PITZ RC, 07.02.2013

M.Krasilnikov

Week 6: Original planning→ Run

- Longitudinal momentum measurements (LMM)
    1. Preparation (resonance and RF FB tuning, laser BBA) → done
    2. Gun characterization -> Pz vs. gun phase for various gun gradients → done with modulated flat-top laser for Max,7,6,5MW
    3. LPS tomography (DM program) → mainly done with short Gaussian laser
- Solenoid BBA (MK) → first test measurements on 5.2.13A
- BPM commissioning (MK) → only LOW.BPM1 shows signals (tunnel access is needed)
- Gun stability measurements (IgI)
    – Phase stability
    – Long Term Tests (LTT) – night runs → 650us x 5-5.5MW
- Emittance:
    – Emwiz/emcalc tests (new video client)

| Mon Feb-04	Tue Feb-05	Wed Feb-06	Thu Feb-07	Fri Feb-08	Sat Feb-09	Sun Feb-10
LMM-2 Isaev	**LMM-3** Isaev	Isaev	Isaev	Isaev	Isaev	Isaev
Kalantaryan	Malyutin	Malyutin	Malyutin	Malyutin	Malyutin	Kalantaryan
rc	**LMM-2**		**rc**		**LMM-3 | Phase stability?**	
Marchetti Krasilnikov	Marchetti Krasilnikov	Marchetti Malyutin	Marchetti Krasilnikov	Marchetti Krasilnikov	Marchetti Khojoyan	Marchetti Krasilnikov
LMM-2, BPM SolBBA (prep)			**SolBBA**			
Stability Long Term Tests (650us) + Laser temp.pulse shaper adjustment						
Automatic Conditioning **5.2MW-8h**	Automatic **5.7MW-7h e-det***	Automatic Conditioning **5.5MW-8h**	Automatic Conditioning	Automatic Conditioning	Automatic Conditioning	Automatic Conditioning
Marchetti	Marchetti	Marchetti	Marchetti	Marchetti	Marchetti	Marchetti

Problems observed

Radiation protection server (for DAQ)
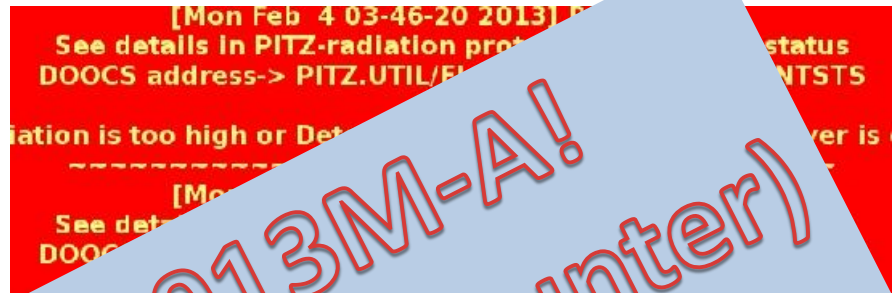
Solved on 04.02.2013M-A!
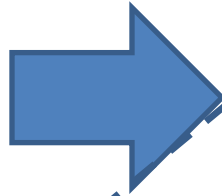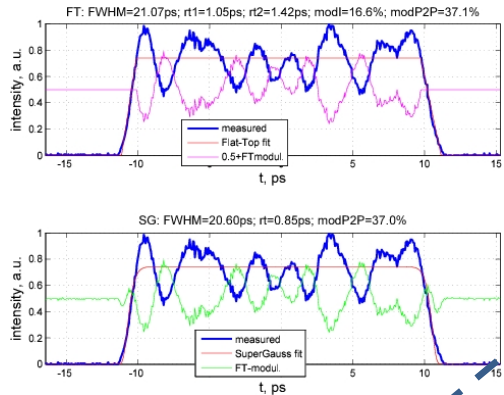Thanks to Control group (Gunter)
Typically: everything is green now
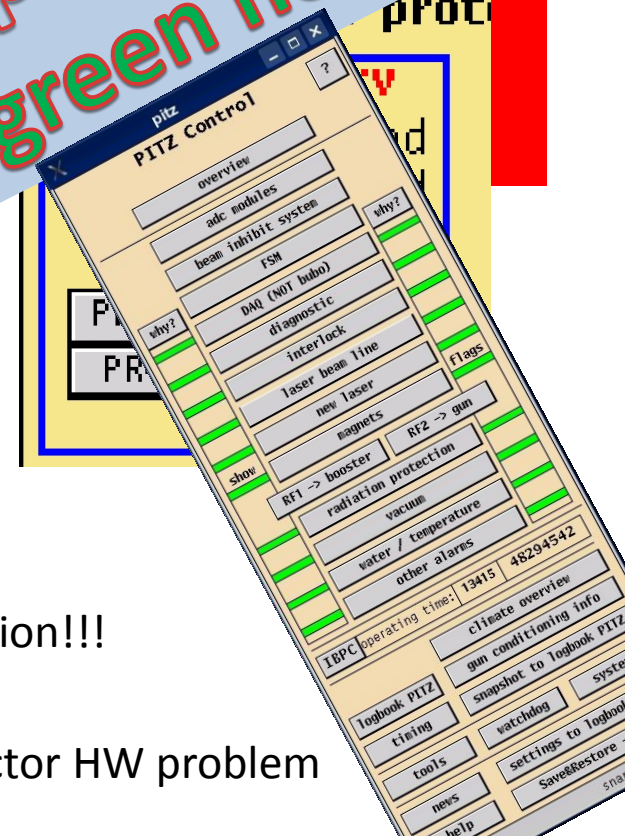
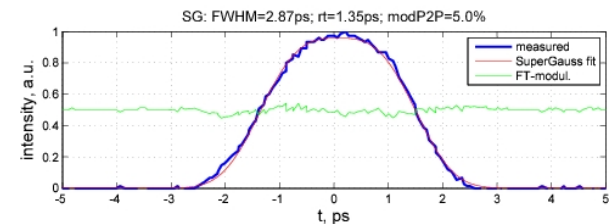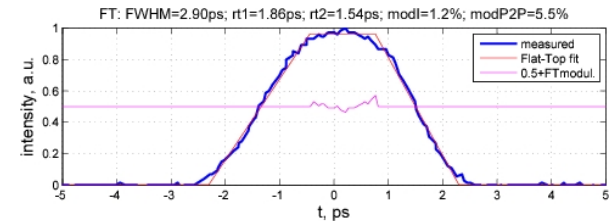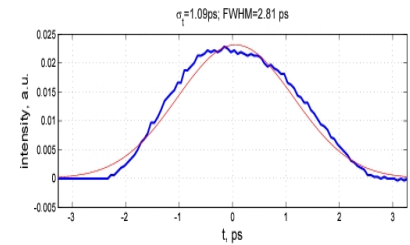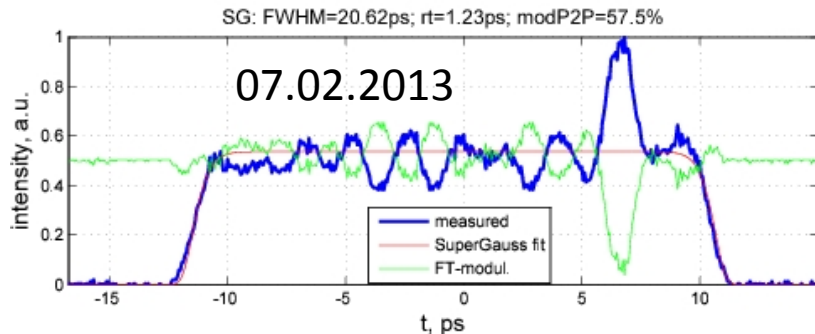! HW Radiation IL is always in the operation!!!

Remains: Z-44 (He3 error) → Detector HW problem

Cathode laser temporal profile

e.g. 01.02.2013M

FT: FWHM=21.07ps; rt1=1.05ps; rt2=1.42ps; modI=16.6%; modP2P=37.1%

SG: FWHM=20.60ps; rt=0.85ps; modP2P=37.0%

1. Night shifts 4-6.02.2013 (GK+MG) for laser temporal pulse shaper adjustment from the scratch
2. For the morning and late shifts on these days → pulse shaper is by-passed ➔ short Gaussian profile FWHM=2.8-2.9ps (1.1ps rms)
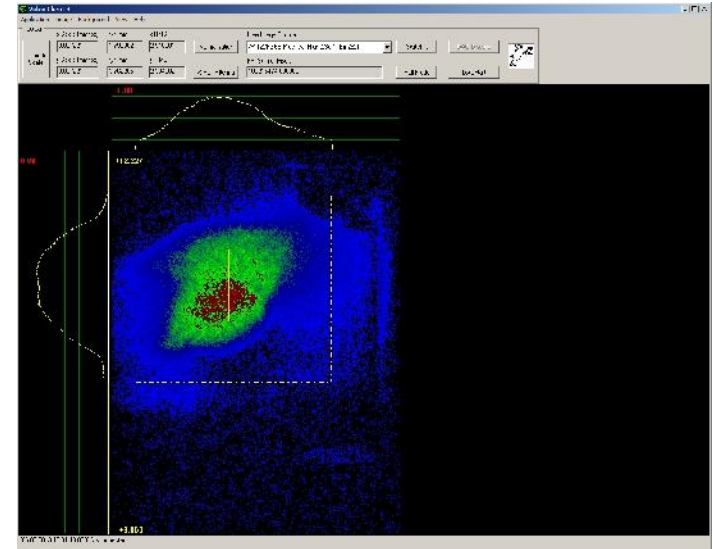

- 06.02.2013 5:23
- 05.02.2013 17:30
- 22.05.2011 10:40

SG: FWHM=20.62ps; rt=1.23ps; modP2P=57.5%

07.02.2013

σ_t=1.09ps; FWHM=2.81 ps

FT: FWHM=2.90ps; rt1=1.86ps; rt2=1.54ps; modI=1.2%; modP2P=5.5%

SG: FWHM=2.87ps; rt=1.35ps; modP2P=5.0%
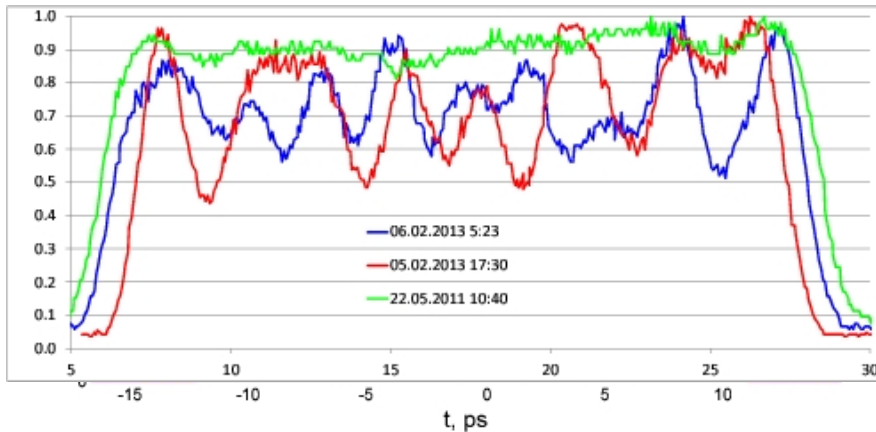
Cathode laser: other problems

L-Beam at VC2
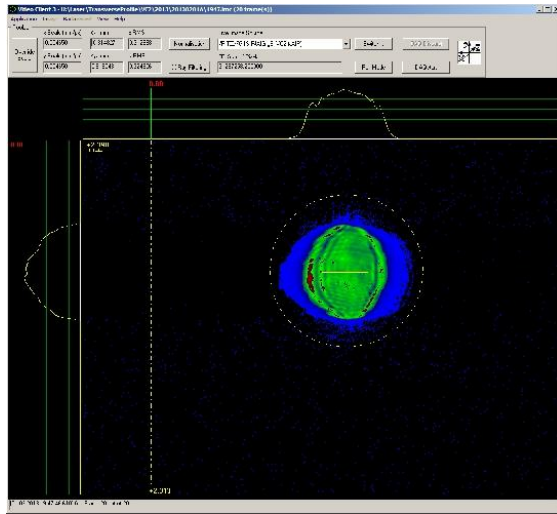
E-Beam at High2.Scr1

Laser energy server (trolley in tunnel) does not work – Bagrat is working on it (library problem). Consequence: no (absolute) laser pulse energy measurement

e-detector coupler faking IL?

- without any visible signal difference on ADC
- also no signal difference was observed on the oscilloscope connected to the ADC channel in the rack room
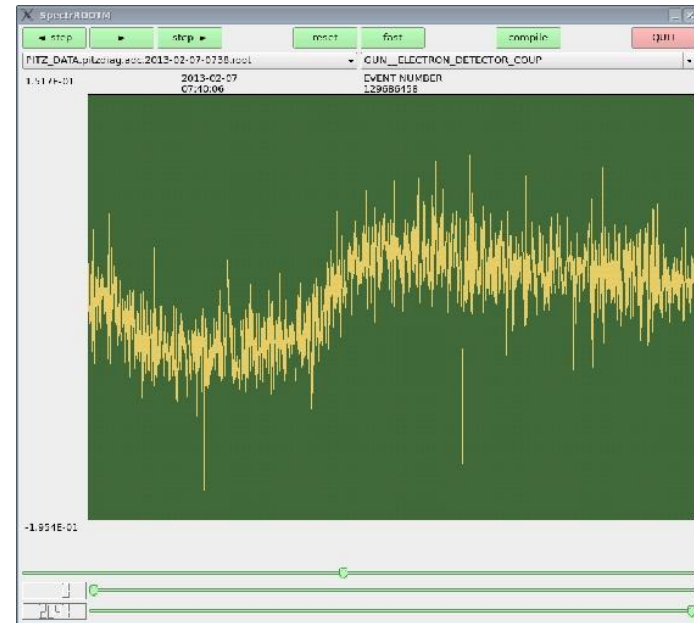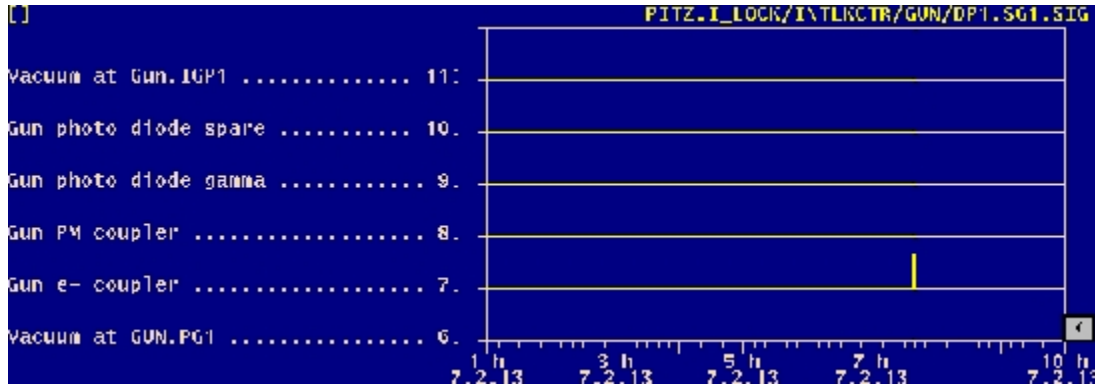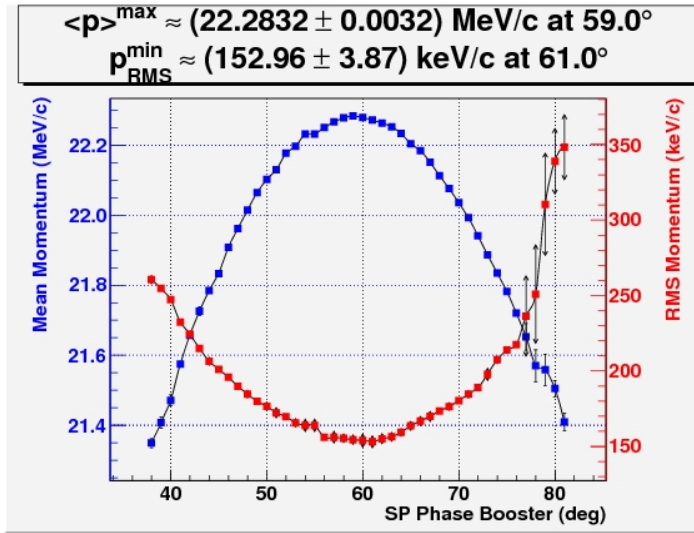

Test: exchange cables between coupler and rf window e-detector IL?
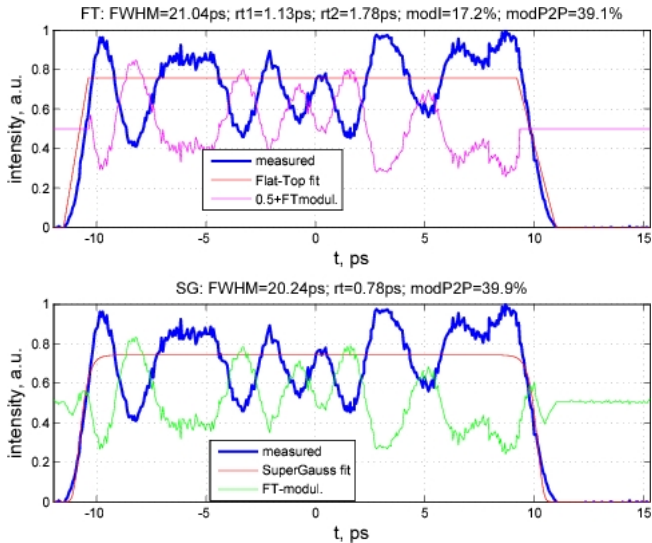
Measurements

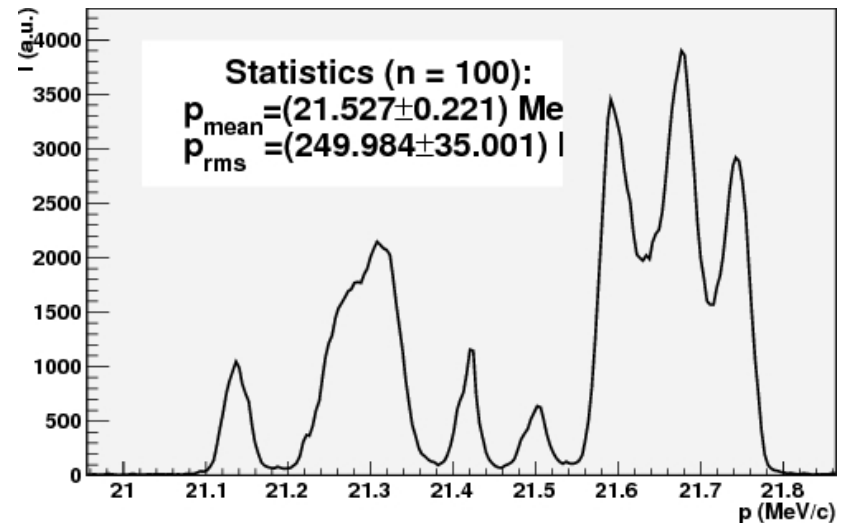# Laser temporal modulation → momentum modulations
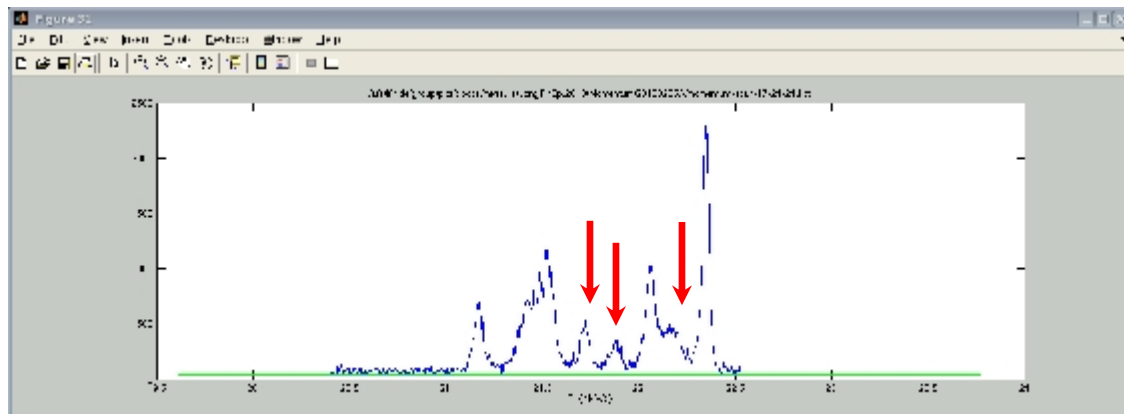
HEDA1 scan, 20 pC

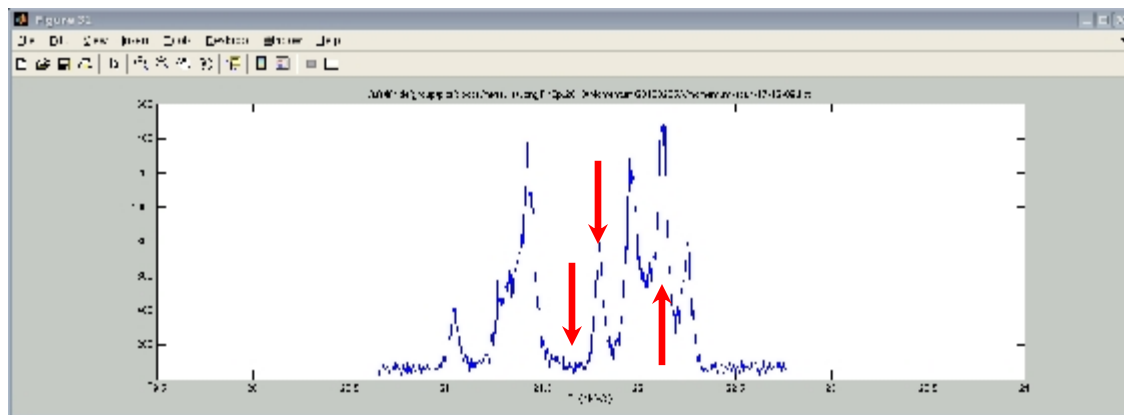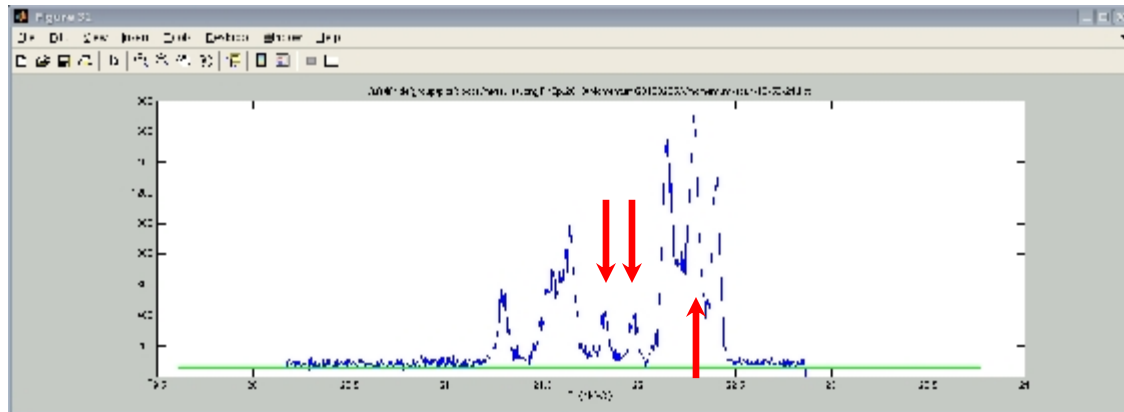Cathode laser temporal profile

E-beam at HEDA1, -19deg off-crest

Laser temporal modulation → momentum modulations, HEDA2 measurements (+19deg off-crest)
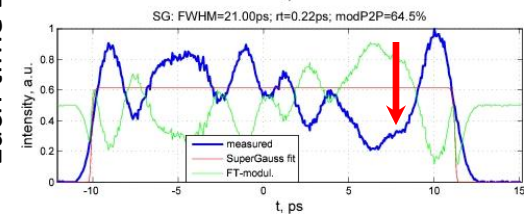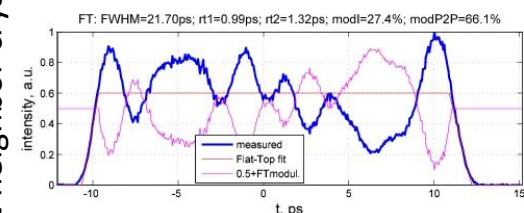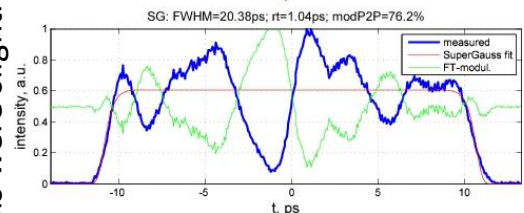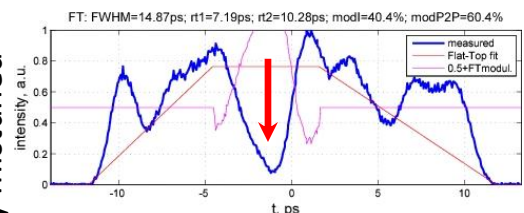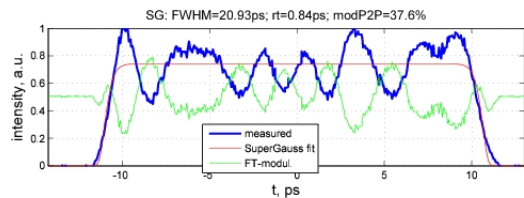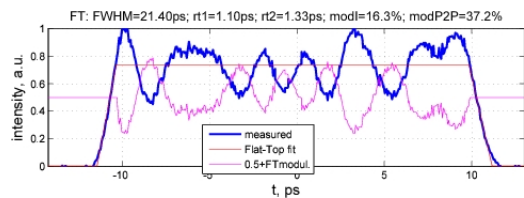
Each time 2 neighbor crystals were slightly mistuned

Momentum modulations in LEDA for Gaussian short pulse???

Momentum scan at LEDA, 100 pC

Similar results for 20pC

Weeks 6,7: Planning

- Longitudinal momentum measurements (LMM)
  - Gun characterization -> Pz vs. gun phase for various gun gradients with Gaussian laser pulses = **LMM-2G**
  - LPS tomography (DM program) → ??? (after the flat-top re-adjustment)
- Solenoid BBA (MK)
- BPM commissioning (MK) → only LOW.BPM1 shows signals (tunnel access is needed)
- Gun stability measurements (IgI)
  - Phase stability
  - Long Term Tests (LTT) – night runs → 650us x 5-5.5MW
- Emittance:
  - Emwiz/emcalc tests (new video client)
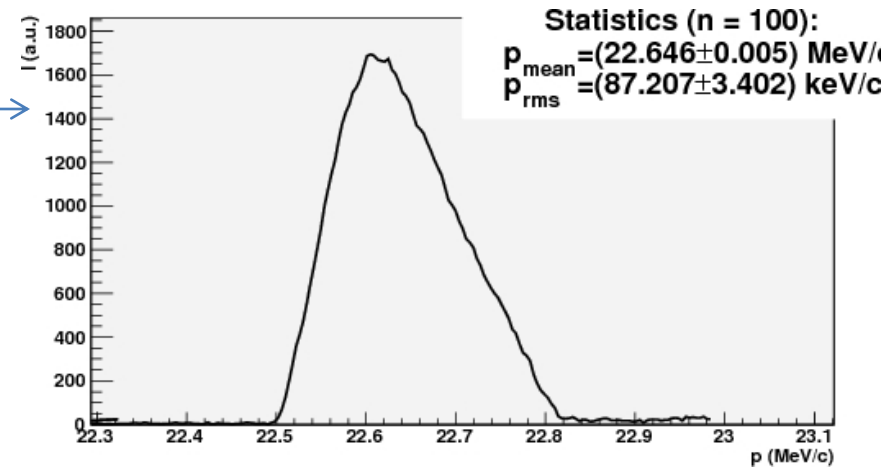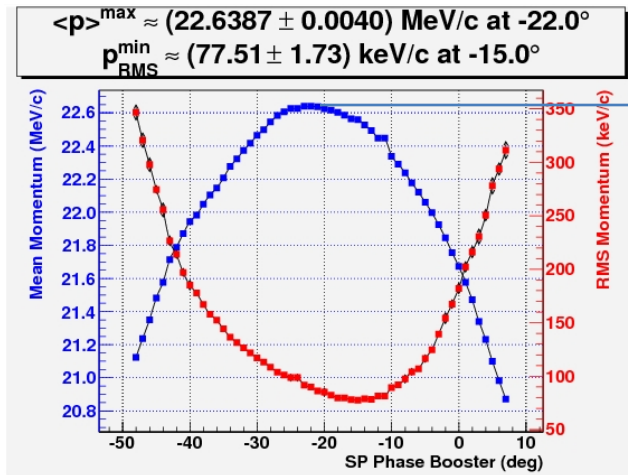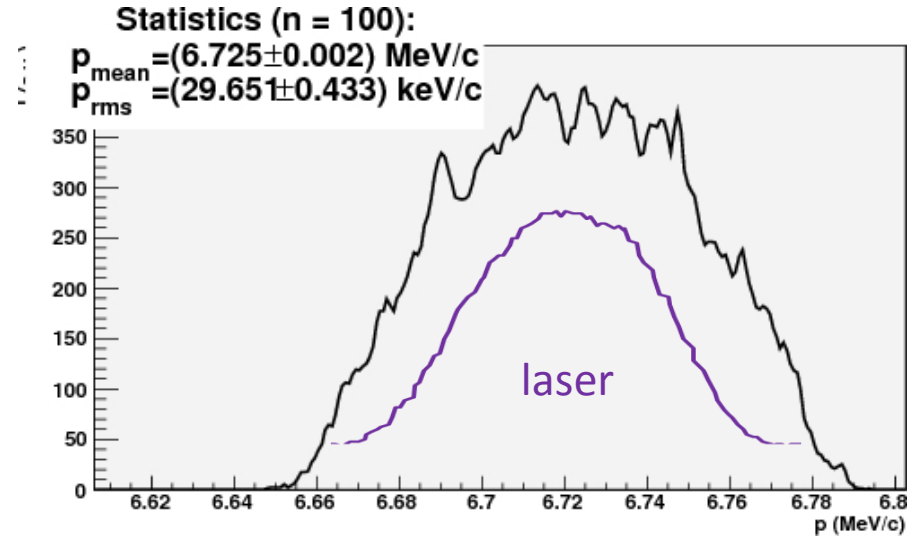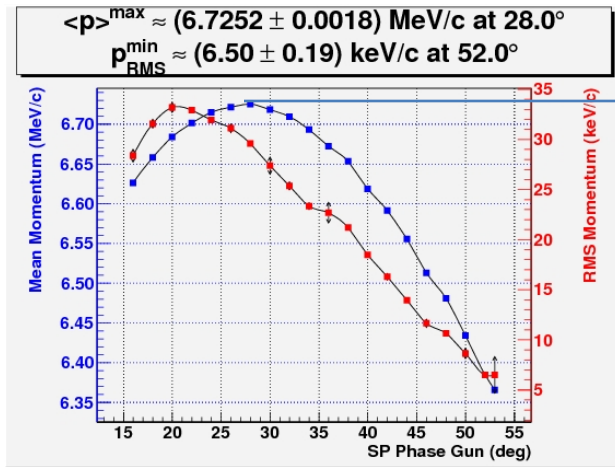 - Emittance for short Gaussian and low charge (BM) = **EG0Q**
  - Emittance 1nC with nominal FT = **E1nC**

Thu Feb-07	Fri Feb-08	Sat Feb-09	Sun Feb-10	Mon Feb-11	Tue Feb-12	Wed Feb-13	Thu Feb-14	Fri Feb-15	Sat Feb-16	Sun Feb-17
LMM-2 Isaev	Isaev	**LMM-2G | Phase stability?** Isaev	Isaev	Khojoyan	**E1nC** Khojoyan	Khojoyan	Khojoyan	Khojoyan	Khojoyan	Krasilnikov
Malyutin	Malyutin	Malyutin	Kalantaryan	Nozdrin	Nozdrin	Nozdrin	Nozdrin	Nozdrin	Nozdrin	Nozdrin
rc					**rc**					
Marchetti **SolBBA**	Marchetti	Marchetti **Emittance EG0Q**	Marchetti	**FT-Laser? E1nC**		Gross	Gross	Gross	Gross	Gross
Krasilnikov	Krasilnikov	Khojoyan	Krasilnikov			Kourkafas	Kourkafas	Kourkafas	Kourkafas	Kourkafas
Automatic	Automatic	Automatic	Automatic	Automatic	**Stability Long Term Tests (650us)** Automatic	Automatic	Automatic	Automatic	Automatic	Automatic
Conditioning	Conditioning	Conditioning	Conditioning	Conditioning	Conditioning	Conditioning	Conditioning	Conditioning	Conditioning	Conditioning
Marchetti	Marchetti	Marchetti	Marchetti	Gross	Gross	Gross	Gross	Gross	Gross	Gross

Measurement program 2013/1

item	Task	Description	Responsible	program available?
1	Gun-3.1 conditioning	+Cs2Te cathode	MK	+
2	CDS booster test run		? , MK	+
3	Long. momentum measurements	Gun characterization + data for LPS tomography trial	DM, MK	+
4	Gun stability measurements	Amplitude and phase, + pulse train flatnness	Igl	+
5	Emittance measurements	Min emittance for 0.02; 0.1; 0.25;1;2 and 3nC (new), slit scan	MK, GV	
6	Emittance vs. booster gradient	100pC	GV	
7	Emittance vs gun gradient	45 vs. 60MV/m		
8	Emittance vs. laser rt		+MG, GK	
9	Emitance optimization for Gaussian	laser pulse length variation		
10	Emittance along the beam line and tomography	100pC?	GeK	
11	RF gun coupler kick studies	???	MK, Igl	
12	Studies for PWA	Kapton window tests	MG	
13	Solenoid BBA	Still magnetizable parts	MK	+
14	BPM commissioning	Timing + calibration	MK	+
15	Low charge studies	short pulse characterization	BM	+
16	Laser shapes adjustment	Temporal and transverse	GK, MG	

Longitudinal momentum after the gun = LMM2 program (MK)

meas#	Task	Description	Tool	Soft	Remark	Info
1	Laser at VC2	Cathode laser transverse distribution, BSA=1.2mm	VC2 camera	VideoClient3	10frames	Xrms/Yrms=
2	Laser temopral profile	Cathode laser temporal profile	OSS	Matlab tool: TempProfFit_WINdoubleFit.m		FWHM= ;rt=
3	**RF power -> max**	max. peakpower in the gun (7.7MW?)				peak power=
4	Resonance and FB	Gun temperature tuning to min reflection, FB=ON			100 or 200us	reflection=
5	Rough momentum scan	Rough momentum scan in LEDA, find MMMG phase	LEDA	MAMA	1deg step	PzMax= Imain=
6	LT0 tuning	Tune the laser transmission (LT0) for Q(MMMG)=1nC	LOW.ICT1	Matlab tool	if (Q<1nC), LT0=100%	LT0= Q0=
7	Focus at LOW.Scr1	Find Imain to focus e-beam for Q(LT0,MMMG)	LOW.Scr1	VideoClient3	approximately	ImainF0= Xrms/Yrms=
8	Schottky scan	Bunch charge vs. gun phase (ImainF0)	LOW.ICT1	Matlab tool: phasescangui.m	1 deg step	Qmax=
9	LEDA scan	Gun phase scan for longitudinal momentum for LT0	LEDA	MAMA	tune Imain*; 10 (30) statistics Phase Step=0.5deg	Imain0= MMMG= ; MaxPz=
10	Momentum distribution	Momentum distribution at MMMG and LT0	LEDA	MAMA	50 (100) statistics fine Imain tuning if nessesary	Imain= MMMG= ; MaxPz=
11	LT1 tuning	reduce LT for smalller charge, but reasonable S2N at LEDA	LEDA		~50-100pC tune Imain if nessesary	LT1= Imain1=
12	Focus at LOW.Scr1	Find Imain to focus e-beam for Q(LT1,MMMG)	LOW.Scr1	VideoClient3	approximately	ImainF1= Xrms/Yrms=
13	Measure bunch charge	Imain=ImainF1	LOW.ICT1	Matlab tool: MeasureCharge.m	100 statistics	LT1= Q1=
14	Schottky scan	Bunch charge vs. gun phase (Imain1, LT1)	LOW.ICT1	Matlab tool: phasescangui.m	1 deg step	Qmax=
15	LEDA scan	Gun phase scan for longitudinal momentum for LT1	LEDA	MAMA	tune Imain*; 10 (30) statistics Phase Step=0.5deg	Imain1= MMMG= ; MaxPz=
16	Momentum distribution	Momentum distribution at MMMG and LT0	LEDA	MAMA	50 (100) statistics fine Imain tuning if nessesary	Imain= MMMG= ; MaxPz=
17	**RF power -> 7MW**					
18	Resonance and FB	Gun temperature tuning to min reflection, FB=ON			100 or 200us	reflection=
19	Rough momentum scan	Rough momentum scan in LEDA, find MMMG phase	LEDA	MAMA	1deg step	PzMax= Imain=
20	no LT0 tuning!				LT0 remains the same for all power levels!	
21	Focus at LOW.Scr1	Find Imain to focus e-beam for Q(LT0,MMMG)	LOW.Scr1	VideoClient3	approximately, LT0=fixed	ImainF0= Xrms/Yrms=
22	Schottky scan	Bunch charge vs. gun phase (ImainF0, LT0)	LOW.ICT1	Matlab tool: phasescangui.m	1 deg step	Qmax=
23	LEDA scan	Gun phase scan for longitudinal momentum for LT0	LEDA	MAMA	tune Imain*; 10 (30) statistics Phase Step=0.5deg	Imain0= MMMG= ; MaxPz=
24	Momentum distribution	Momentum distribution at MMMG and LT0	LEDA	MAMA	50 (100) statistics fine Imain tuning if nessesary	Imain= MMMG= ; MaxPz=
25	LT1 tuning	reduce LT for smaller charge, but reasonable S2N at LEDA	LEDA		~50-100pC tune Imain if nessesary	LT1= Imain1=
26	Focus at LOW.Scr1	Find Imain to focus e-beam for Q(LT1,MMMG)	LOW.Scr1	VideoClient3	approximately	ImainF1= Xrms/Yrms=
27	Measure bunch charge	Imain=ImainF1, LT=LT1	LOW.ICT1	Matlab tool: MeasureCharge.m	100 statistics	LT1= Q1=
28	Schottky scan	Bunch charge vs. gun phase (ImainF1, LT1)	LOW.ICT1	Matlab tool: phasescangui.m	1 deg step	Qmax=
29	LEDA scan	Gun phase scan for longitudinal momentum for LT1	LEDA	MAMA	tune Imain*; 10 (30) statistics Phase Step=0.5deg	Imain1= MMMG= ; MaxPz=
30	Momentum distribution	Momentum distribution at MMMG and LT0	LEDA	MAMA	50 (100) statistics fine Imain tuning if nessesary	Imain= MMMG= ; MaxPz=

repeat 17-30 for peak power=6;5; 4; 3; 2 MW