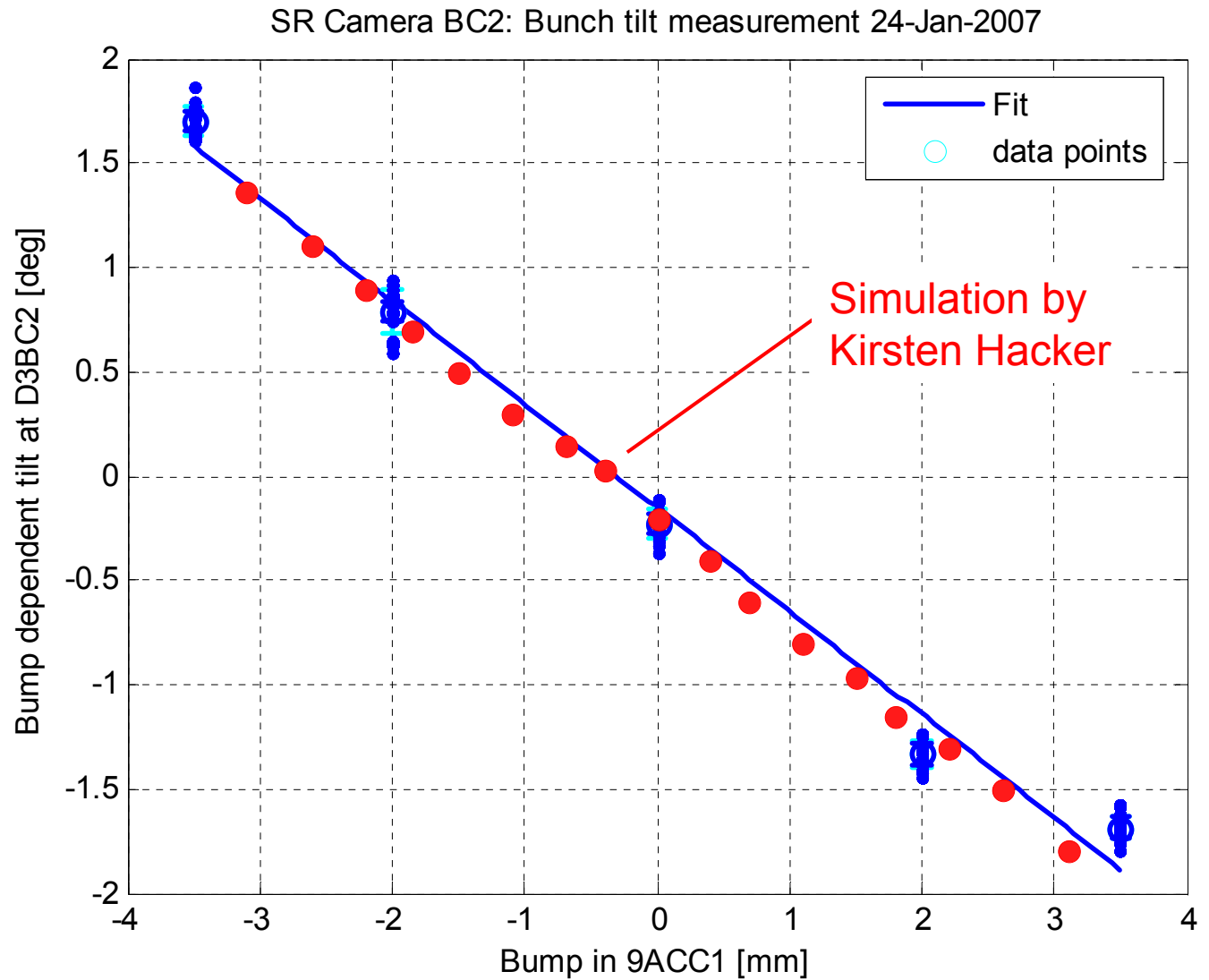
Step 3) Find slice centre



Step 4) Linear Fit of slice centers gives tilt

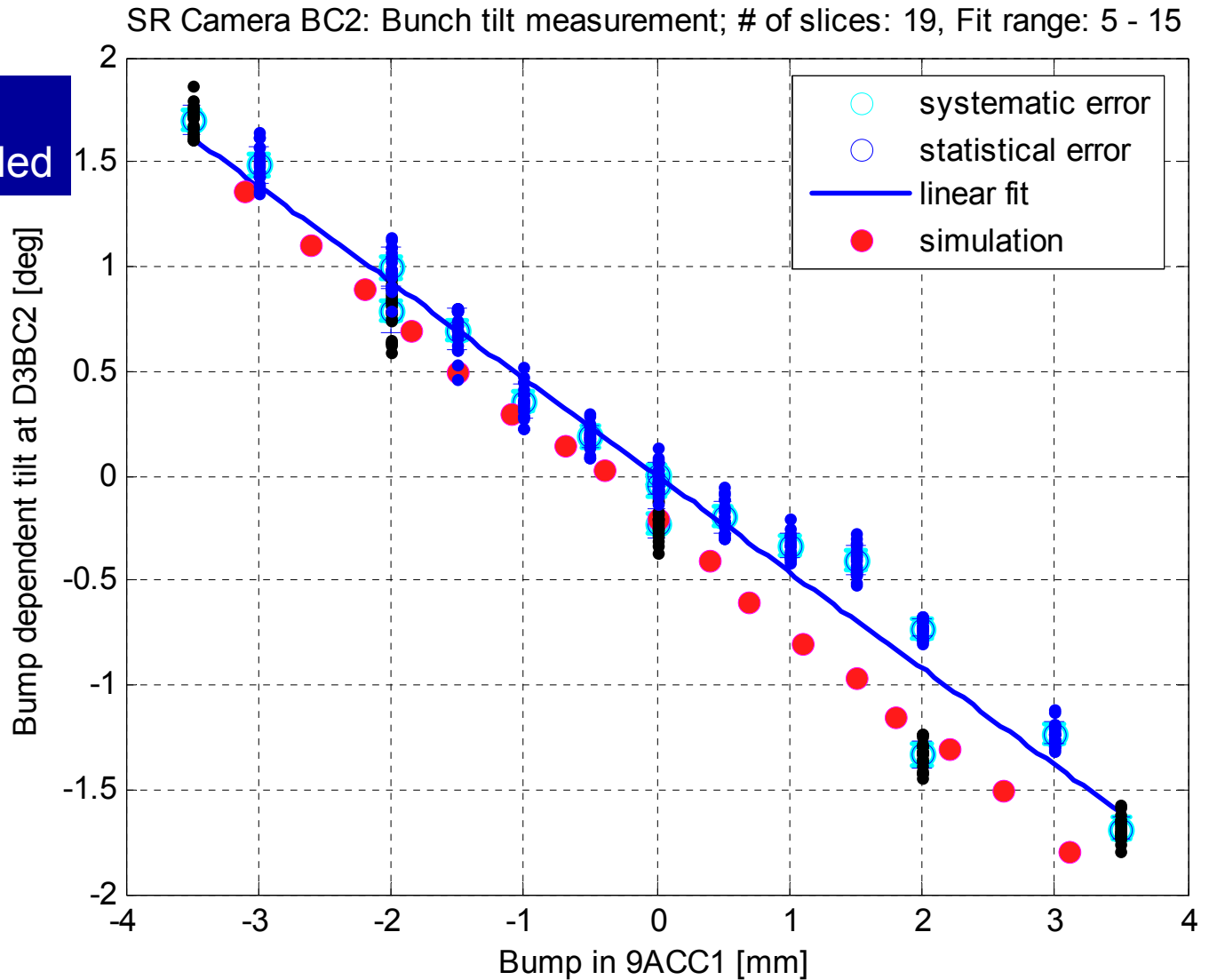


Raw data



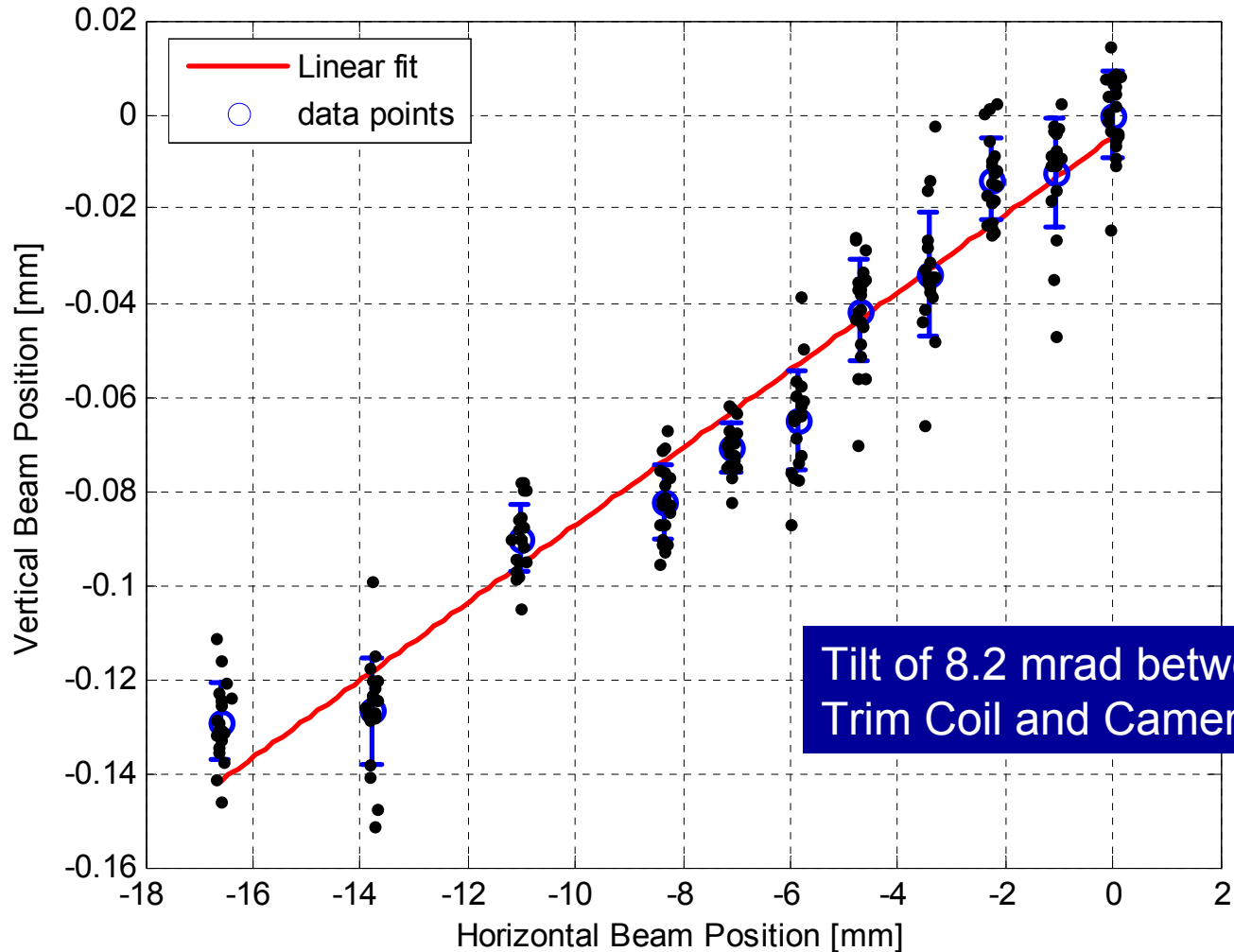
Raw data!

Measurement of 20/02/2007 included



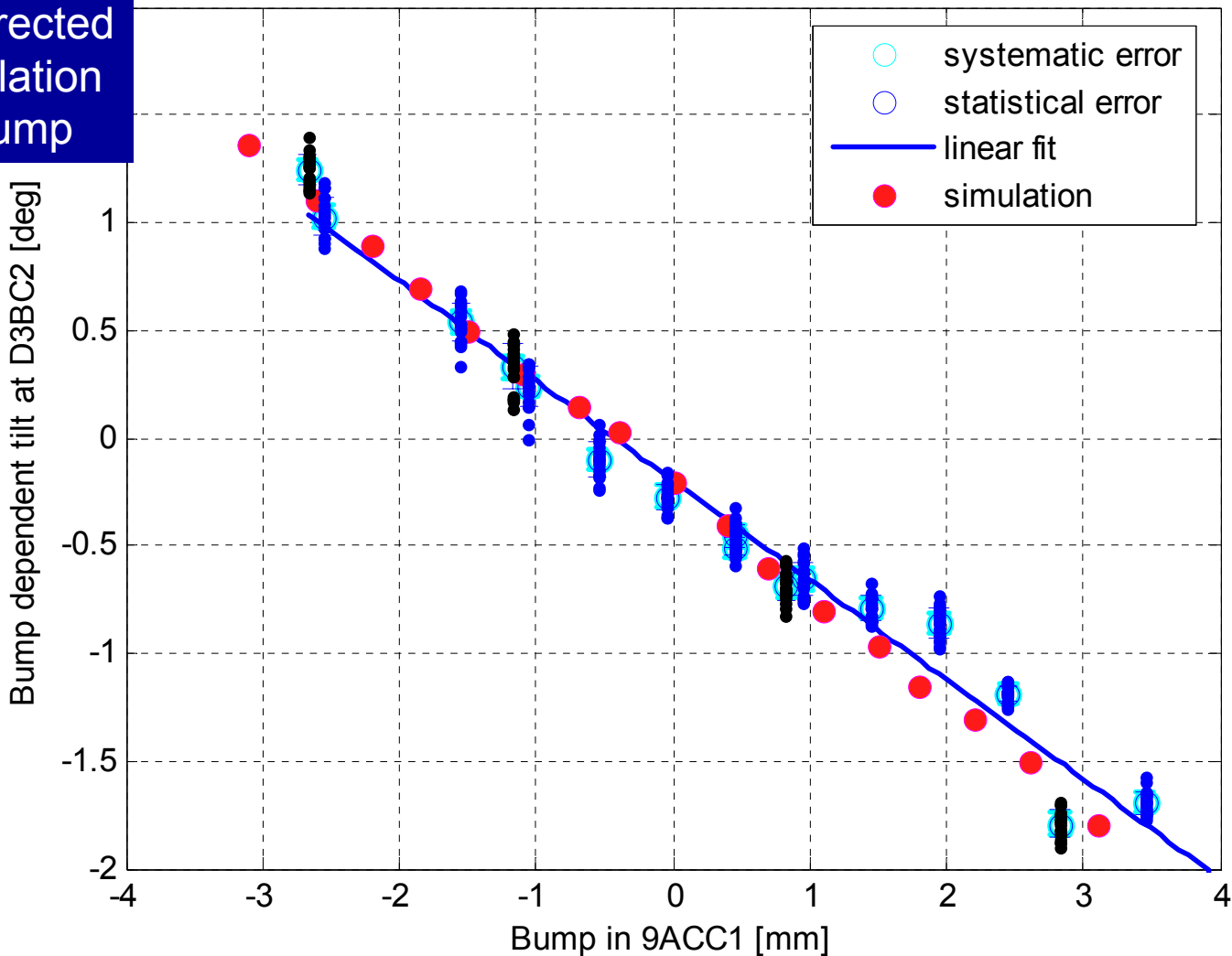
Trim coil H2BC2 used to steer the beam horizontally

2007-03-13T070419-H2BC2_TEST, SR Camera BC2: tilt 8.2 mrad

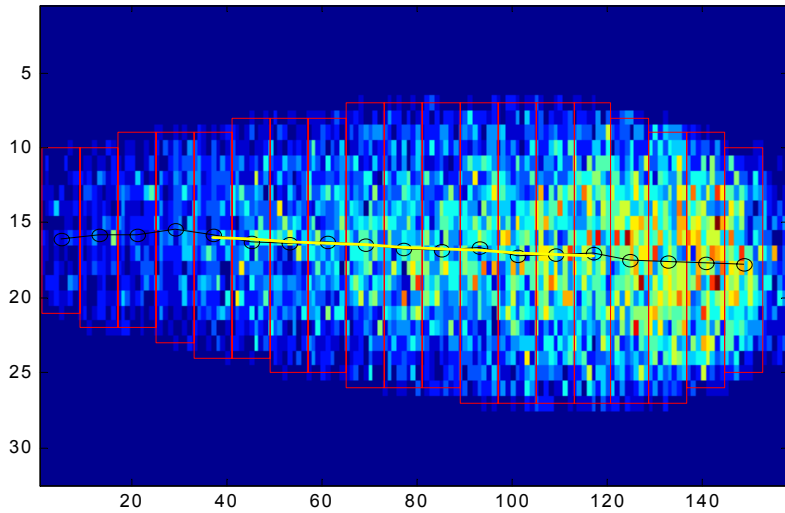


SR Camera BC2: Bunch tilt measurement; # of slices: 19, Fit range: 5 - 15

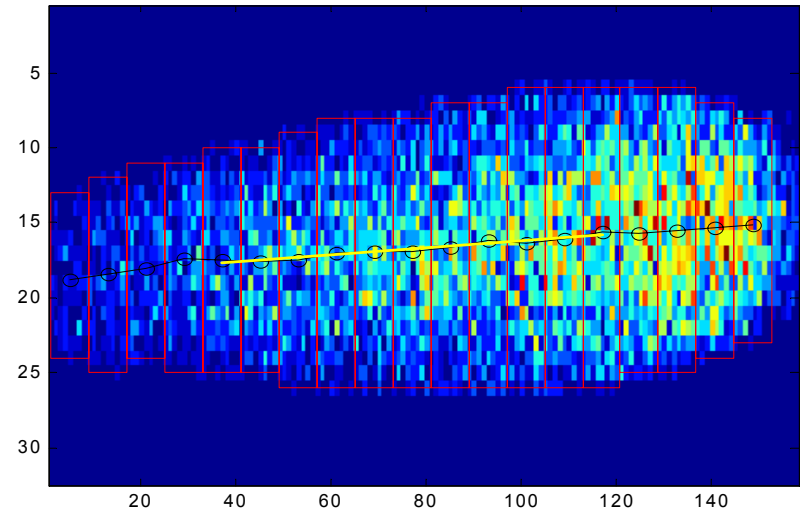
1) Camera tilt corrected
2) Shifted to simulation
Result at 0 mm bump



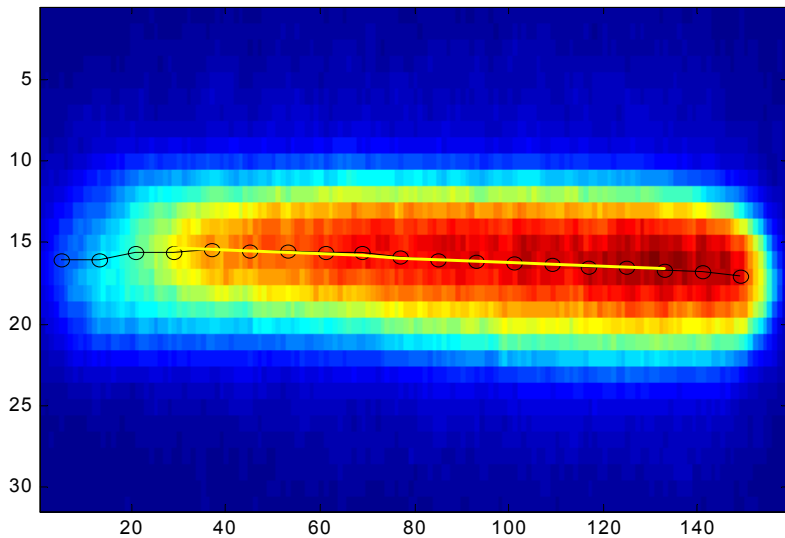
Bump: -2.2 mm



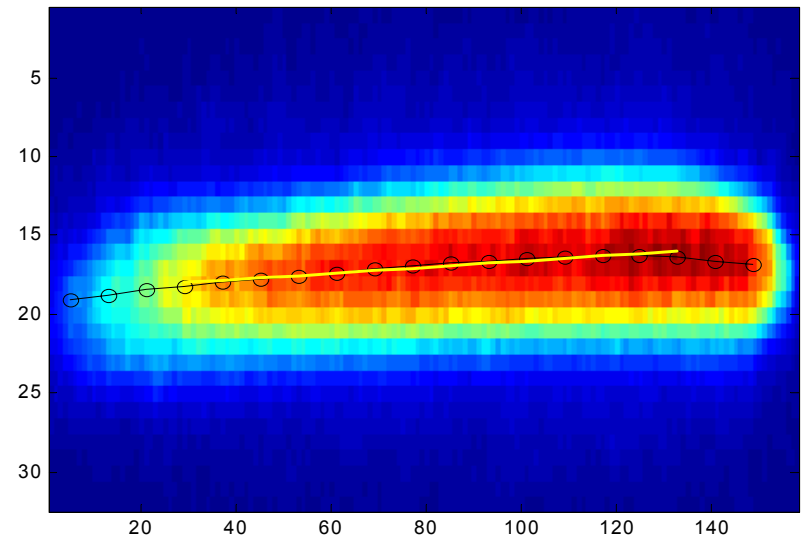
Bump: 2.2 mm



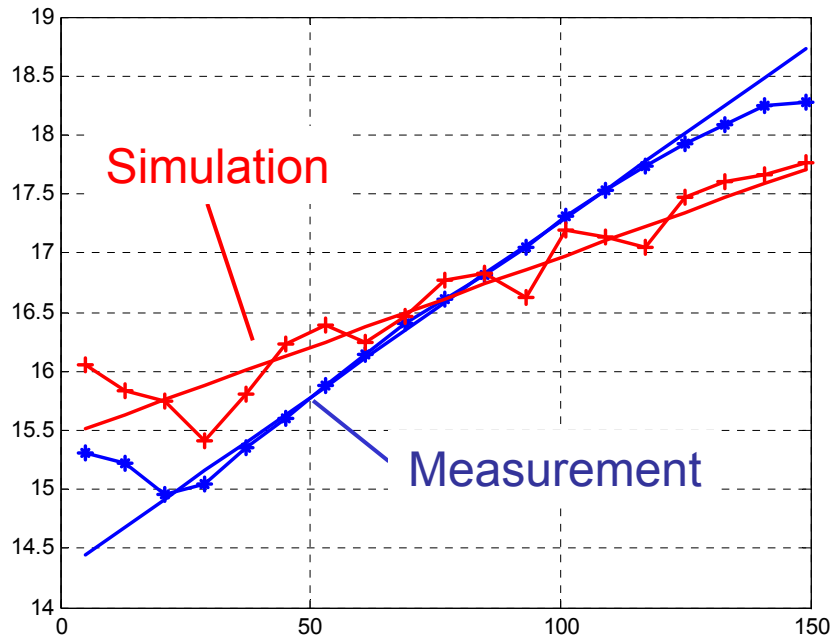
Bump: -2 mm



Bump: 2 mm



Tilt



Intensity Profile

