HINS RFQ Beam Studies Update

Vic Scarpine for the HINS Collaboration

HINS Weekly Meeting

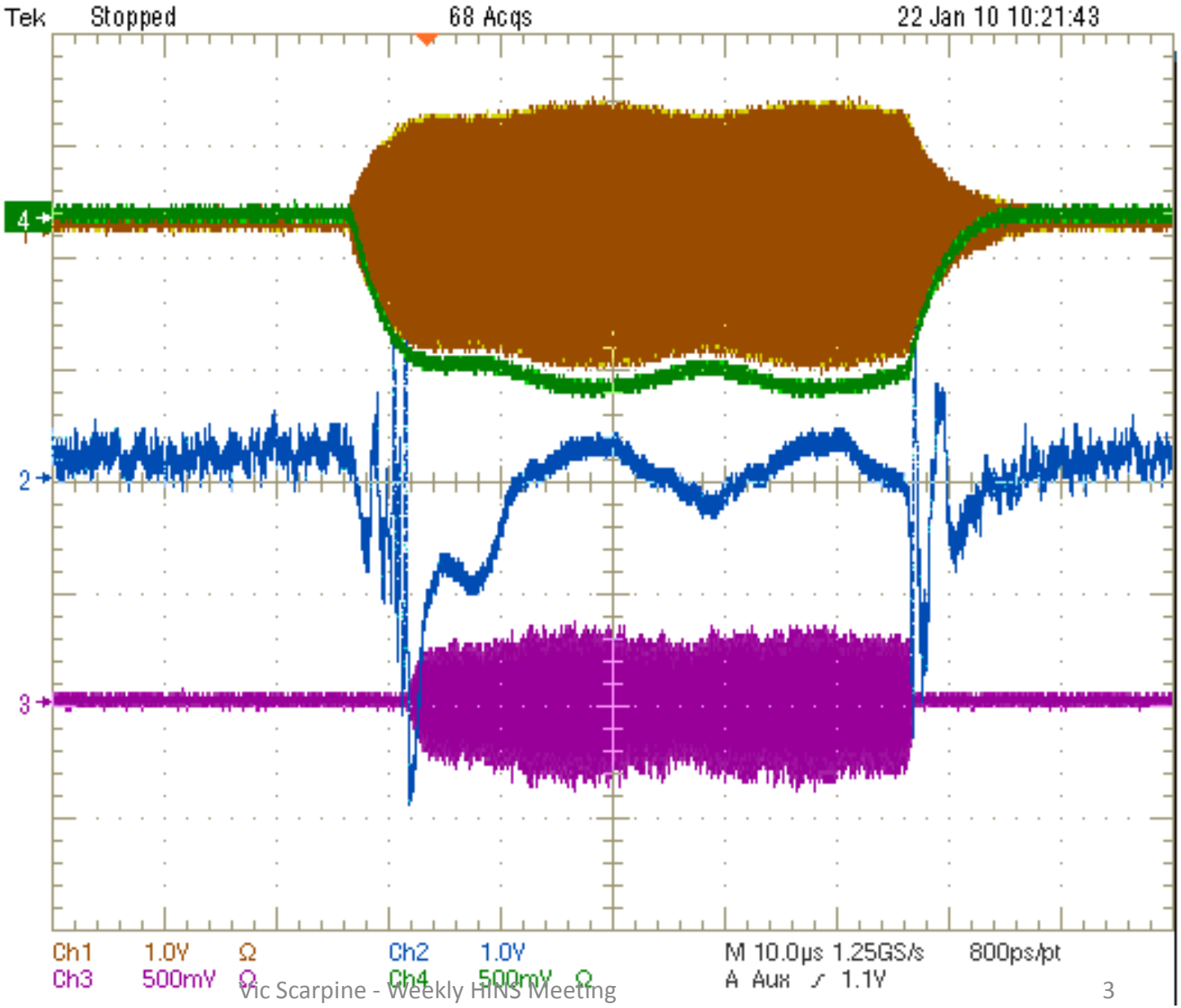
Jan 28, 2010

RFQ RF Study – 22 & 27 Jan 2010

- Modify RFQ RF power and observe (1) RFQ field, (2) RFQ-to-BPM phase and (3) BPM signal.
- Scope pictures of:
  - RFQ cavity RF pickup – scope channel 1
  - Phase detector I – scope channel 2
    - Inputs: MEBT BPM 1 & RFQ RF pickup
  - MEBT BPM 1 single button – scope channel 3
  - RFQ cavity RF pickup envelope – scope channel 4
- LEBT current ~ 18.5 ma
- MEBT current ~ 3.8 ma

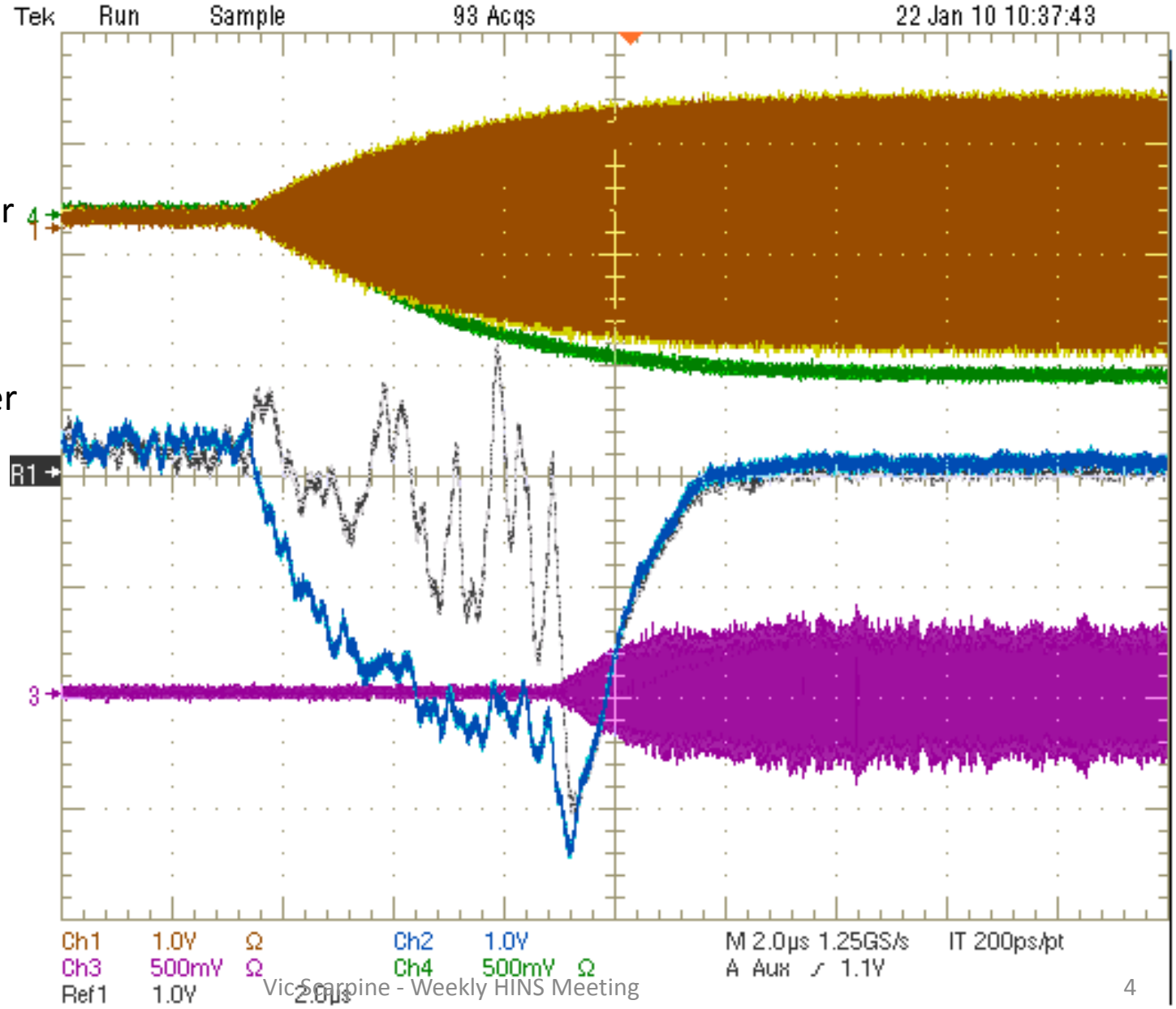
Pict1: RF = 338 KW with Modulation

Ch2: Phase monitor
~ 22.5 degrees per volt



Pict1c: Phase monitor with 20 db lower input

- Ref1: standard RFQ pickup power into phase monitor
- Ch2: 20 db lower BPM power into phase monitor
- Shows phase monitor tracks phase over adequate input power range

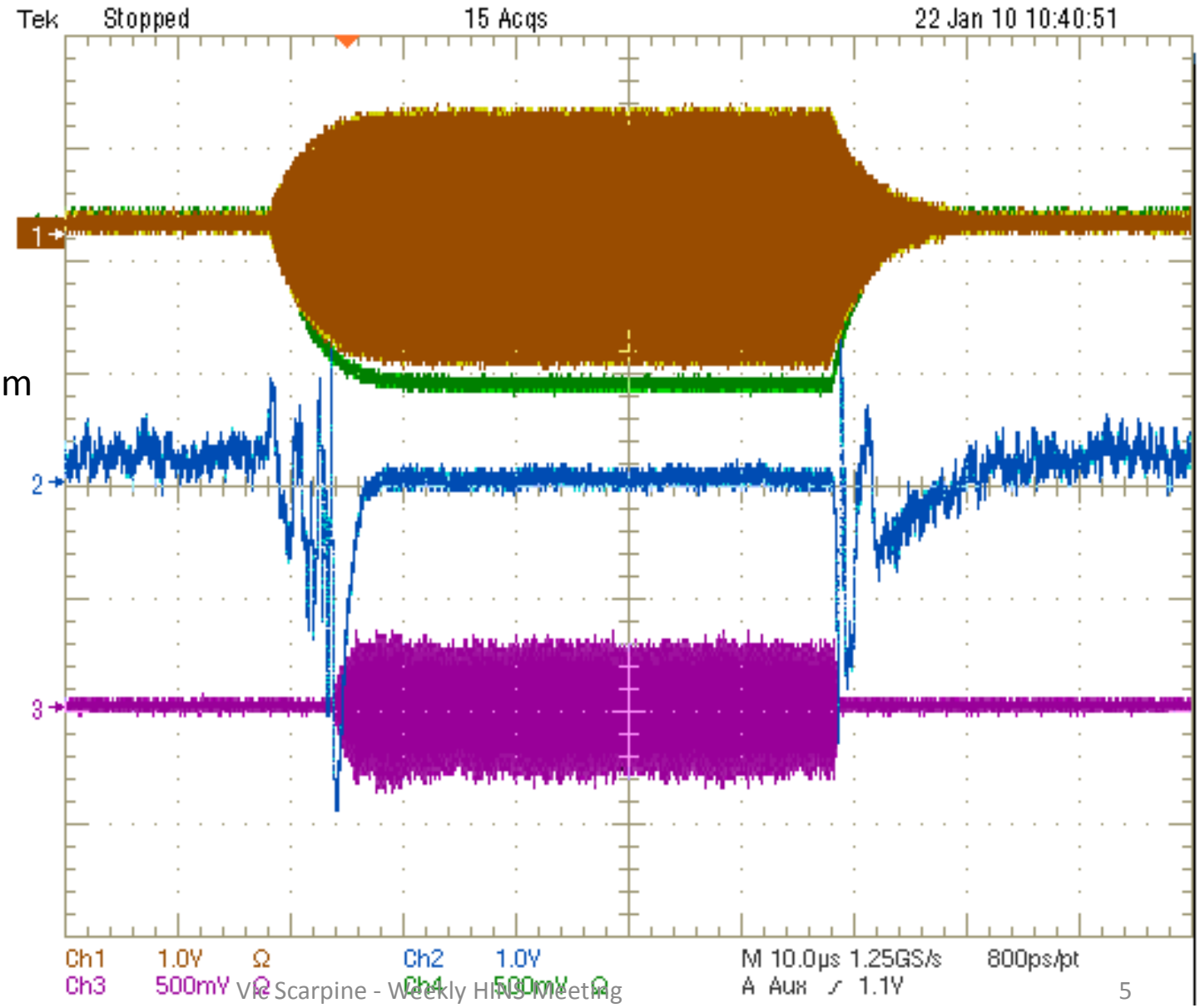


Pict2: RF = 338 KW & no modulation

Ch1: RFQ pickup

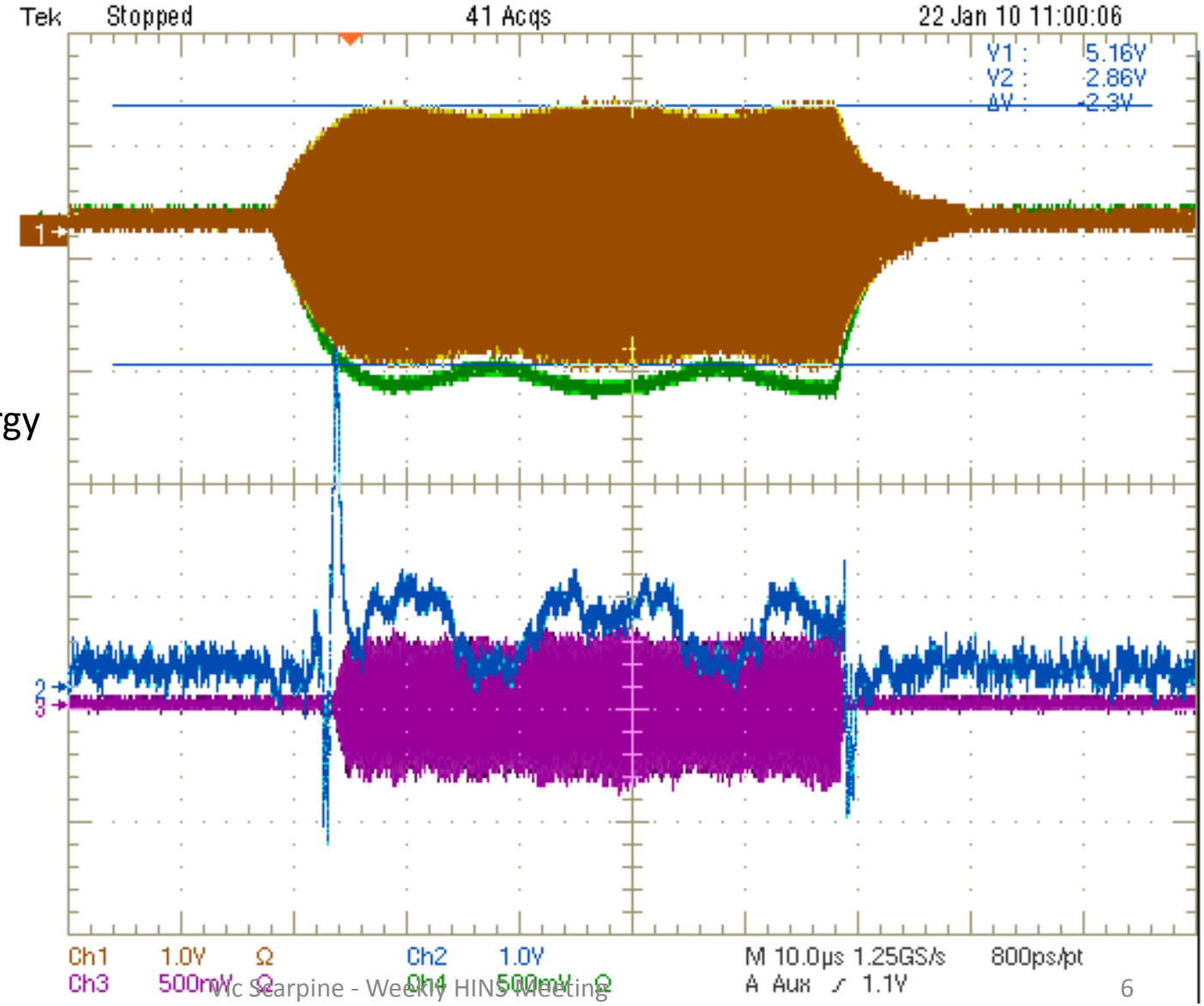
Ch2: Phase
~ 120 mV ripple fwhm
~ 2.7 degrees

Ch3: BPM1

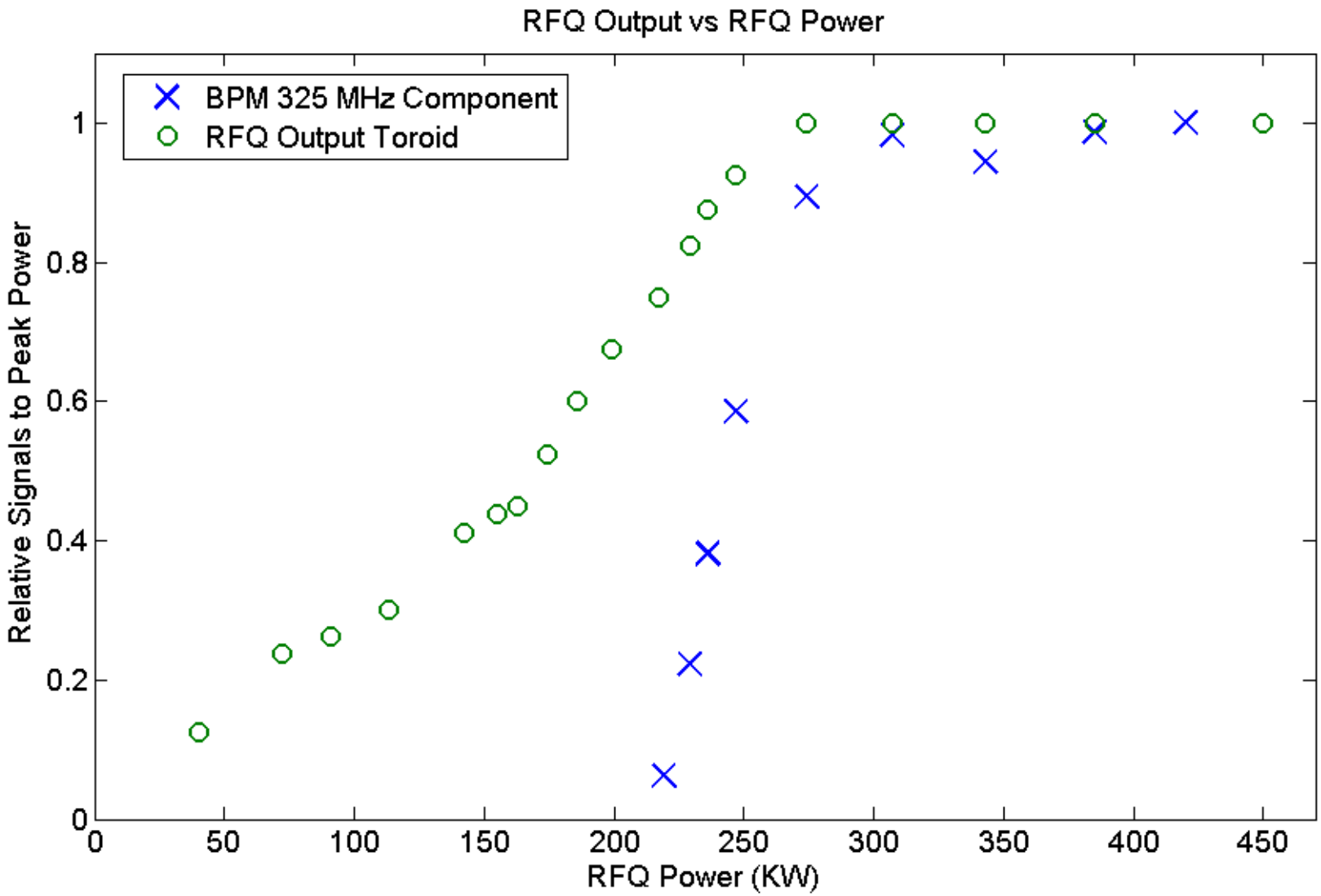


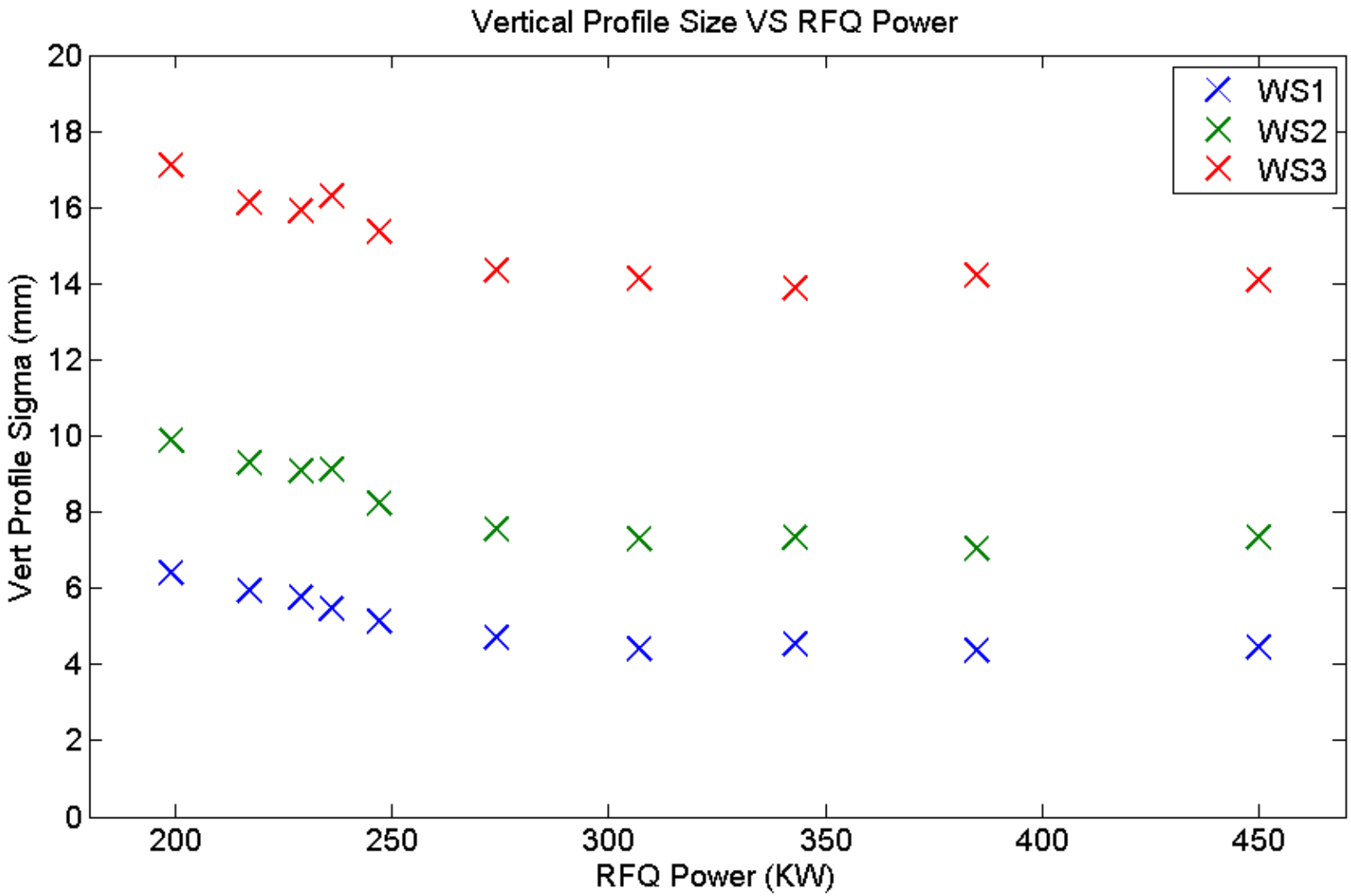
Pict8: Change phase detector inputs back to BPM 1 and 2; RF at 338 KW

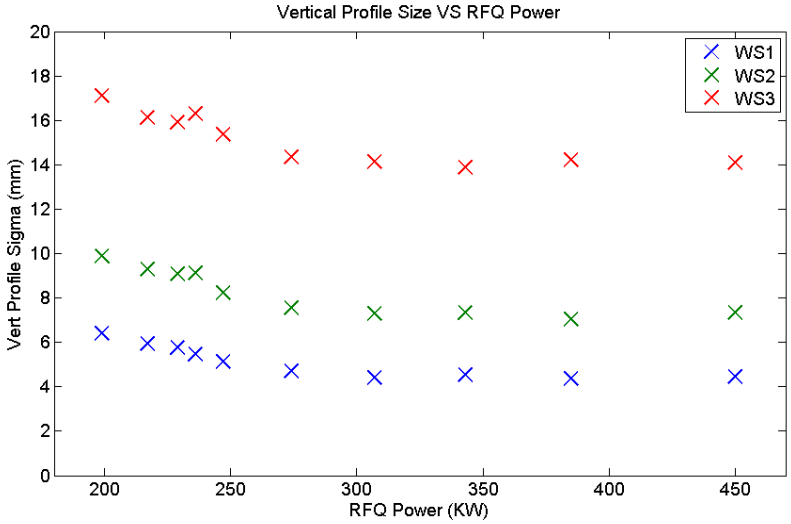
Ch2 now shows energy oscillation
~ 0.8 V p-p
~ 15 KeV

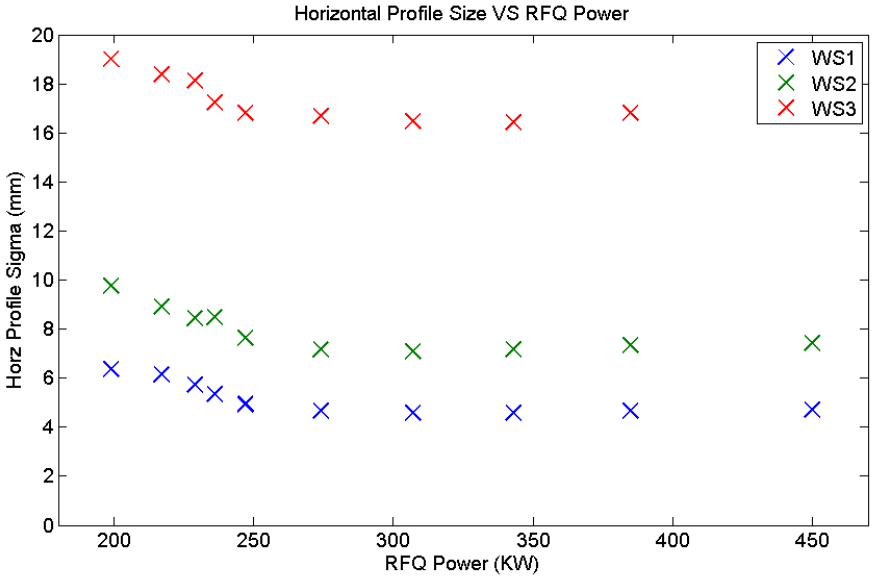


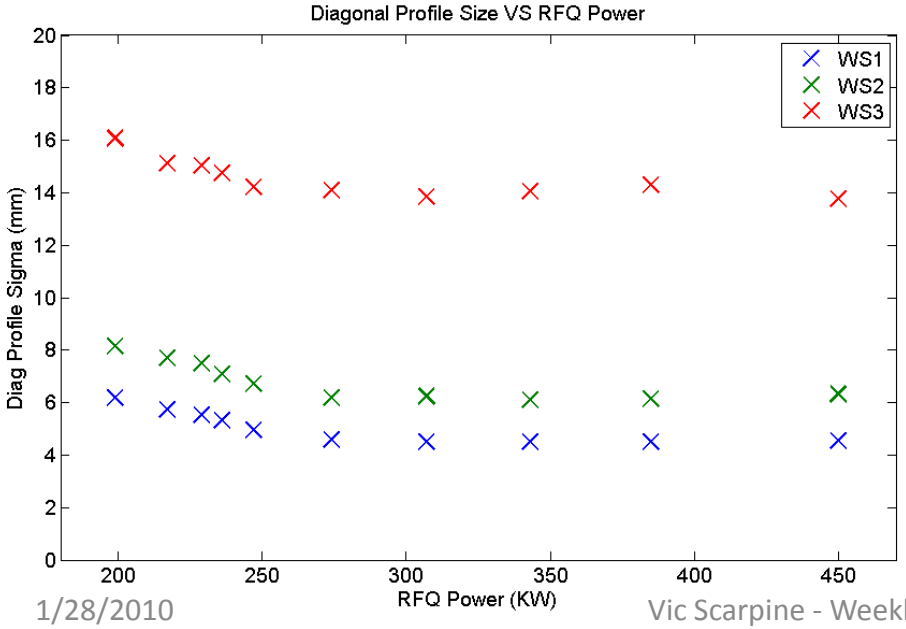
RFQ Outputs VS RFQ Power




Vertical Profile Size VS RFQ Power
Vert Profile Sigma (mm)
RFQ Power (KW)
WS1
WS2
WS3
0
2
4
6
8
10
12
14
16
18
20
200
250
300
350
400
450

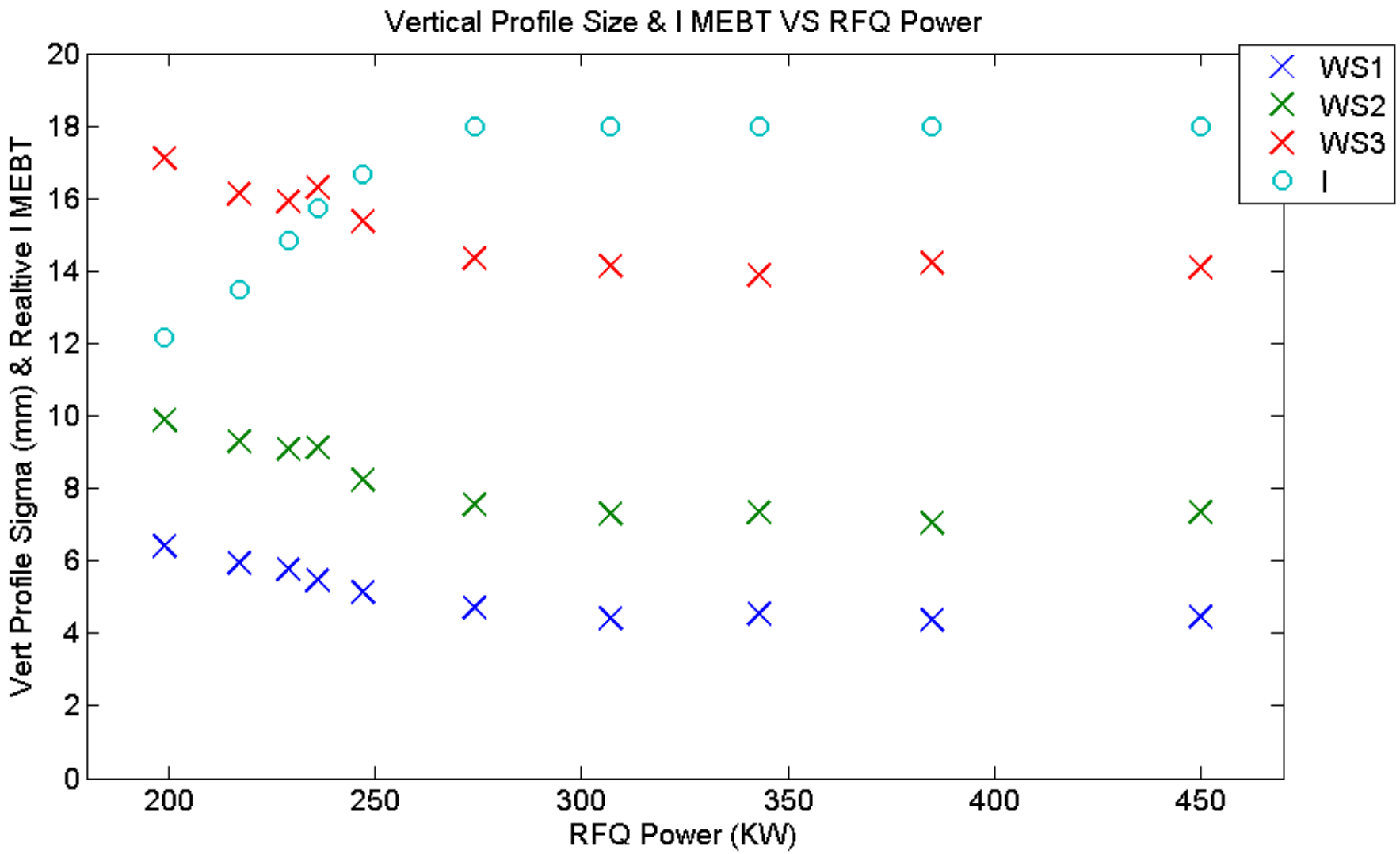






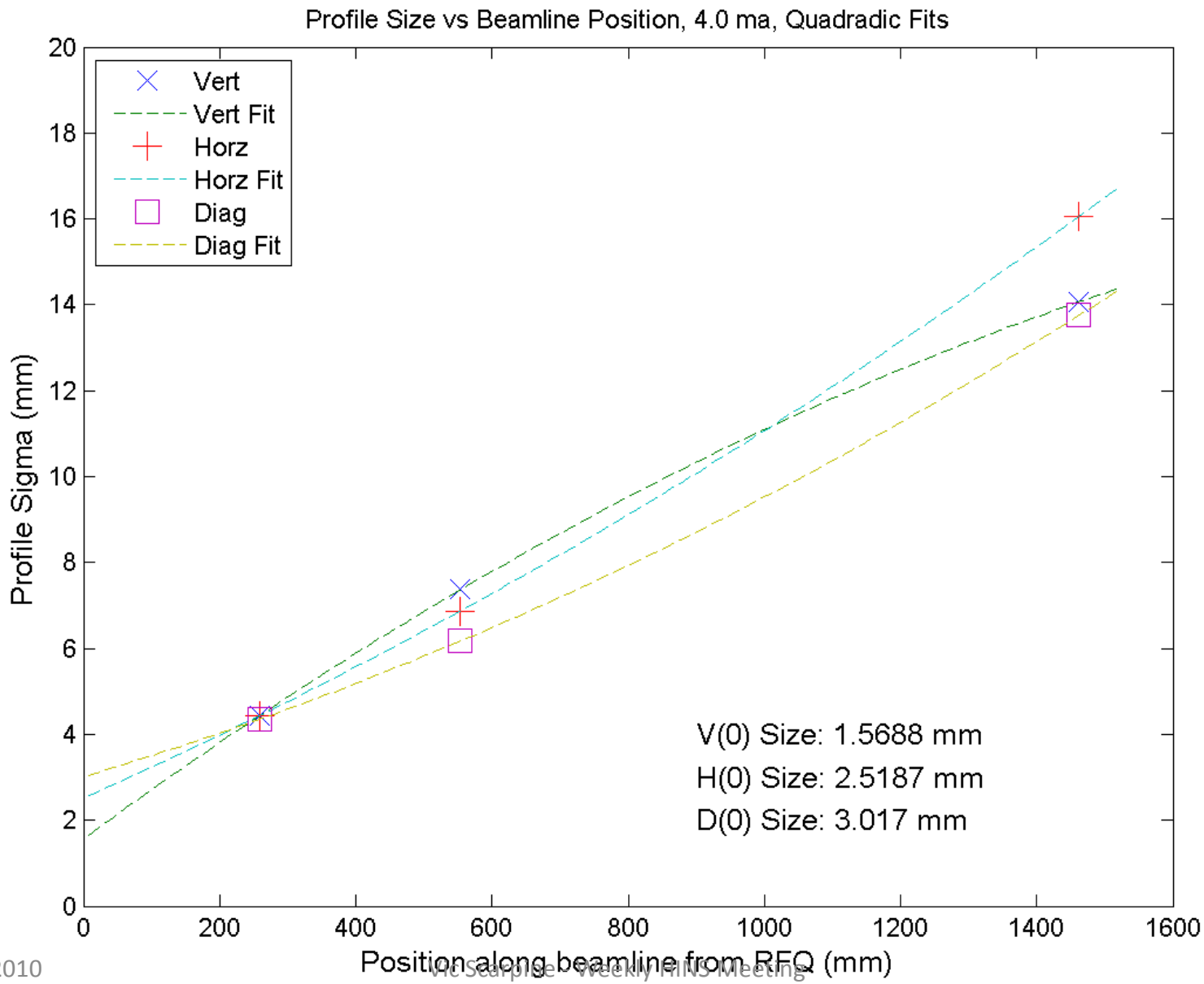
Vert, Horz and Diag Profiles VS RFQ Power

Profile Size and MEBT Current VS RFQ Power

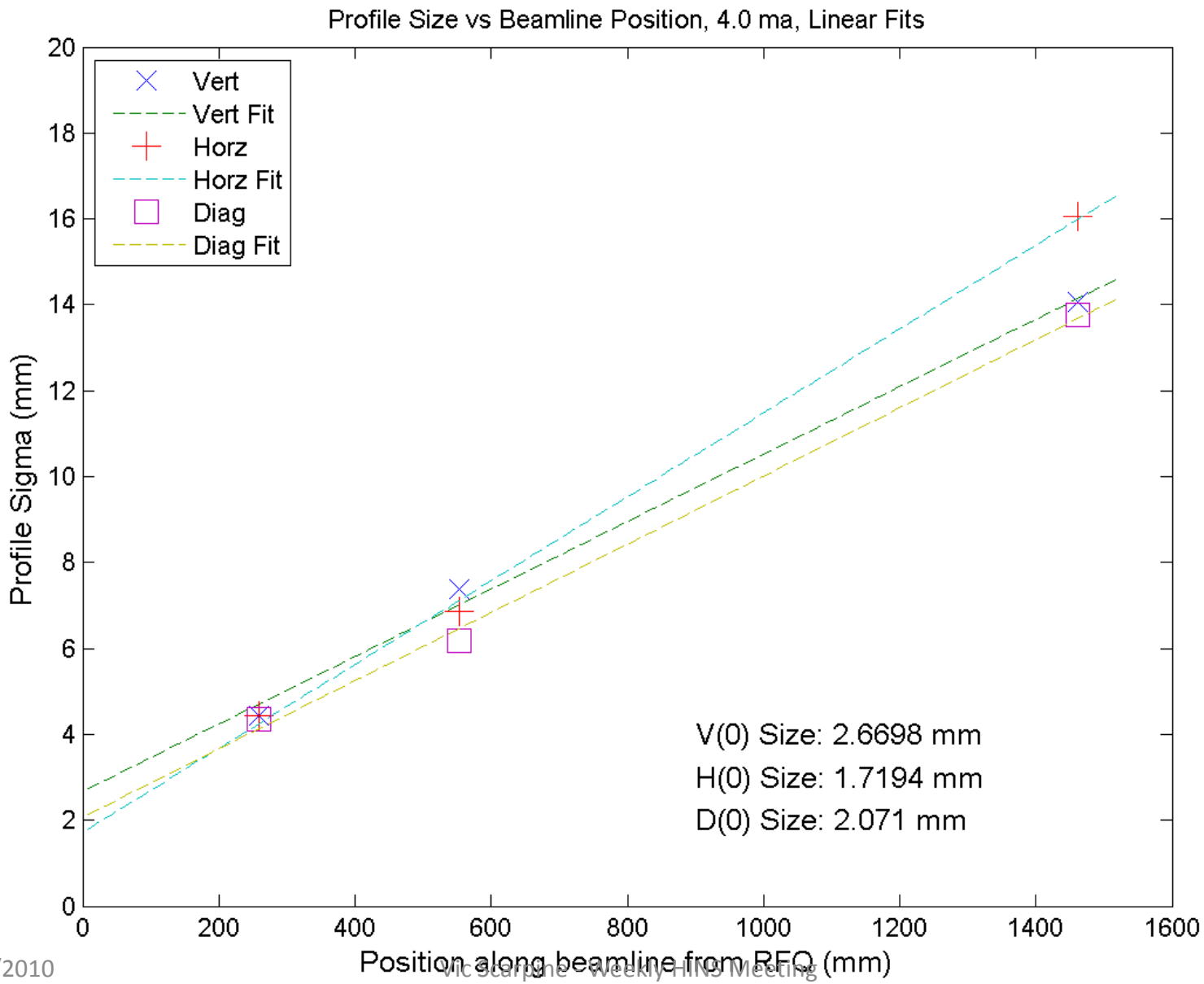


STUDY OF PROFILE SIZE VS BEAM CURRENT
27 JAN 2010

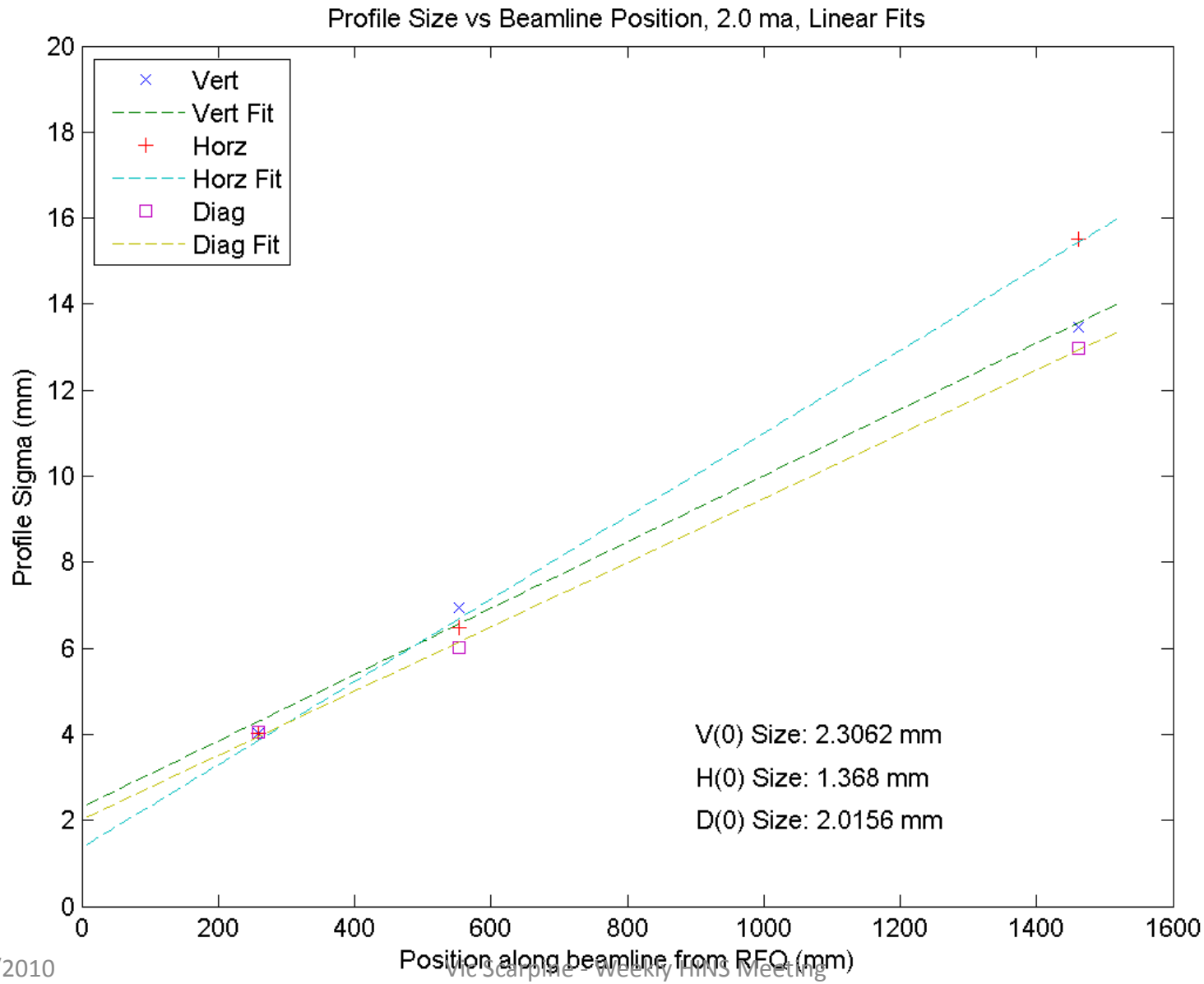
Size VS Beamline Position, I ~ 4 ma



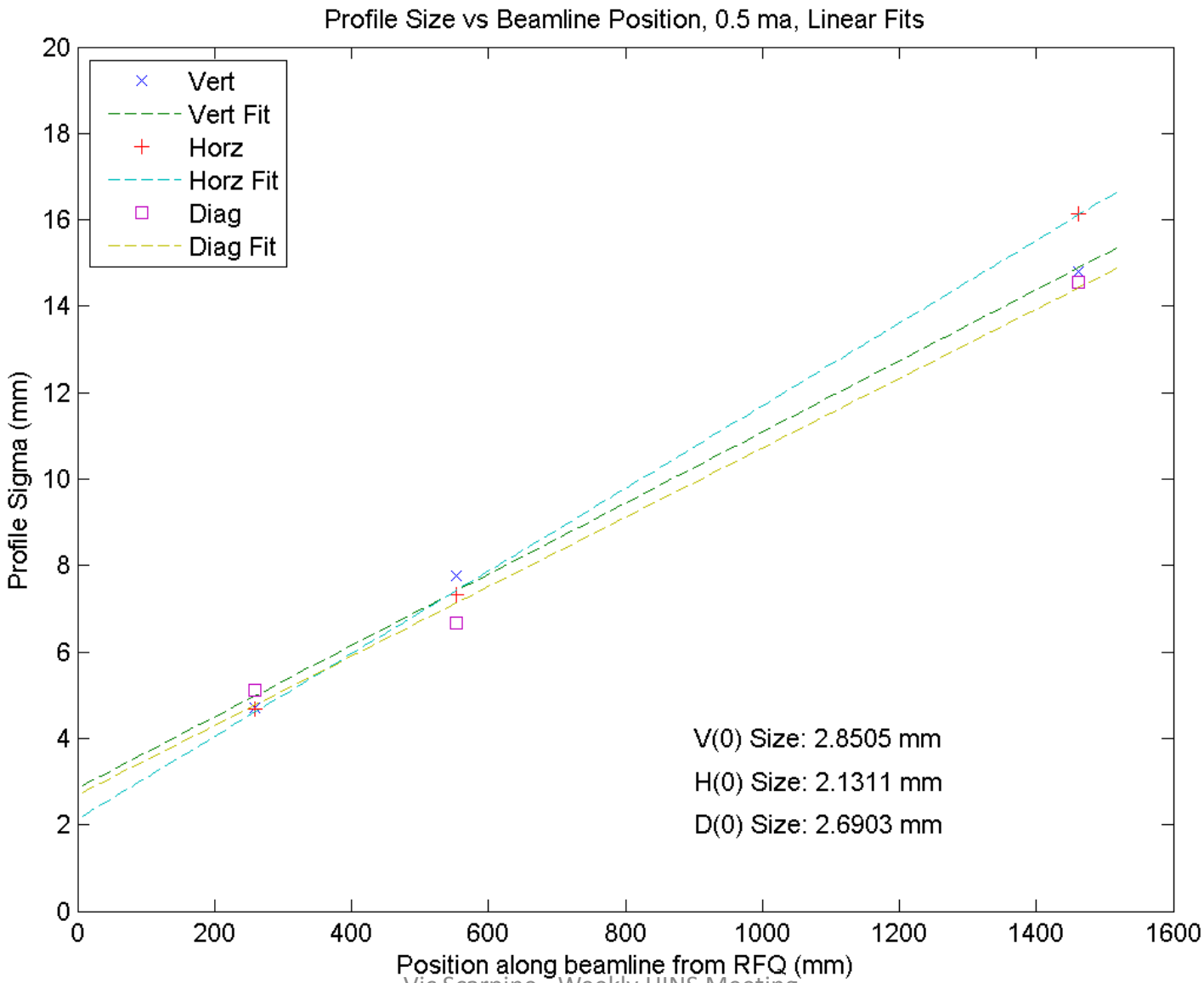
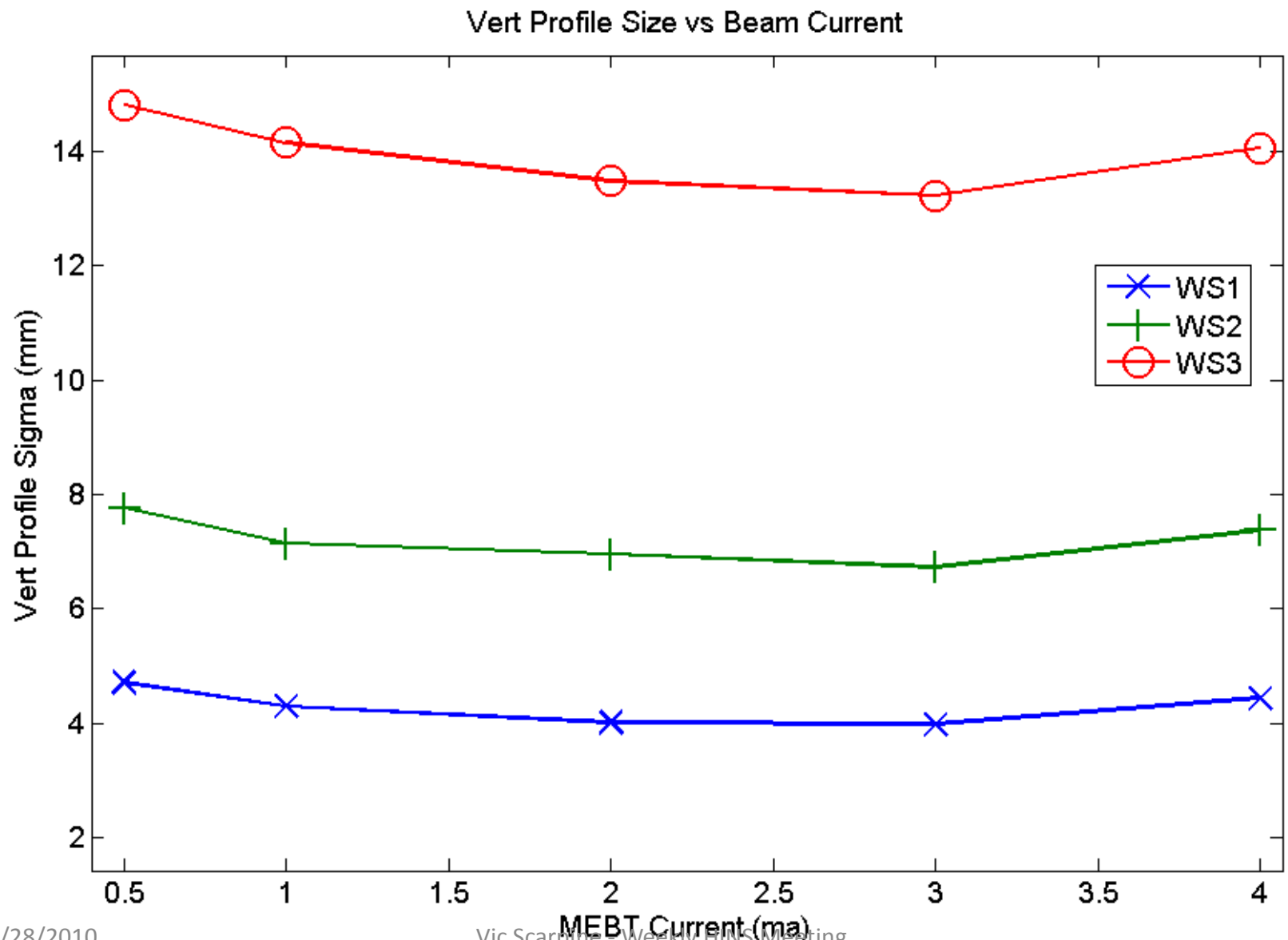
Size VS Beamline Position, I ~ 4 ma



Size VS Beamline Position, I ~ 2 ma



Size VS Beamline Position, I ~ 0.5 ma



Profile Size vs Beam Current