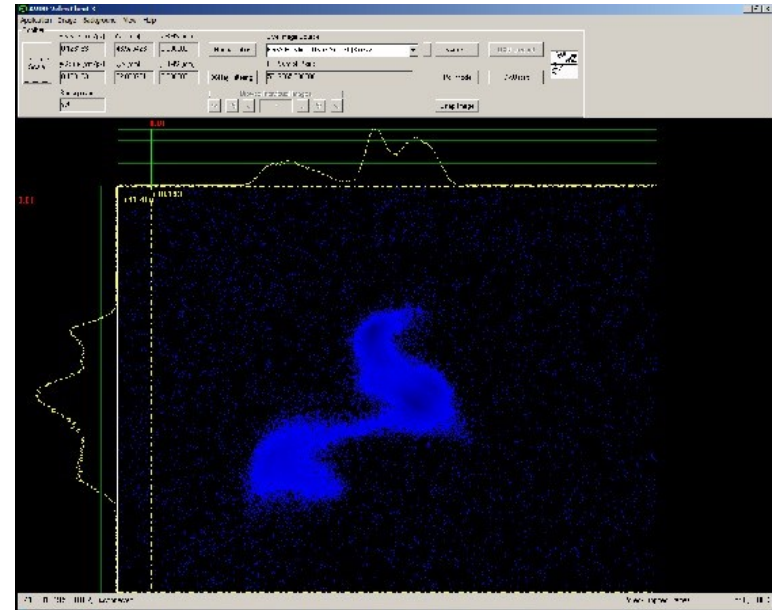
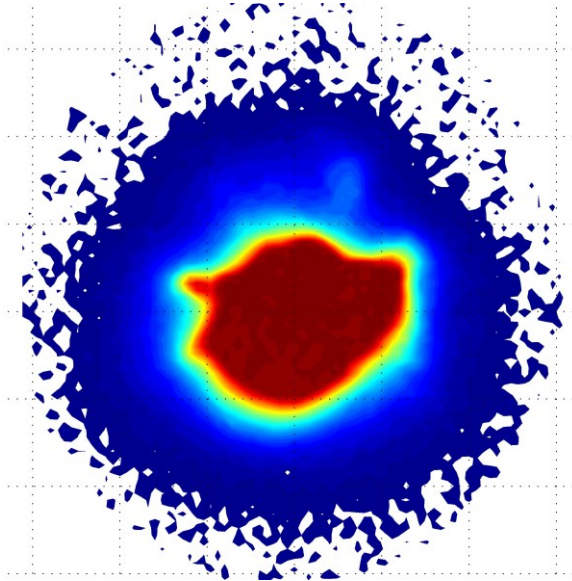


# PITZ Run Coordination Meeting

Run week 49/2016



# Week 49: Measurement program

- **Startup/pulse shaping/(plasma cell extraction? To be decided on Monday 12th)**
- **Self Modulation (SM)**
- **High Transformer Ratio (HTR)**
- **Ellipsoidal laser pulses (3D) emittance/continued PWFA programme**
- **3D basic measurements**
- **Fast gun recovery tests**

to do:	Measurements							Measurements						
Week 49	Mon Dec-05	Tue Dec-06	Wed Dec-07	Thu Dec-08	Fri Dec-09	Sat Dec-10	Sun Dec-11	Mon Dec-12	Tue Dec-13	Wed Dec-14	Thu Dec-15	Fri Dec-16	Sat Dec-17	Sun Dec-18
Morn. 07:00 to 15:30		Lishilin Isaev	Lishilin Li	Lishilin Li	Lishilin Li	Rublack Li	Rublack Li	Rublack Isaev	Krasilnikov Rublack	Krasilnikov Rublack	Rublack Chen	Rublack Kalantaryan	Krasilnikov Kalantaryan	Krasilnikov Li
Late 15:00 to 23:30	Krasilnikov Rublack	Huck Chen	Loisch Chen	Loisch Qian	Loisch Isaev	Loisch Huck	Loisch Huck	Loisch Chen	Loisch Li	Good Melkumyan	Good Melkumyan	Good Li	Gross Chen	Good Kalantaryan
Night 23:00 to 07:30	Renier Melkumyan	Renier Melkumyan	Renier Melkumyan	Renier Melkumyan	Renier Qian	Renier Qian	Renier Qian	Automatic Conditioning	Automatic Conditioning	Automatic Conditioning	Automatic Conditioning	Lishilin Melkumyan	Lishilin Qian	Gross Chen
Resp. Phys								Loisch	Loisch	Lishilin	Lishilin			
Laser	Rublack	Rublack	Rublack	Rublack	Rublack	Rublack	Rublack	Good	Good	Good	Good	Gross	Gross	Gross
RF	Koehler	Koehler	Koehler	Koehler	Koehler	Koehler	Koehler	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann
Vaku.	Rueger	Rueger	Rueger	Rueger	Rueger	Rueger	Rueger	Philipp	Philipp	Philipp	Philipp	Philipp	Philipp	Philipp
Contr.	Melkumyan	Melkumyan	Melkumyan	Melkumyan	Melkumyan	Melkumyan	Melkumyan	Kalantaryan	Kalantaryan	Kalantaryan	Kalantaryan	Kalantaryan	Kalantaryan	Kalantaryan
Electr.	Schultze	Schultze	Schultze	Schultze	Schultze	Schultze	Schultze	Pohl	Pohl	Pohl	Pohl	Pohl	Pohl	Pohl
Infrast.	Schulze	Schulze	Schulze	Schulze	Schulze	Schulze	Schulze	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann
SSB	Rublack	Rublack	Rublack	Rublack	Rublack	Rublack	Rublack	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov
Schichtabsch	Kalantaryan	Kalantaryan			Krasilnikov	Krasilnikov	Good		Chen	Gross	Gross	Gross	Gross	Qian

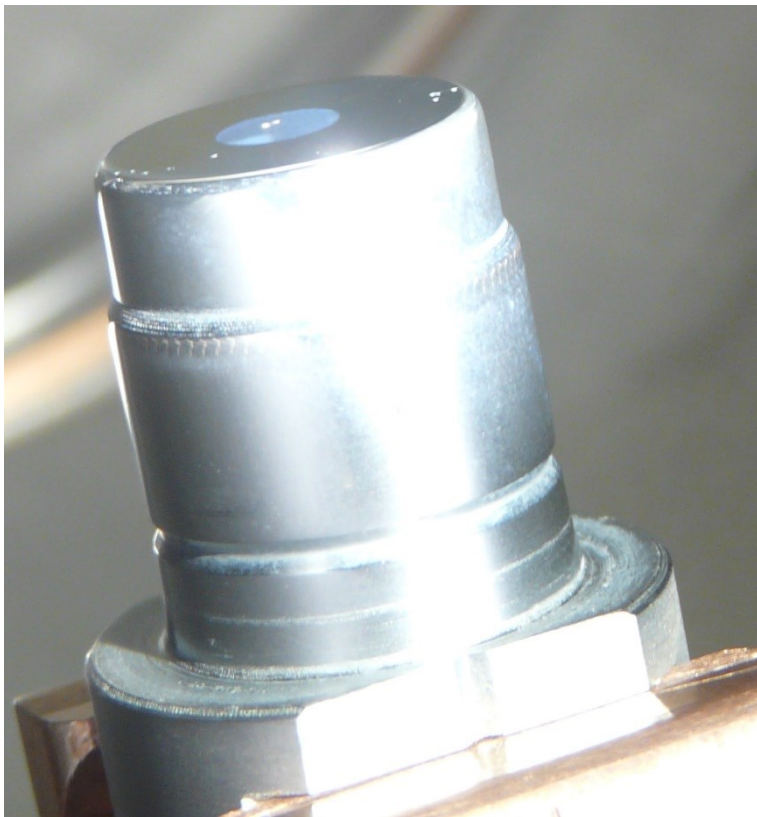
Issued on 30-Nov-2016

A gray field means the status has changed since the last version

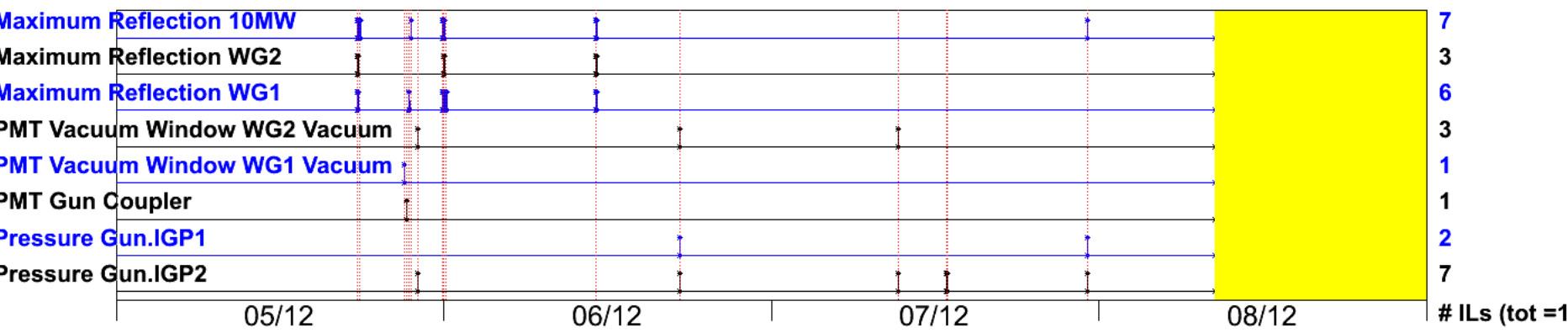
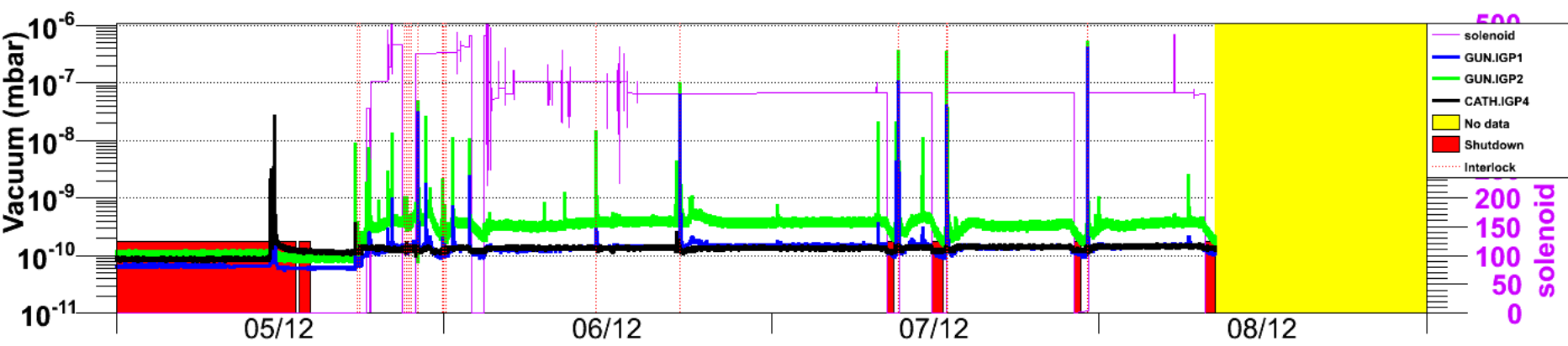
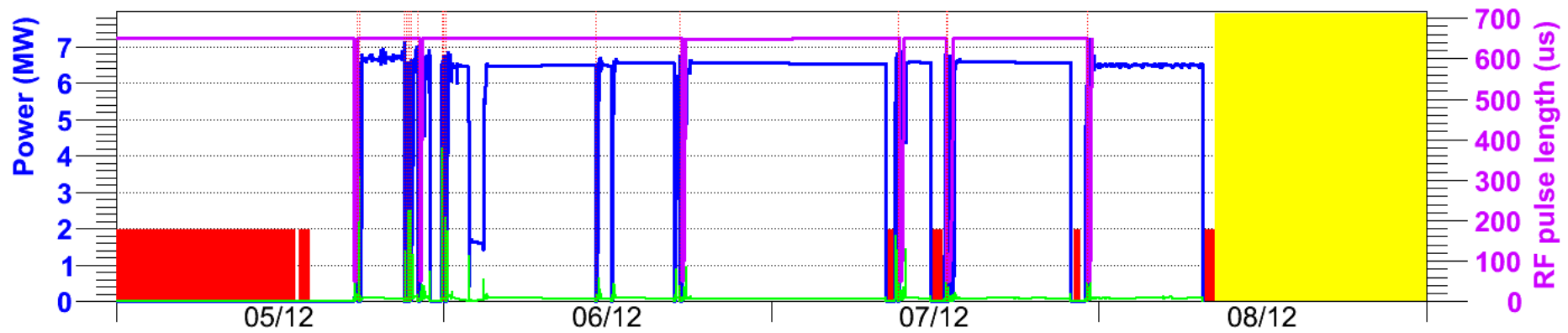
v-2016

A gray field means the status has changed since the last version

# Cathode 682.1, visual inspection on 5.12.2016



# Gun status



Legend:

- solenoïd
- GUN.IGP1
- GUN.IGP2
- CATH.IGP4
- No data
- Shutdown
- Interlock

RF pulse length (us)

solenoïd

# ILs (tot =18)

# Achievements

- > 3D Ella – photoelectrons, first synchronized “regular” measurements
- > Cathode laser (MBI):
  - Pulse shaper in
  - BBA done on 5.12M
- > Plasma cell:
  - HTR
  - SMI
- > Script for the booster uTCA measurements:
  - uTCA\_stability\_boo.m script
- > ...

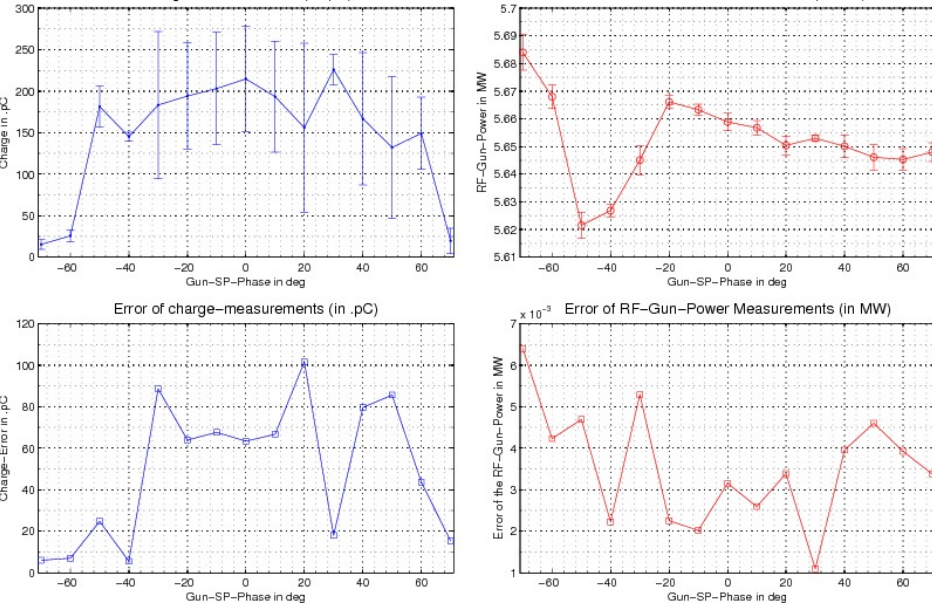
## 3D EIIa: first synchronized “regular” PE measurements

- > no SLM in the laser beamline
- > Synchronization is working
- > 300 pulses always: but using timing → last N pulses could be measured

# 3D Ella: bunch charge at LOW.FC1

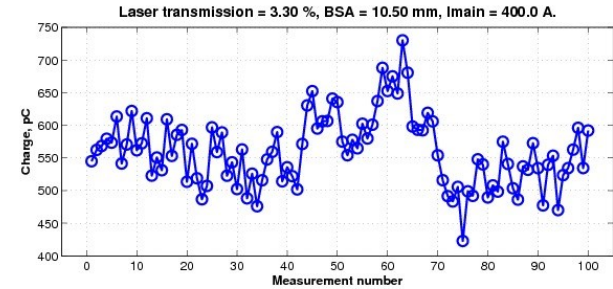
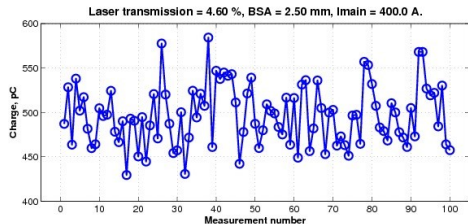
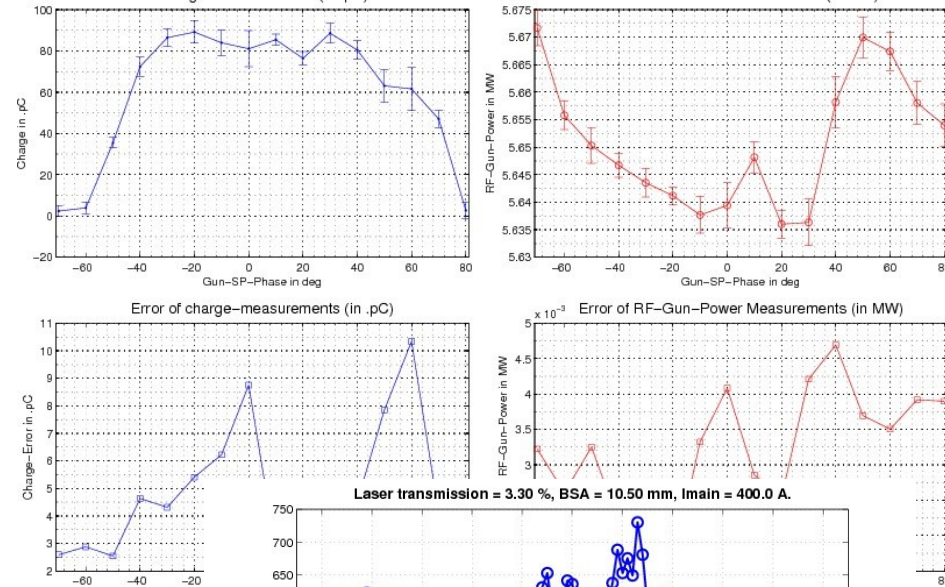
## > 1st laser pulse in train

Phaseplot 05-Dec-2016 Mon 19-31-35  
 Device: low\_FC\_1 ( at Scopa-Output\_3, Attenuation =0 dB )  
 Qmax =225.8774 ±18.0336 .pC ( at P =5.653 ±0.0011 MW, Phase-SP =30.0 deg, Phase-Rdbk =0.0 deg )  
 Magnet-current =399.69 A, Laser-transmission =3.3 %  
 Line-Slope = [pC/deg]  
 Line-Offset = .pC



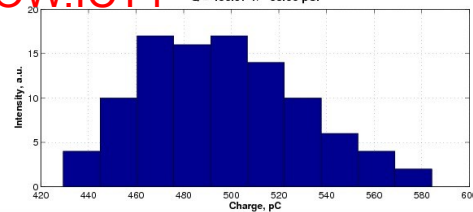
## > ~ 290th pulse in train

Phaseplot 05-Dec-2016 Mon 19-42-21  
 Device: low\_FC\_1 ( at Scopa-Output\_3, Attenuation =0 dB )  
 Qmax =89.1292 ±5.4110 .pC ( at P =5.641 ±0.0016 MW, Phase-SP =-20.0 deg, Phase-Rdbk =0.0 deg )  
 Magnet-current =399.69 A, Laser-transmission =3.3 %  
 Line-Slope = [pC/deg]  
 Line-Offset = .pC



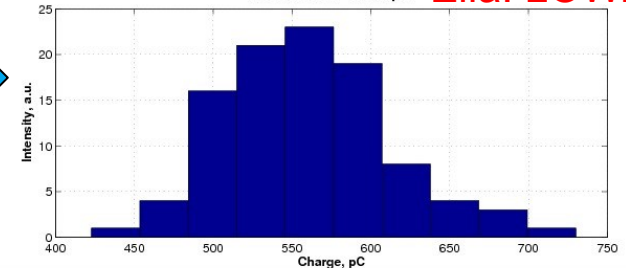
MBI laser: LOW.ICT1

Q = 496.37 ±/− 33.66 pC.



MBI vs Ella

Q = 560.37 ±/− 53.87 pC. Ella: LOW.FC1



Data saved to  
 Charge measurement using Low.FC1; calibration corrected by 1/1.

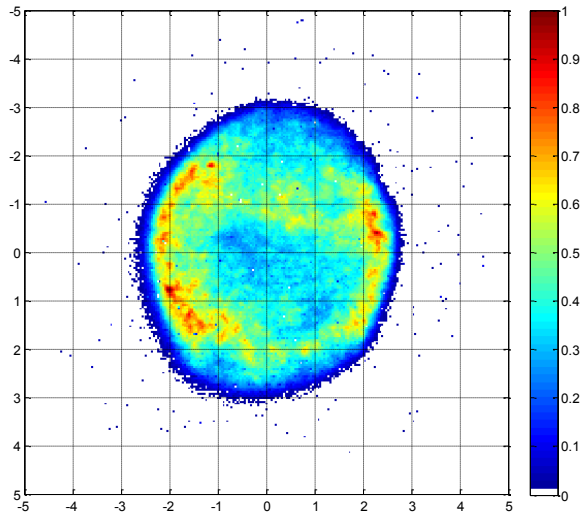




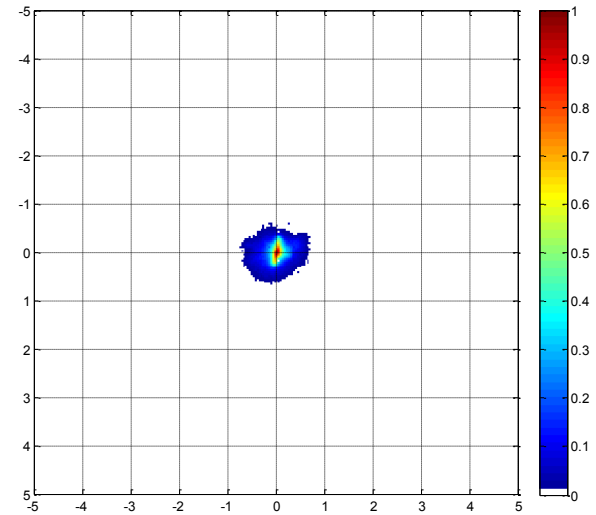
# 3D EIIa: E-beam at LOW.Scr1

>  $\sim 500\text{pC}$ ,  $\sim 6.5\text{MeV}/c$

I<sub>main</sub>=400A



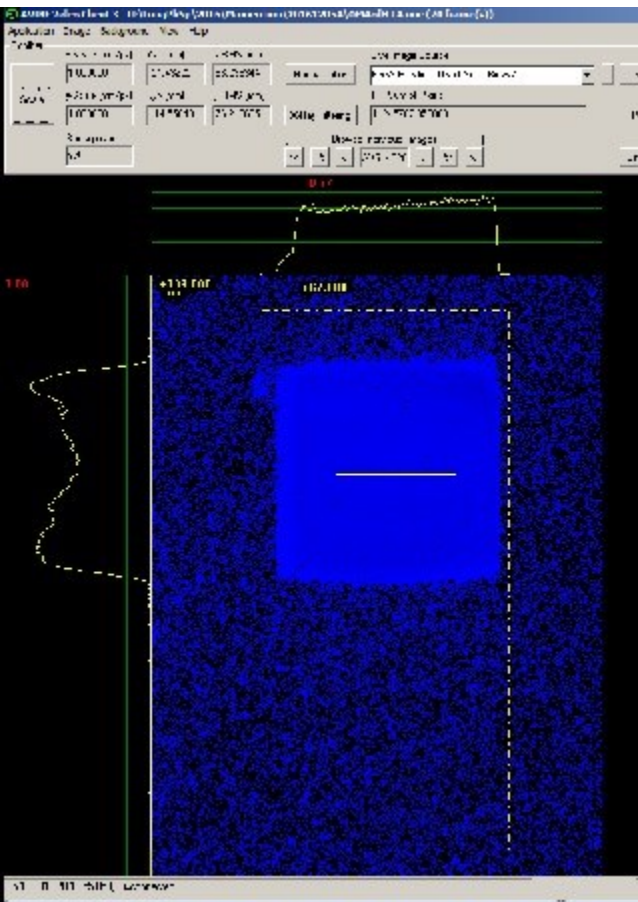
I<sub>main</sub>=465A





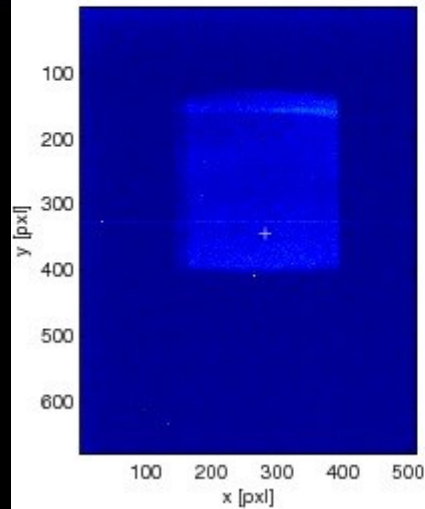
# 3D ELLA: E-beam in LEDA

> SPPPhase=20deg)



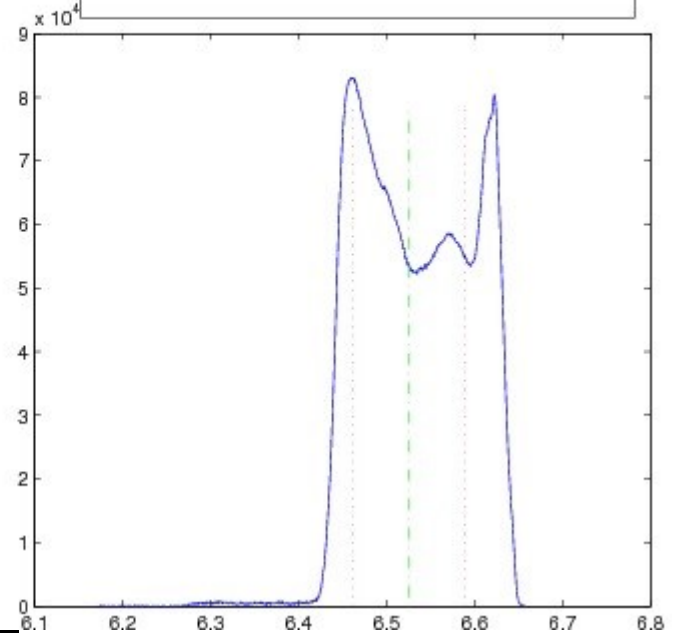
Phase: 20°

Statistics (Img): 100  
Statistics (Bkg): 20



$p_{\text{mean}} = (6.525 \pm 0.019)\text{MeV}/c$

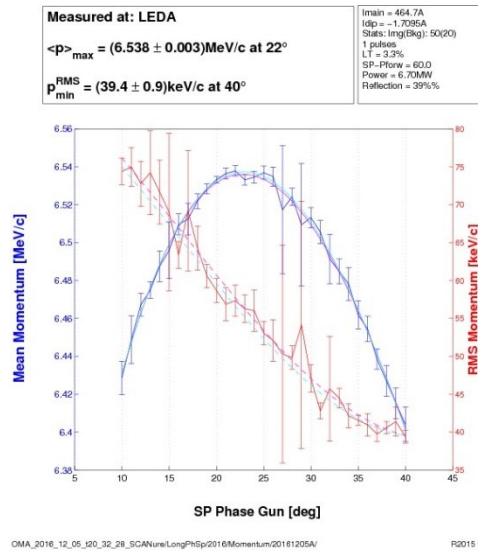
$p_{\text{RMS}} = (63 \pm 6)\text{keV}/c$



# 3D ELLa: LEDA scans

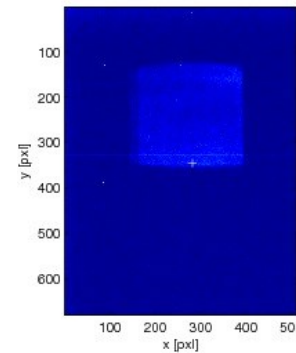
LEDA measurement using ELLA at ~ 0.5 nC, open BSA

LEDA measurement using ELLA at ~30pC (?), BSA=1.2mm



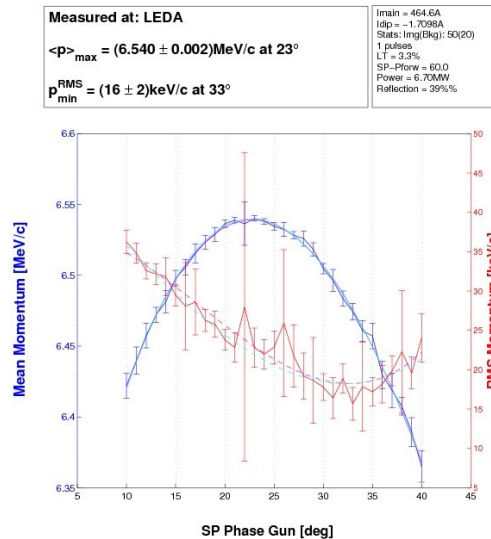
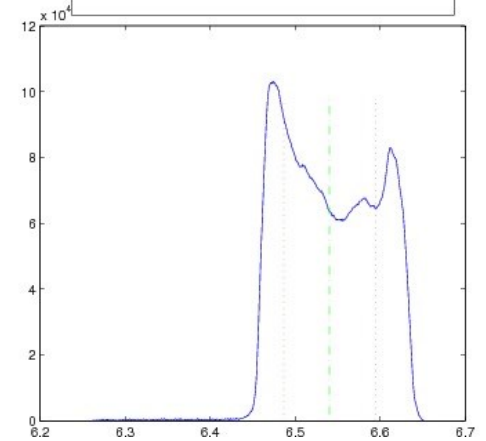
Phase:  $24^\circ$

Statistics (Img): 100  
Statistics (Bkg): 20



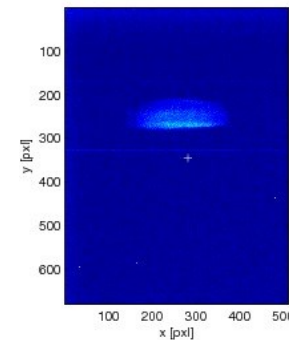
$p_{\text{mean}} = (6.541 \pm 0.002) \text{MeV/c}$

$p_{\text{RMS}} = (54 \pm 2) \text{keV/c}$



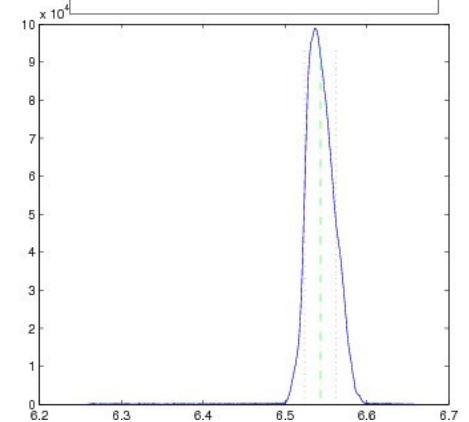
Phase:  $24^\circ$

Statistics (Img): 100  
Statistics (Bkg): 20



$p_{\text{mean}} = (6.544 \pm 0.004) \text{MeV/c}$

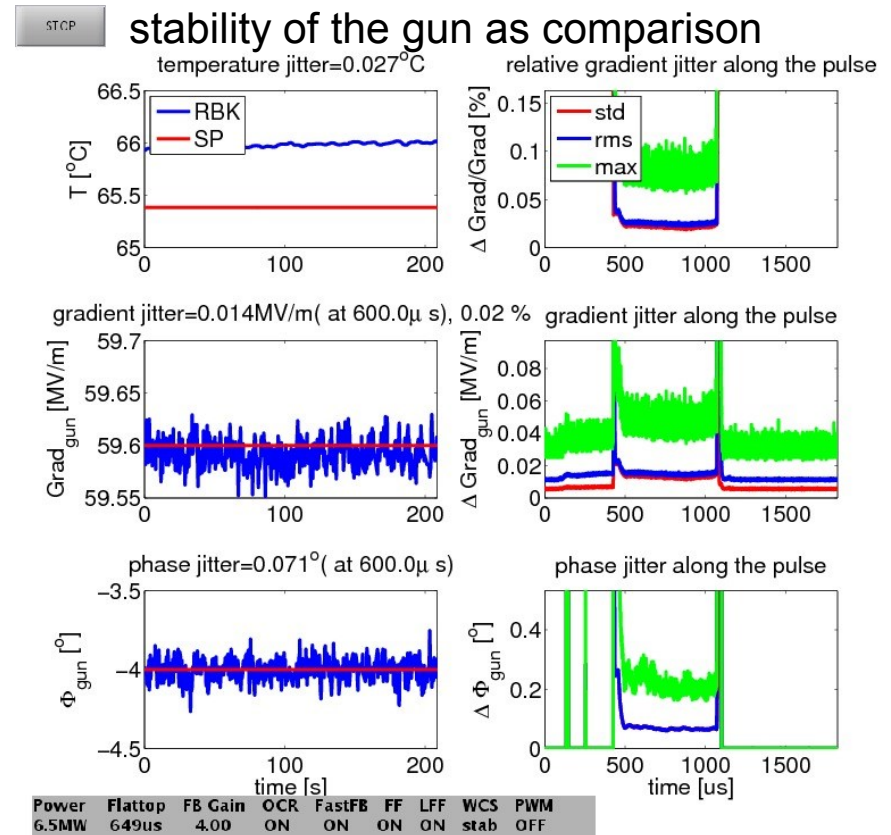
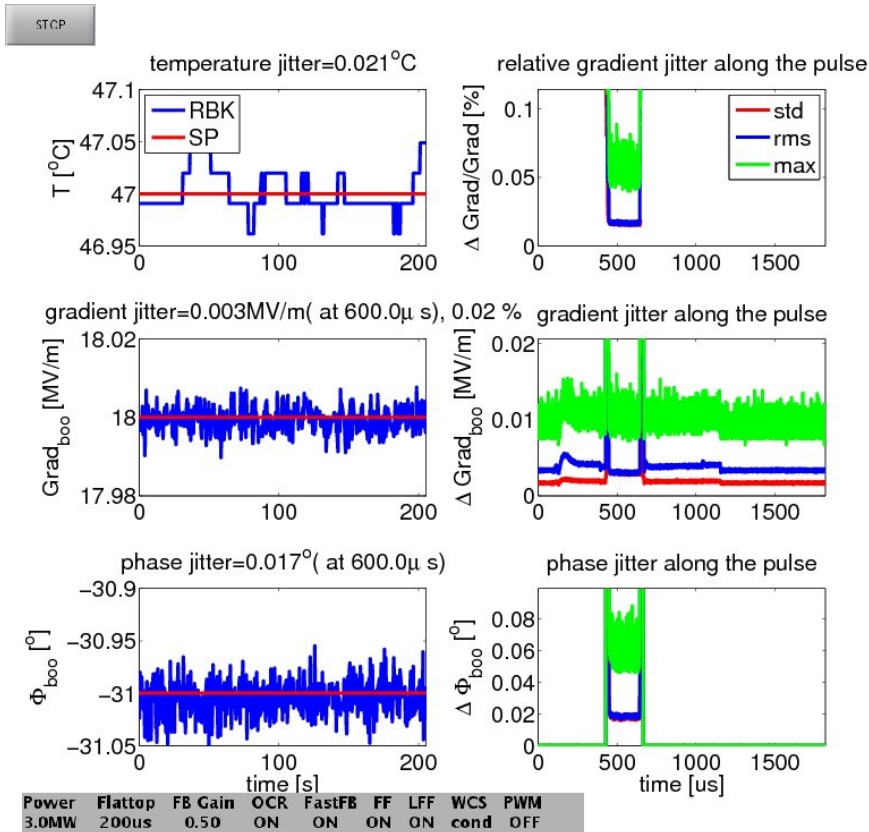
$p_{\text{RMS}} = (19 \pm 3) \text{keV/c}$



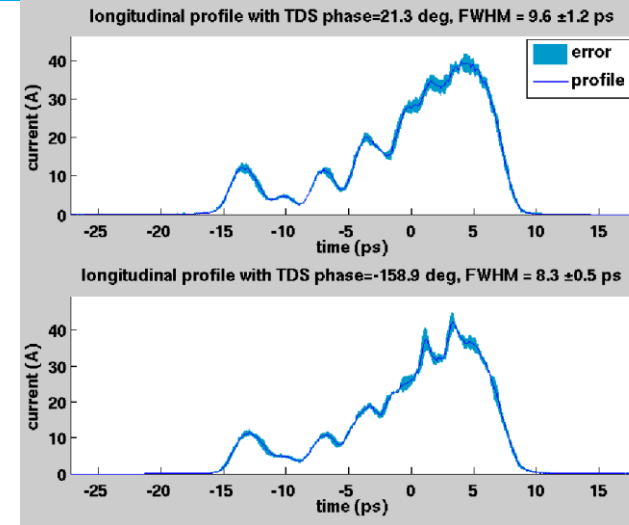
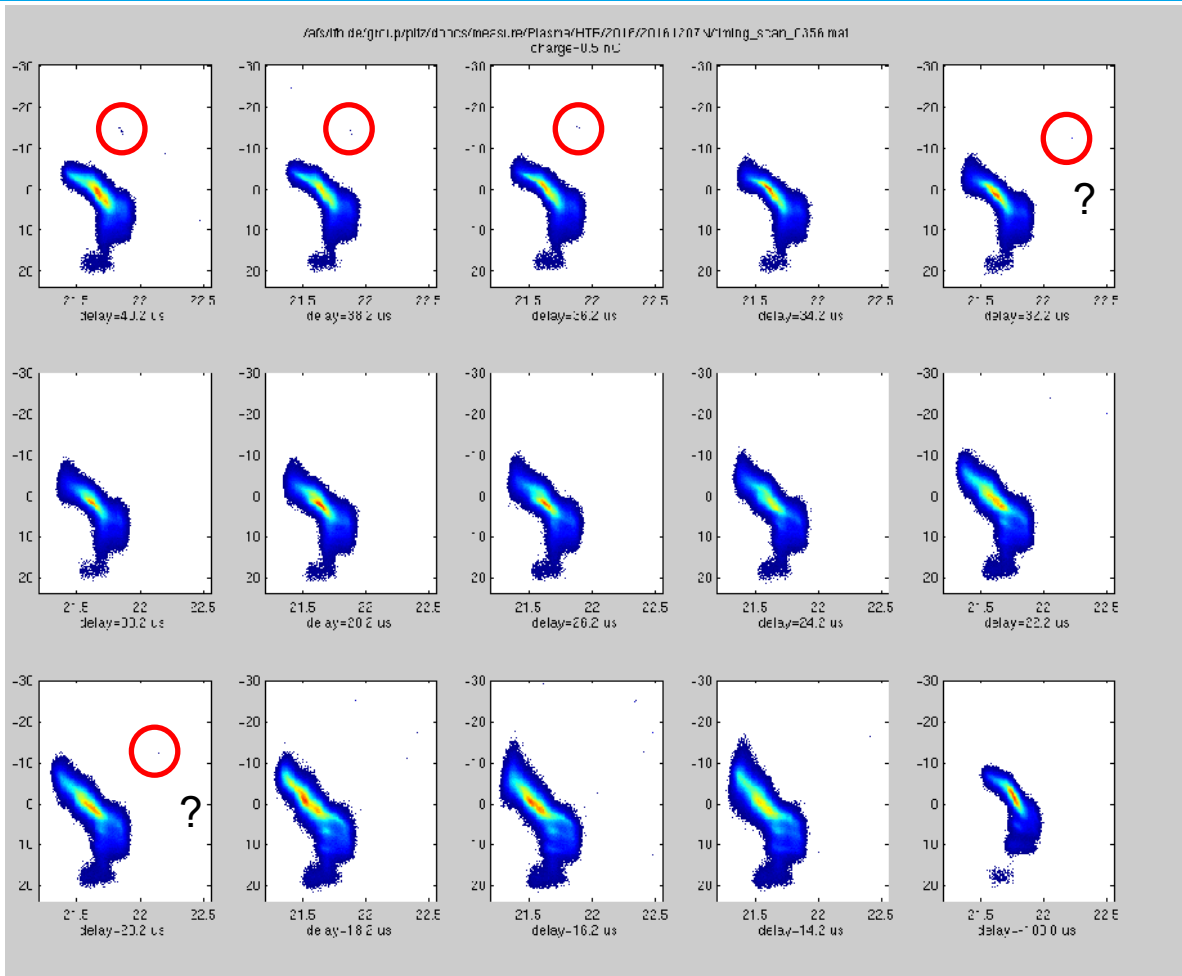
# CDS booster uTCA stability

## > /docs/measure/scripts/SVN/MatlabScripts/uTCA\_Stability/uTCA\_stability\_boo.m

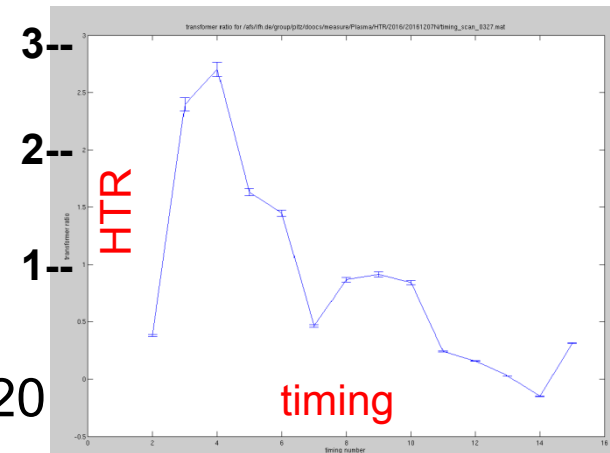
- Quickly check FB gain for booster, not stable from gain>2
- gradient jitter = 0.02% (same as for the gun)
- phase jitter of the booster = 0.017deg (better than for the gun by a factor 5) !!
- for booster WCS in operation does not improve anything



# Gas discharge plasma cell – first results



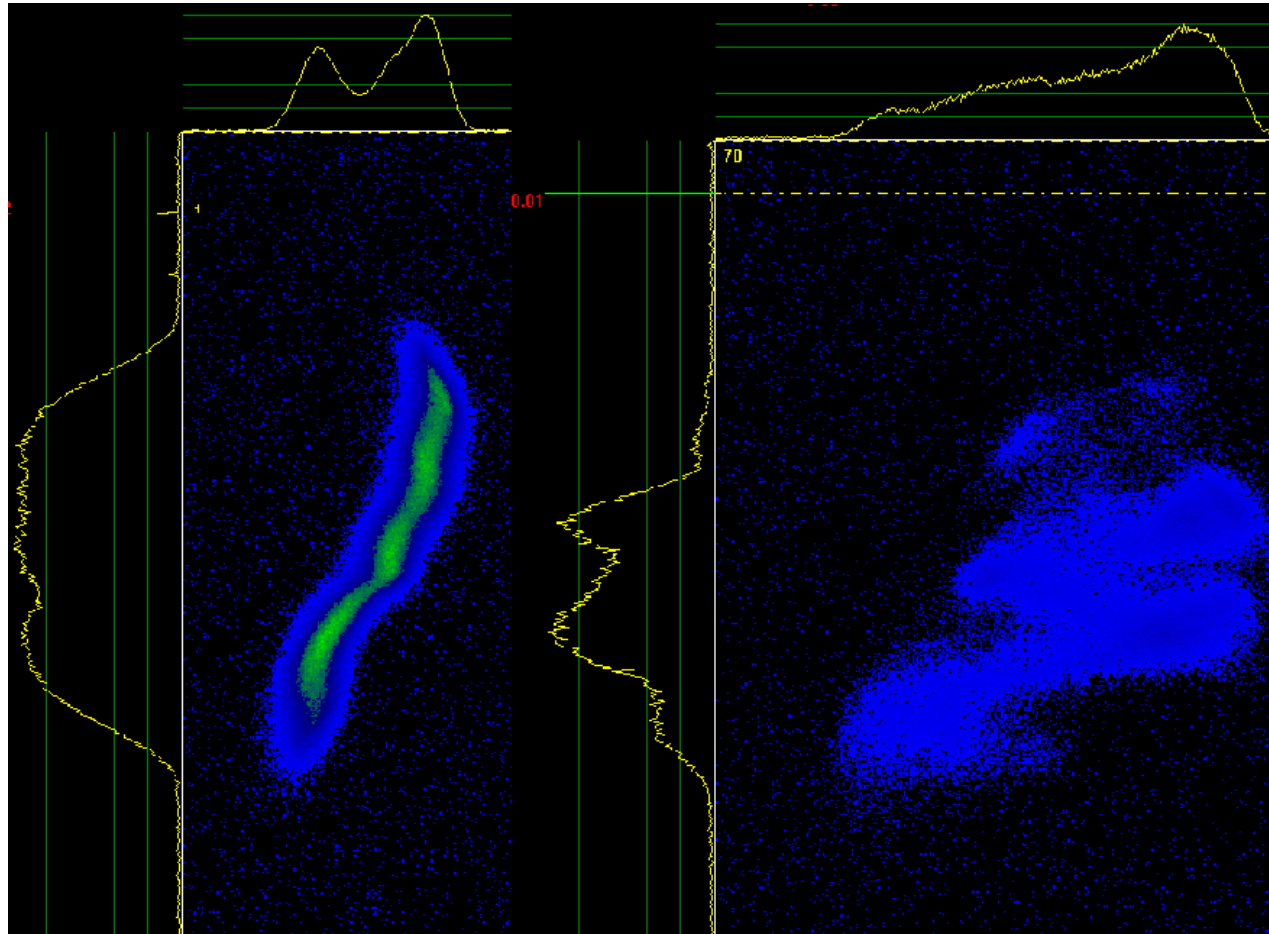
Double triangle shape (20161206N)



- Reproducible HTR of  $\sim 3$  at the trigger delay=1.3820
- Whiteness bunch is displaced both in energy and time, which makes it really hard to find it with LYSO

# Gas discharge plasma cell – first results

$$\lambda = 0.1 \text{ mm} \sqrt{\frac{10^{17} \text{ cm}^{-3}}{n}}$$

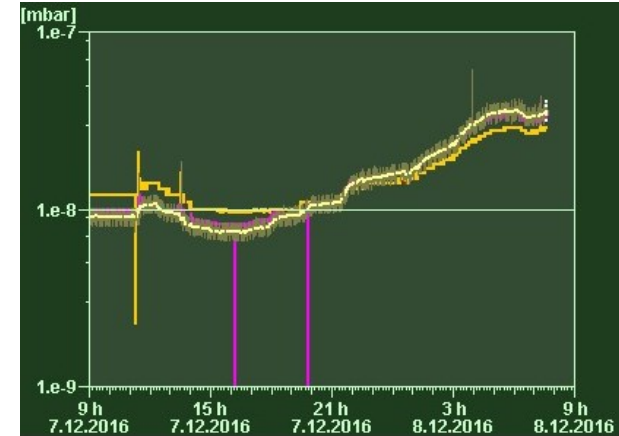
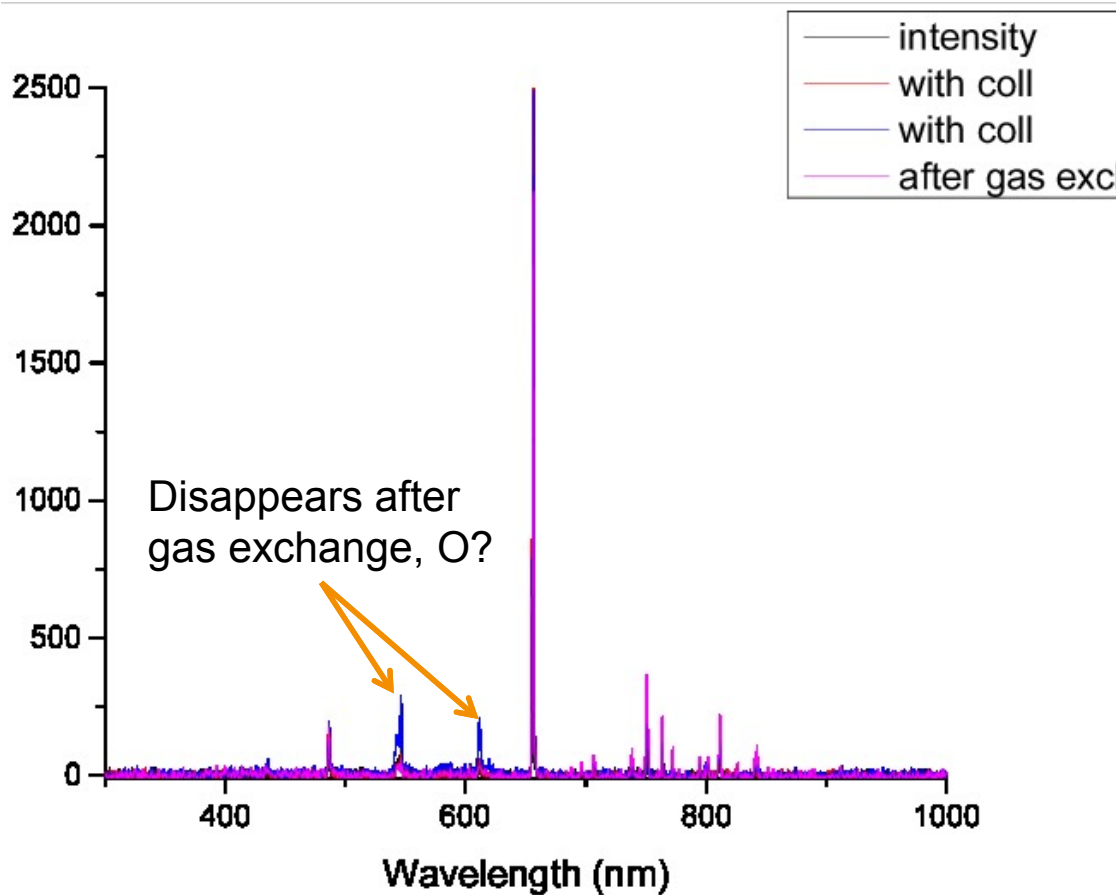


„flattop“,  
BSA=1 mm,  
~200 pC

- Self modulation with ~6 mm long beam, ~3 modulations -  $\rightarrow \lambda \sim 2 \text{ mm} \rightarrow n \sim 2\text{E}14$

# Leaks?

- > Discharge is not really stable because of gas content of the cell



Vacuum around plasma cell overnight

- > Argon is seen on the RGA this morning

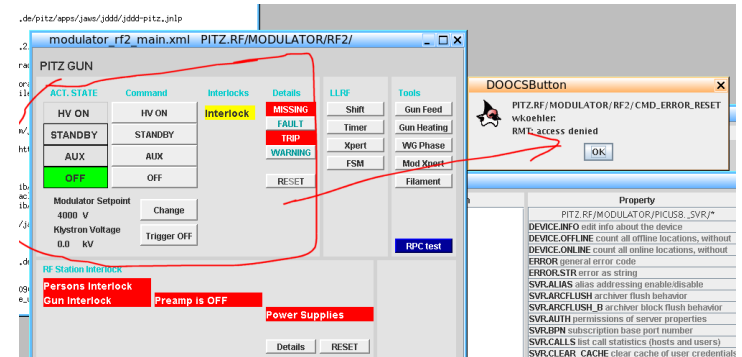
- > Leak tests are ongoing in the tunnel



# Problems

- remote control of RF2 modulator is no longer working for some reason: "access denied" for any command

- Fixed by control experts on 05.12A



- Rotating steerers were unavailable – fixed on 05.12N

- It seems that, steerer SP addresses have not been initialized properly after server restart (?). Problem is fixed by setting (manually) steerer SP addresses as follows:  
PITZ.MAGNETS/STEEROT/LOW.STxxx/STEERER.SP.ADDR -> PITZ.CA/MAGNETS/LOW.STxxx/SETPOINT  
(for ST 1, 3 and 4)

- Plasma cell leaks? → what is next to do = to be decided now!

- ...

# Measurement program week

- Plasma cell methodic (HEDA2 upon quads \_ HIGH2.Scr2) = HEDA2-Quad
- 3D EIIa
- MBI laser -> long Gaussian (Monday, 12.12A)
- Slice energy spread – long Gaussian
- Fast gun recovery tests
- ...

to do:	Measurements							to do:	Measurements						
Week 49	Mon Dec-05	Tue Dec-06	Wed Dec-07	Thu Dec-08	Fri Dec-09	Sat Dec-10	Sun Dec-11	Week 50	Mon Dec-12	Tue Dec-13	Wed Dec-14	Thu Dec-15	Fri Dec-16	Sat Dec-17	Sun Dec-18
Morn. 07:00 to 15:30		Lishilin Good	Lishilin Li	Lishilin Li	Krasilnikov Li	Rublack	Rublack	Morn. 07:00 to 15:30	Rublack	Krasilnikov Rublack	Krasilnikov Rublack	Rublack Chen	Rublack Kalantaryan	Krasilnikov Kalantaryan	Krasilnikov Li
Late 15:00 to 23:30	Krasilnikov Rublack	Huck Chen	Loisch Chen	Loisch Qian	Loisch Lishilin	Loisch Huck	Lishilin	Late 15:00 to 23:30	longGross Chen	Gross Li	Good Melkumyan	Good Melkumyan	Good Li	Gross Chen	Good Kalantaryan
Night 23:00 to 07:30	Renier Melkumyan	Renier Melkumyan	Renier Melkumyan	Renier Melkumyan	Renier Qian	Renier Qian	Renier Qian	Night 23:00 to 07:30	Loisch Kalantaryan	Loisch Kalantaryan	Gross Qian	Gross Qian	Lishilin Melkumyan	Lishilin Qian	Lishilin Chen
Resp. Phys Laser	Good	Good	Good	Rublack	Rublack	Rublack	Rublack	Resp. Phys Laser	Loisch	Loisch	Lishilin	Lishilin	Gross	Gross	Gross
RF	Koehler	Koehler	Koehler	Koehler	Koehler	Koehler	Koehler	RF	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann	Jachmann
Vaku.	Rueger	Rueger	Rueger	Rueger	Rueger	Rueger	Rueger	Vaku.	Philipp	Philipp	Philipp	Philipp	Philipp	Philipp	Philipp
Contr.	Melkumyan	Melkumyan	Melkumyan	Melkumyan	Melkumyan	Melkumyan	Melkumyan	Contr.	Kalantaryan	Kalantaryan	Kalantaryan	Kalantaryan	Kalantaryan	Kalantaryan	Kalantaryan
Electr.	Schultze	Schultze	Schultze	Schultze	Schultze	Schultze	Schultze	Electr.	Pohl	Pohl	Pohl	Pohl	Pohl	Pohl	Pohl
Infrast.	Schulze	Schulze	Schulze	Schulze	Schulze	Schulze	Schulze	Infrast.	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann	Hoffmann
SSB	Krasilnikov	Krasilnikov	Krasilnikov	Rublack	Rublack	Rublack	Rublack	SSB	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Krasilnikov	Gross
Schichtabsich	Kalantaryan	Kalantaryan				Krasilnikov	Good	Schichtabsich		Chen			Gross		Qian
Issued on 06-Dec-2016	A gray field means the status has changed since the last version							Issued on 06-Dec-2016	A gray field means the status has changed since the last version						