

# PITZ Run Coordination Meeting

20.03.2014

# Weeks 12: Plans

## Measurement program

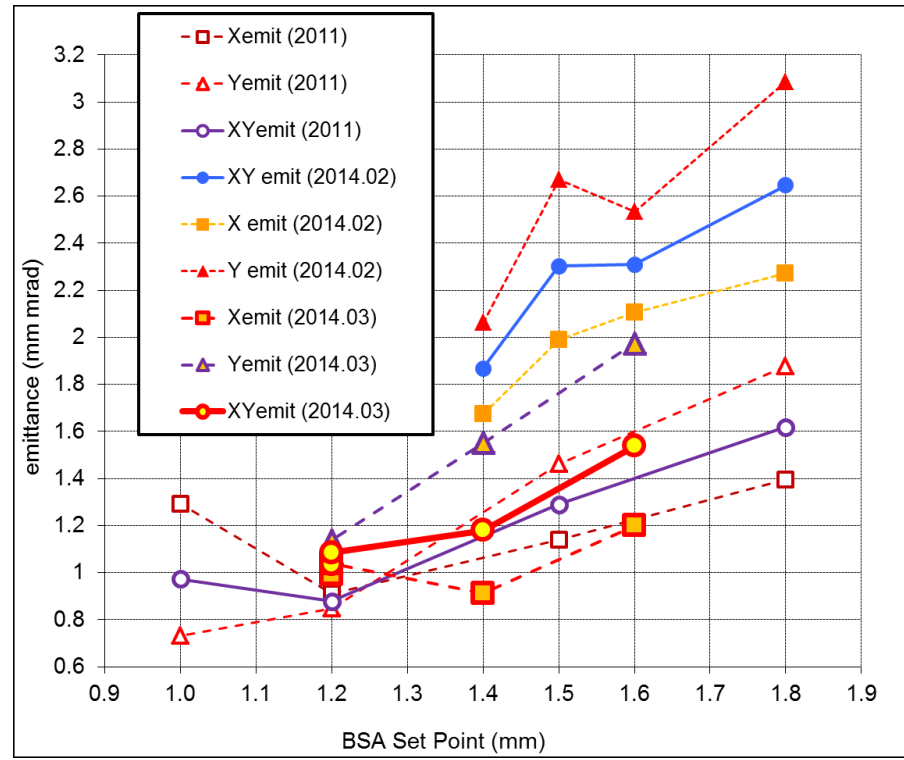
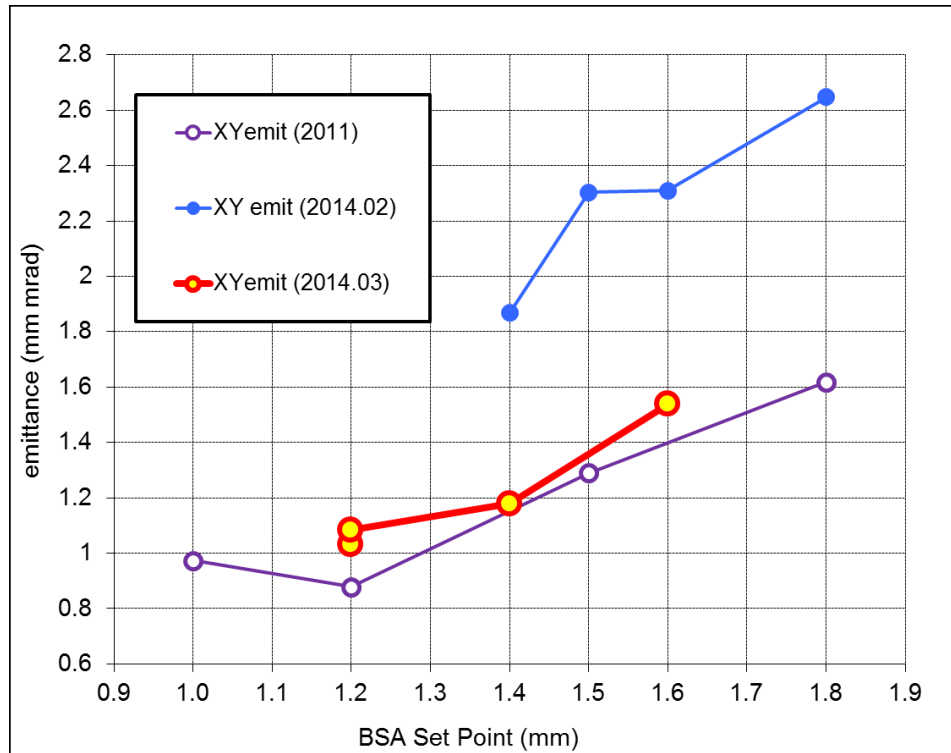
- 0. Beam trajectory for 1nC emittance measurements → (re-)adjustments
- 1.6 Emittance 1nC → BSA=1.4mm (1.6mm?) for “nominal steering” (LOW.StQ.1 → steerer)
- 1.65 Emittance measurements Q=100pC, BSA=0.3..0.6mm
- 1.7-2.41 Tomo → GeK+GV
- 2.5 Phase stability measurements (+new WCS tests) → Igl
- 2.8 Coupler kick studies

## Other tasks:

- 1) Check booster FB → **done**
- 2) LOW.BPM1,2 → “centering” (MK) → **done**
- 3) Setup laser pulse energy monitoring (before BSA → 1.4mm) → **done**
- 4) Check Save&Restore tool for (at least) steerers → ??
- 5) ...

Week 12	Mon Mar-17	Tue Mar-18	Wed Mar-19	Thu Mar-20	Fri Mar-21	Sat Mar-22	Sun Mar-23
<b>Morn.</b>	<b>Gun phase stability / Coupler kick measurements?</b>						
7:00	Isaev	Isaev	Isaev	Isaev	Isaev	Isaev	Isaev
to	Rublack	<b>New WCS</b>	Rublack	Rublack	Rublack	Good	Good
15:30							
<b>Late</b>	<b>Emittance 100pC</b>						
15:00	Otevel	Otevel	Otevel	Gross	Gross	Gross	Gross
to	Pathak	Pathak	Asova	Asova	Asova	Asova	Asova
23:30	<b>Emittance 1nC</b>						
<b>Night</b>	<b>Tomo 100pC</b>						
23:00	Vashchenko	Vashchenko	Kourkafas	Kourkafas	Kourkafas	Kourkafas	Kourkafas
to	Good	Good	Prach B.	Prach B.	Prach B.	Prach B.	Prach B.
7:30	<b>Emittance 1nC</b>						
<b>Resp. Phys</b>							
<b>Laser</b>	Krasilnikov	Krasilnikov	Krasilnikov	Gross	Gross	Gross	Gross
<b>RF</b>	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann
<b>Vaku.</b>	Bienge	Bienge	Bienge	Bienge	Bienge	Bienge	Bienge
<b>Contr.</b>	Petrosyan	Petrosyan	Petrosyan	Petrosyan	Petrosyan	Petrosyan	Petrosyan
<b>Electr.</b>	Pohl	Pohl	Pohl	Pohl	Pohl	Pohl	Pohl
<b>Infrast.</b>	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann
<b>SSB</b>	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov
<b>Schichtabsich</b>	Gross	Krasilnikov	Krasilnikov	Vashchenko	Otevel	Otevel	Vashchenko

# 1nC emittance (2011-2014.02-2014.03)

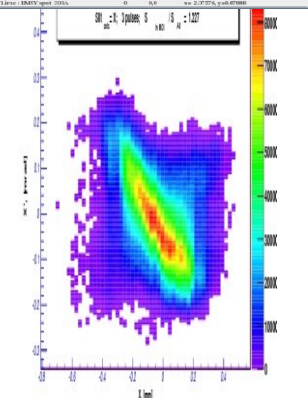
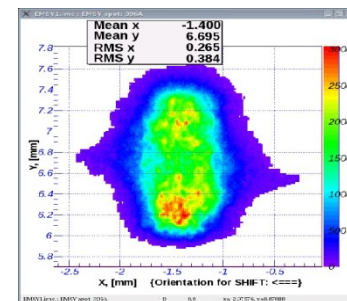
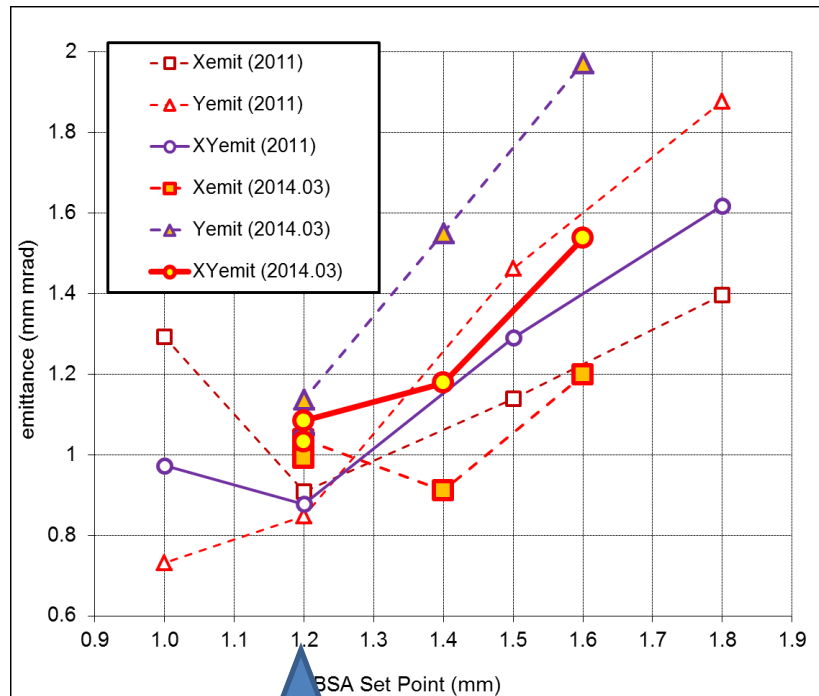
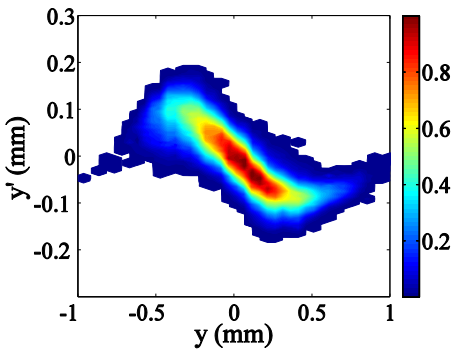
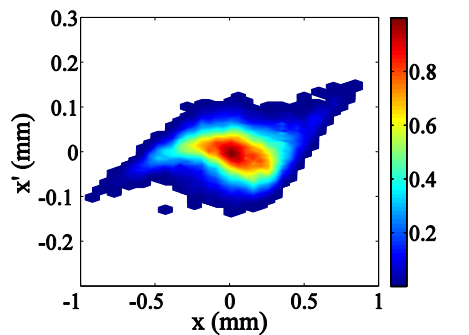
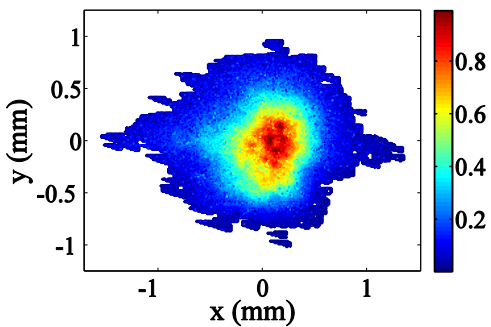


BSA	lmain	gun phase	Xemit (2014.03)		Yemit (2014.03)		XYemitt (2014.03)		shift
1.2	396	0	0.991	0.017	1.075	0.05	1.032	0.031	07.03.14M
1.2	395	0	1.038	0.016	1.137	0.012	1.084	0.012	12.03.14N
1.4	399	0	0.911	0.019	1.551	0.024	1.178	0.016	18.03.14N
1.6	399	0	1.198	0.035	1.973	0.022	1.537	0.024	19.03.14N
1.2	396	-6	1.039	0.033	1.076	0.024	1.057	0.022	9.03.14M

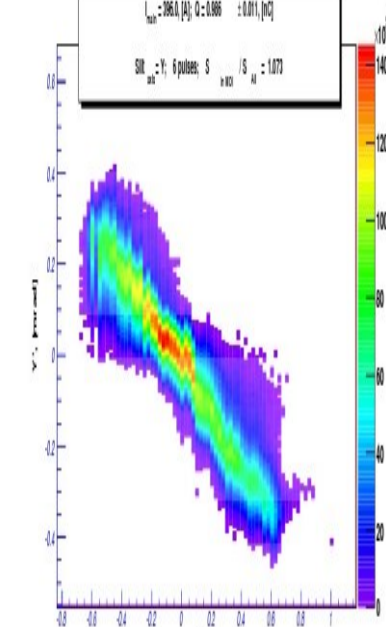
2011

# 1nC emittance (2011-2014.03)

2014.03.07M

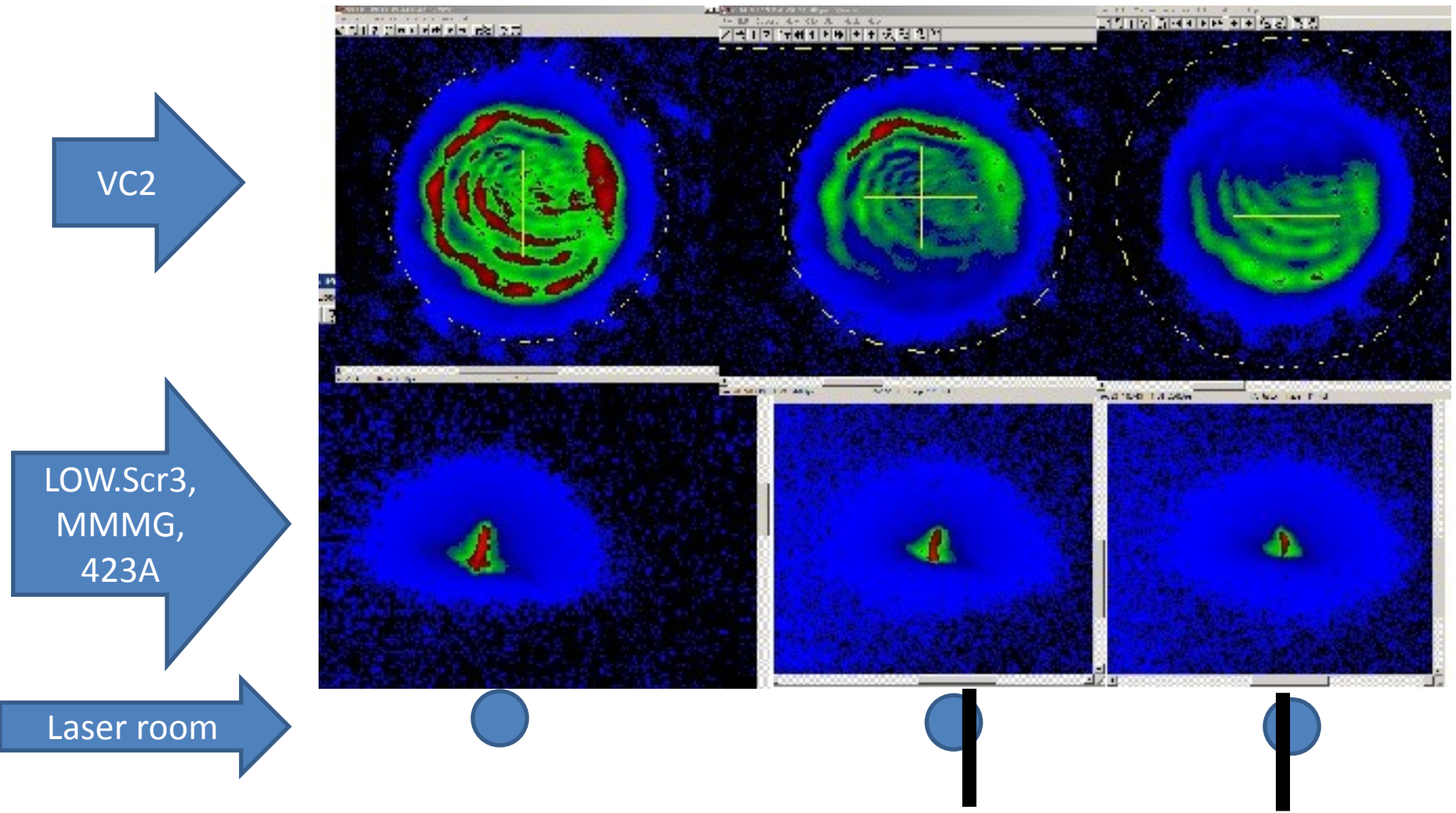


$I_{\text{max}} = 286.0 \text{ [A]} \cdot Q = 0.066 \pm 0.011 \text{ [nC]}$   
 SR : Y: 6 pulses, S : 100 / S\_M : 1.073



# Other studies

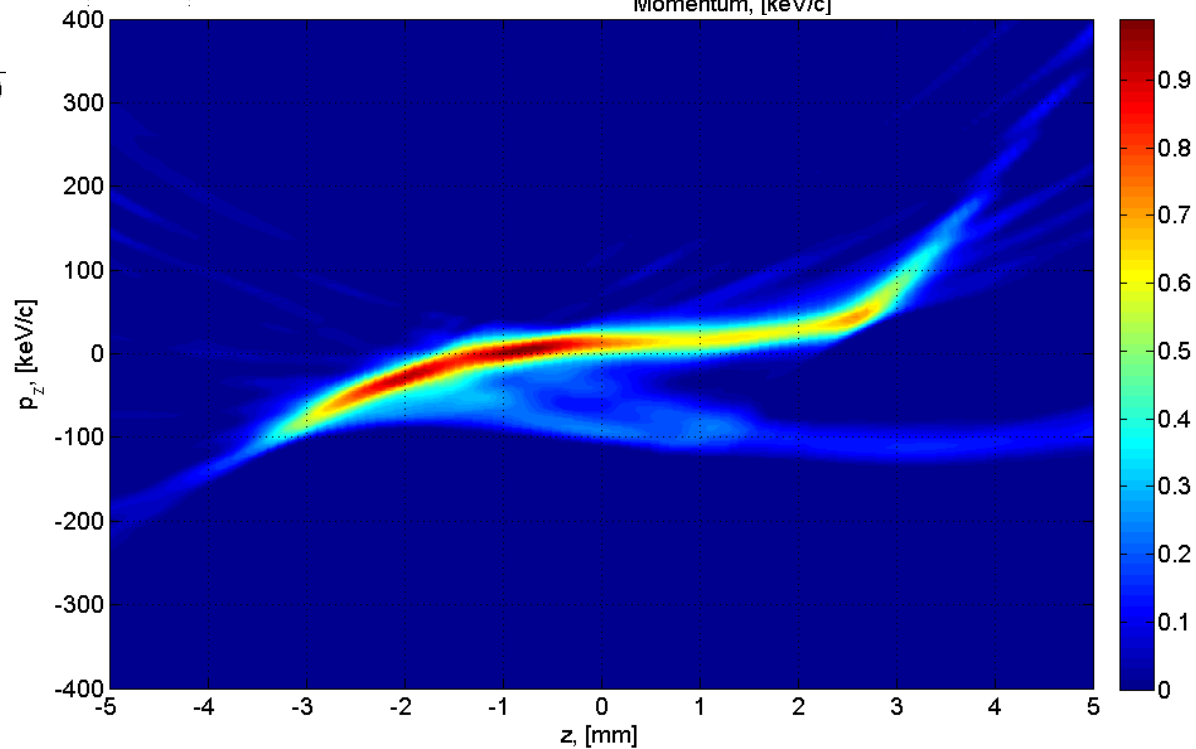
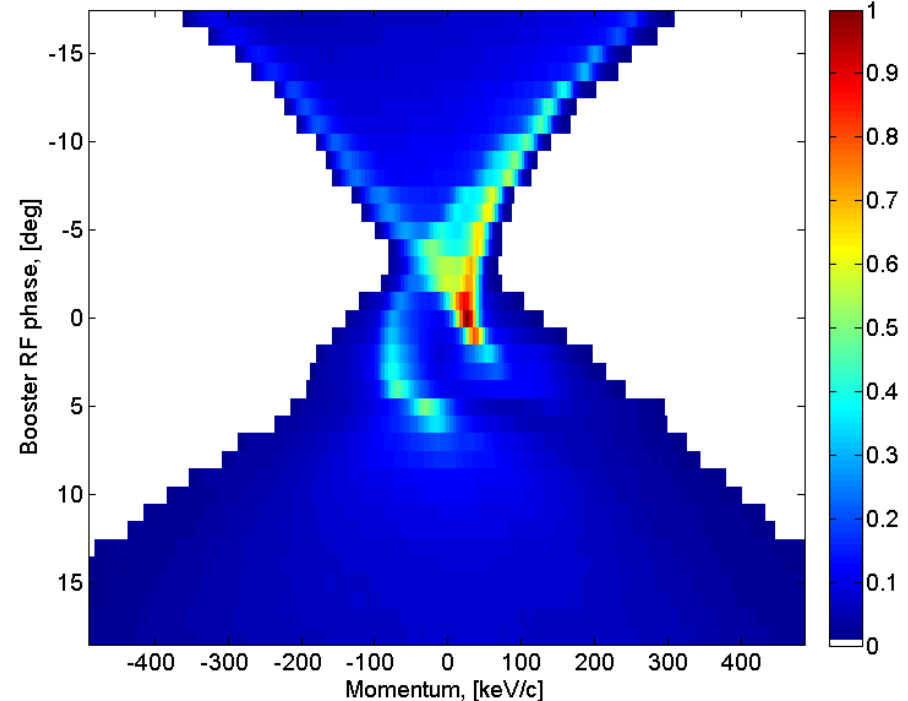
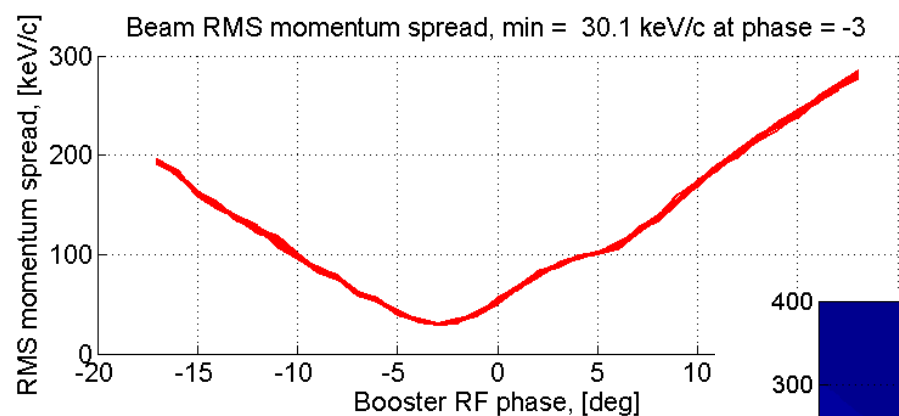
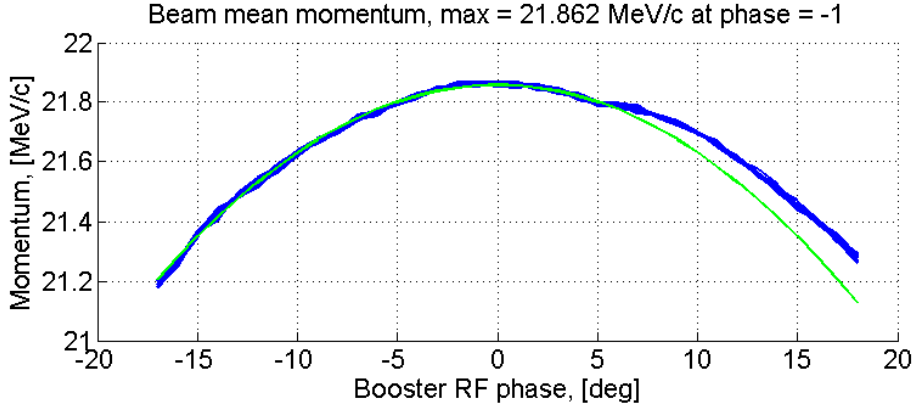
- Experiment with a wire in the laser (laser room)



- The core of the e-beam is strongly affected by the laser transverse distribution - the curvature of the core was changing).
- The e-beam halo is almost remaining the same.

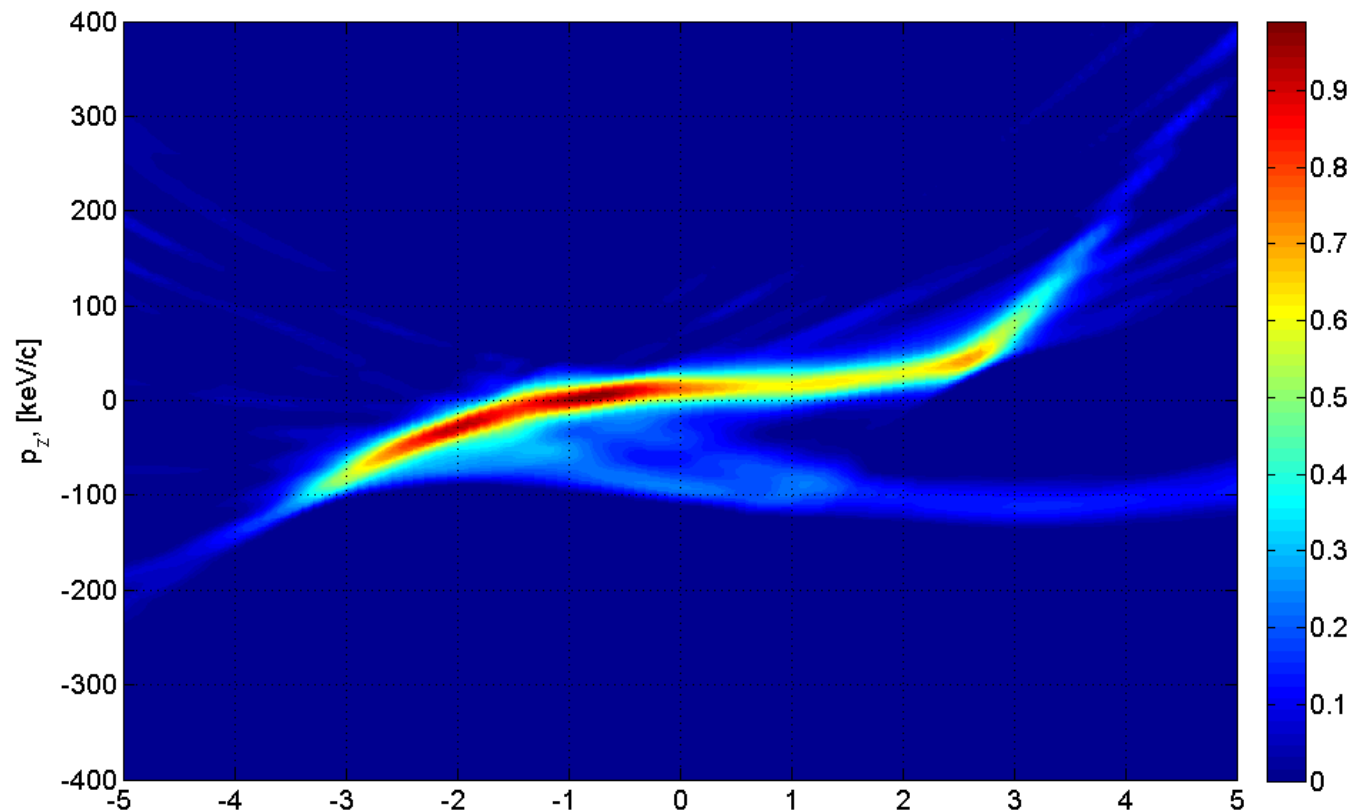
# Other studies

- Phase stability measurements, also with new WCS
- RF gun coupler kick
- Trajectory studies
  
- Analysis of the **longitudinal phase space** (D.Malyutin) → next 2 slides

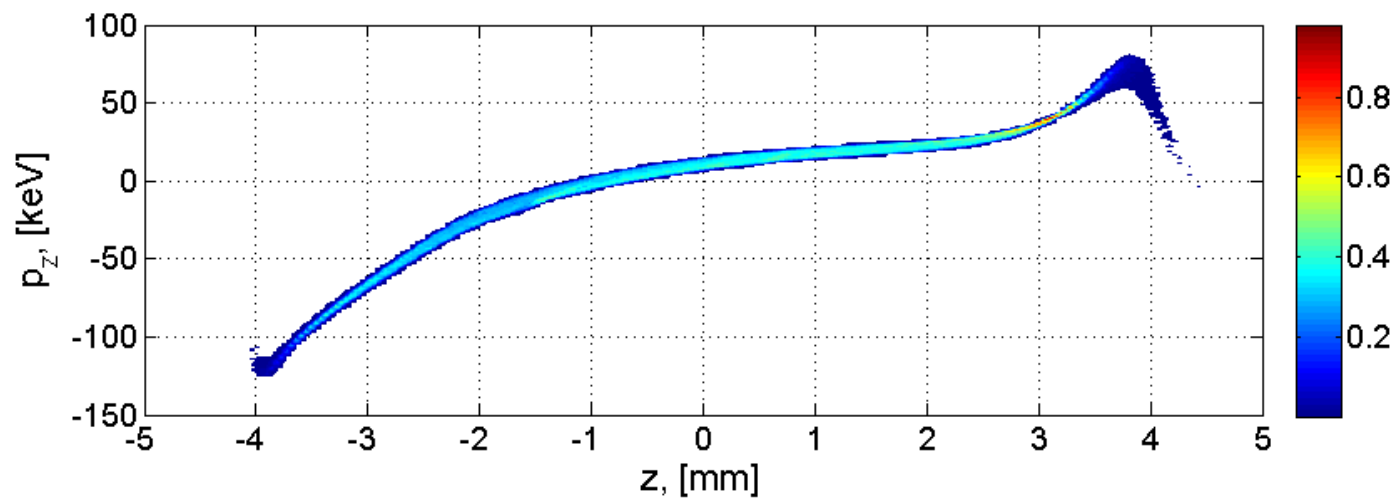


Data from:  
2014.03.19A  
19:59:14

1 nC bunch charge  
~8 keV/c resolution  
~4 keV/c binning



1 nC  
20.5 ps laser



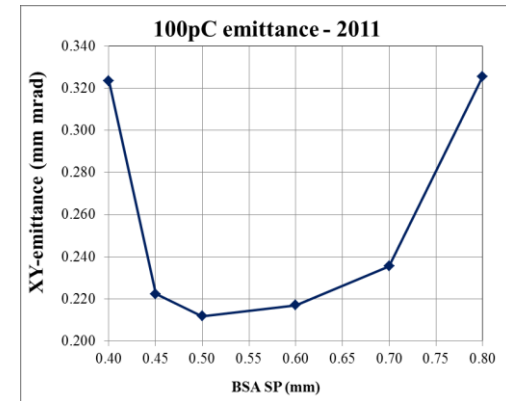
1 nC  
17.4 ps laser



# Problems

- OSS does not work + small laser pulse energy drift?
- Resonance temperature drift during the emittance measurements (17.03N)
- ILs (spark, max reflection 17.03M → 1x, 18.03M → 2x)
- Phase scan GUI → conflict with new scope readouts

# Weeks 12: Plans



## Measurement program

- 0. Beam trajectory for 1nC emittance measurements → (re-)adjustments
- 1.65 Emittance measurements Q=100pC, BSA=0.5mm (2011-best), 0.6mm, 0.4mm, ?
- 1.7-2.41 Tomo → GeK+GV
- 2.5 Phase stability measurements (+new WCS tests) → Igl
- 2.8 Coupler kick studies → Igl

## Other tasks:

- 1) Check booster FB → done
- 2) LOW.BPM1,2 → “centering” (MK) → done
- 3) Setup laser pulse energy monitoring (before BSA → 1.4mm) → done
- 4) Check Save&Restore tool for (at least) steerers → ?
- 5) QE-map and QE
- 6) Dark current

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<b>Morn.</b>	<b>Gun phase stability / Coupler kick measurements?</b>						
7:00 to 15:30	Isaev Rublack	Isaev <b>New WCS</b>	Isaev Rublack	Isaev Rublack	Isaev Rublack	Isaev Good	Isaev Good
<b>Late</b>	<b>Emittance 100pC</b>						
15:00 to 23:30	Otevel Pathak	Otevel Pathak	Otevel Asova	Gross Asova	Gross Asova	Gross Asova	Gross <b>QE, QE-map Dark current?</b>
<b>Night</b>	<b>Tomo 100pC</b>						
23:00 to 7:30	Vashchenko Good	Vashchenko Good	Kourkafas Prach B.	Kourkafas Prach B.	Kourkafas Prach B.	Kourkafas Prach B.	Kourkafas Prach B.
	<b>Emittance 1nC</b>						
<b>Resp. Phys</b>							
<b>Laser</b>	Krasilnikov	Krasilnikov	Krasilnikov	Gross	Gross	Gross	Gross
<b>RF</b>	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann
<b>Vaku.</b>	Bienge	Bienge	Bienge	Bienge	Bienge	Bienge	Bienge
<b>Contr.</b>	Petrosyan	Petrosyan	Petrosyan	Petrosyan	Petrosyan	Petrosyan	Petrosyan
<b>Electr.</b>	Pohl	Pohl	Pohl	Pohl	Pohl	Pohl	Pohl
<b>Infrast.</b>	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann
<b>SSB</b>	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov
<b>Schichtabsich</b>	Gross	Krasilnikov	Krasilnikov	Vashchenko	Otevel	Otevel	Vashchenko

# Measurement program: Gun-4.4

priority	program item	num.of shifts	coordinator	preferred dates	Remarks
0.9	Dark current measurements	1-2	M.Krasilnikov		200us, 2D scan(RF power, I <sub>main</sub> )
1	Laser alignment (rough)	2-4	M.Gross		done
1.1	Solenoid BBA	4	M.Krasilnikov		done*
1.2	Long momentum measurements	2	M. Otevrel		done*
1.2	QE and QE-map measurements	2	M. Otevrel, M. Gross		done*
<b>1.2</b>	<b>Kapton foil tests with e-beam</b>	<b>1</b>	<b>M.Gross</b>		<b>solenoid scan+booster</b>
1.2	Booster steering studies	7	M.Otevrel, D.Kalantaryan		?combined with Cathode-1?
1.4	<i>BPMs commissioning</i>	3	<i>M.Krasilnikov, F.Tonisch</i>		<i>+booster</i>
1.6	<b>Emittance-1nC</b>	<b>17</b>	<b>G.Vashchenko, M.Krasilnikov</b>		<b>Flattop laser temporal profile</b>
1.61	<b>Emittance-250pC</b>	<b>10</b>	<b>G.Vashchenko, M.Krasilnikov</b>		<b>Flattop laser temporal profile</b>
1.62	<b>Emittance-100pC</b>	<b>20</b>	<b>G.Vashchenko, M.Krasilnikov</b>		<b>Flattop laser temporal profile</b>
1.63	<b>Emittance-20pC</b>	<b>21</b>	<b>G.Vashchenko, M.Krasilnikov</b>		<b>Flattop laser temporal profile</b>
1.7	<b>Tomo-1</b>	<b>14</b>	<b>G.Kourkafas</b>		
2.41	<b>Tomo-2 (matching studies)</b>	<b>14</b>	<b>G.Kourkafas</b>		
2.5	Cathodes-1 (life time)	21	S.Lederer		21 shift/cathode!->63?; 6500nC/sec!
2.5	<b>Gun phase stability</b>	<b>9</b>	<b>I.Isaev</b>		<b>to be combined with Cathodes-1?</b>
2.6	Cathodes-2 (emittance, QE, QE-map)	6	S.Lederer,...		2 cathodes
2.8	<b>Emission studies --&gt; Coupler kick</b>	<b>6</b>	<b>M.Krasilnikov</b>		<b>laser temporal profile to be changed</b>
2.85	<b>Bunch length by 3-phase method</b>	<b>??</b>	<b>T.Vinatier</b>		<b>LPS (D.Malyutin?) + D.Lipka (DCM1)?</b>
2.9	<b>Low charge bunches characterization</b>	<b>9</b>	<b>B.Marchetti, D.Malyutin</b>		<b>Laser=5.4ps FWHM</b>
2.91	<b>Gauss-20pC</b>	<b>12</b>	<b>M.Rehders</b>		<b>laser temporal profile to be changed</b>
2.95	Thermal emittance	??	M.Otevrel		
3	Bunch length with DCM1	3	D.Lipka	KW14	cross-check with LPS Tomo (DM)
3	<i>XFEL Toroid</i>	<i>1</i>	<i>R.Neumann (N.Baboi), F.Tonisch</i>	<i>2013/KW50, 2014/KW3,6,8; Mo-Do</i>	<i>to be combined with Cathodes-1?</i>
3.5	?Booster dark current studies?	??			1week for higher peak power