

A detailed wireframe model of the CRYRING@ESR particle accelerator. The model shows a large, roughly circular ring structure with a complex internal layout of pipes and components. The ring is composed of many segments, and the overall structure is rendered in a light gray wireframe style. The text is centered within the ring.

# **CRYRING@ESR**

## **Hands-on Einleitung**

### **Operatorschulung**

### **April 2017**

**Zoran Andelkovic**

- **Applikationen starten**
- **Beamlineübersicht**
- **Ionenquelle hochfahren und steuern**
- **Parammodi**
- **Diagnosen**
- **RFQ überprüfen**
- **Injektion in den Ring**
- **Ring einstellen**
- **Ringdiagnose benutzen**
- **Olog schreiben**

# Apps starten

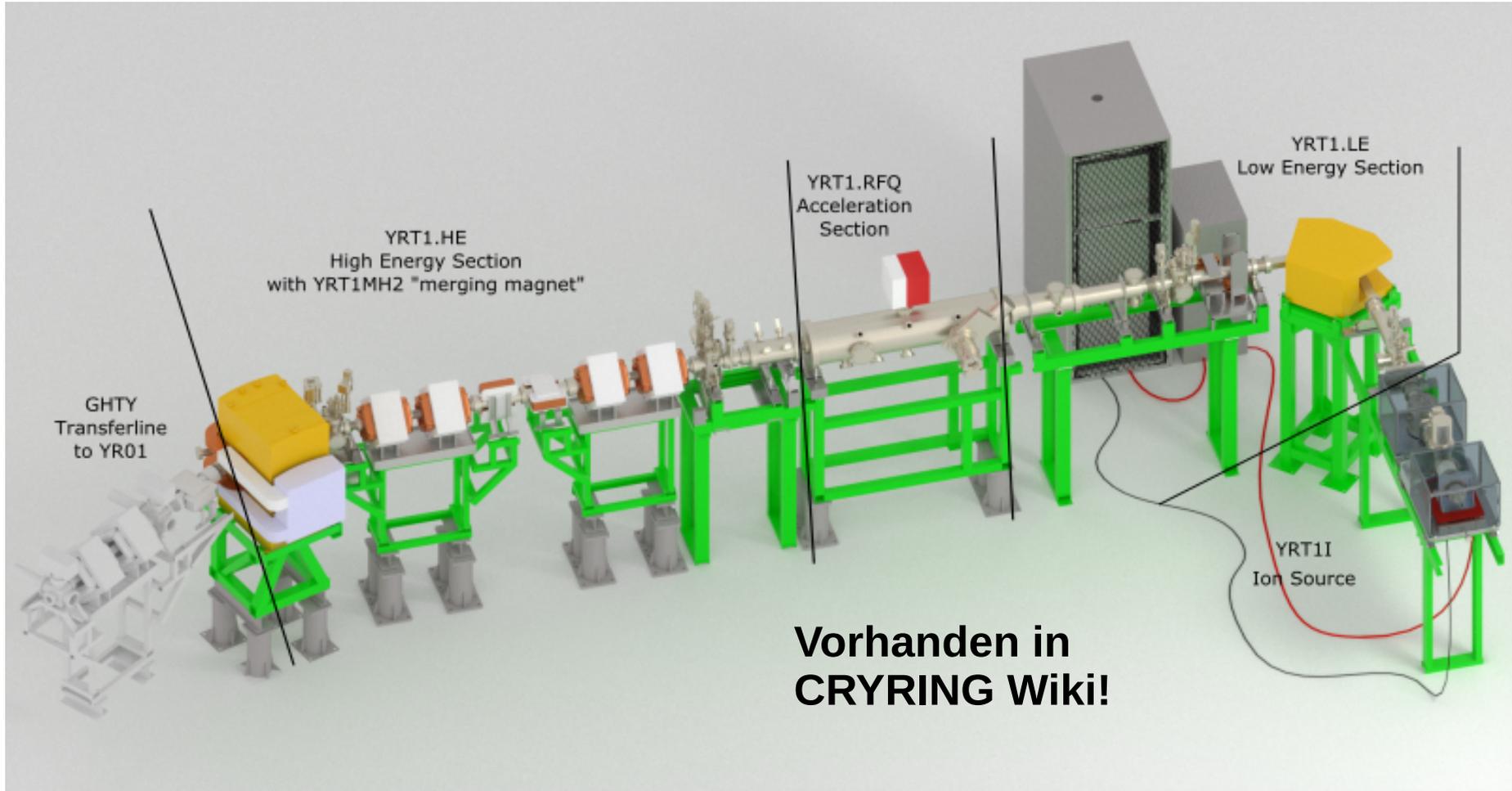
alles fängt an mit dem App Launcher...

Rechtsklick auf Desktop – GSI  
Applications – CSCOAP Launcher

Aktive Apps finden mit dem Mittelklick auf  
Desktop

Aufpassen – es gibt vier Monitore, die  
Fenster können überall auftauchen

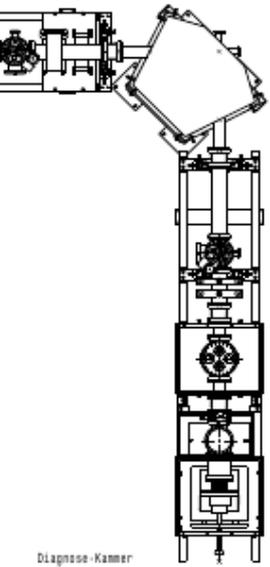




# Beamline

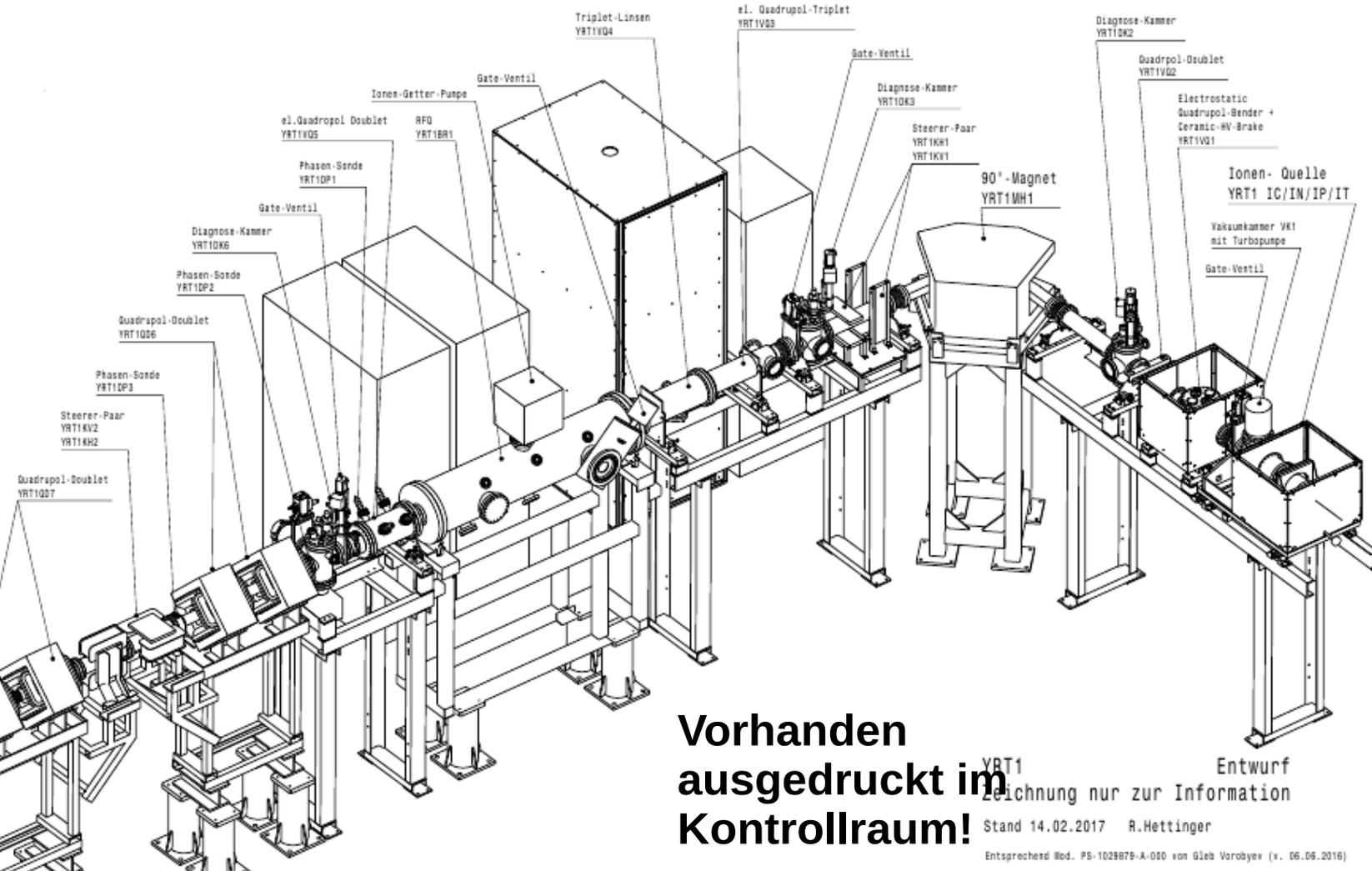
click to zoom out.

irrmung



Diagnose-Kammer YRT10K7

H2  
line



**Vorhanden  
ausgedruckt im  
Kontrollraum!**

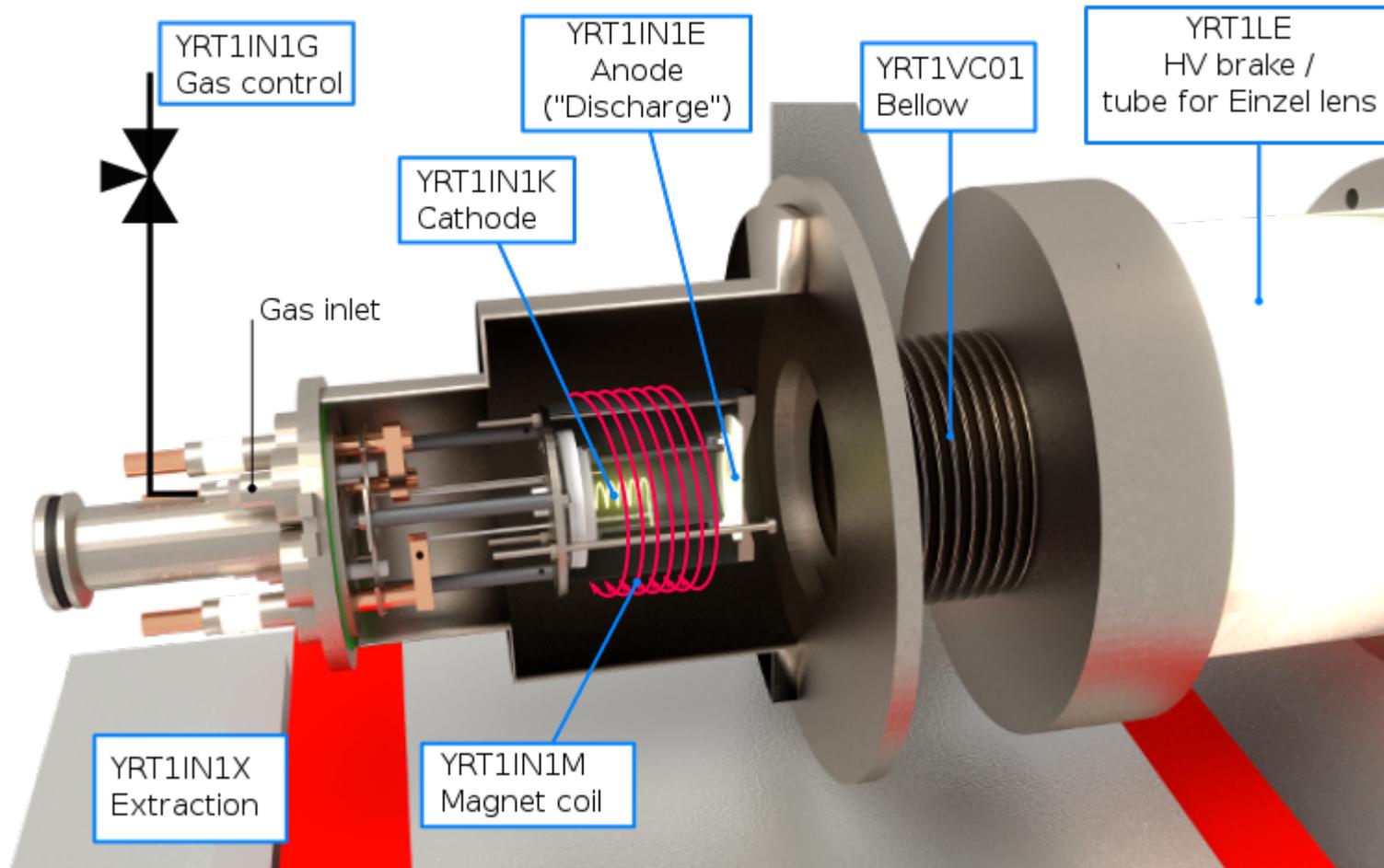
YRT1  
Zeichnung nur zur Information

Entwurf

Stand 14.02.2017 R.Hettinger

Entsprechend Mod. PS-1029879-A-030 von Gleb Vorobyev (v. 06.06.2016)

# Ionenquelle



# Ionenquelle



ionsource Application

CRYRING Deutsch 8. September 2017 08:12 Über

MINIS Menu kleines Inkrement

<b>Cathode (YRT1IN1K)</b> status power on reset 1.707 V 9.024 A	<b>Extraction (YRT1IN1X)</b> status power on reset 19966 V 0.098 mA	<b>Gas Control (YRT1IN1G)</b> status open reset 0.062 sccm
<b>Electro-Magnetic coil (YRT1IN1M)</b> status power on reset 9.25 V 0.194 A	<b>Lens (YRT1E1)</b> status power on reset -13545 V 0.015 mA	
<b>Discharge (YRT1IN1E)</b> status power on reset 91.44 V 0.336 A		

Crying Source Trafo

English 2017-09-08 08:12:09

2017-09-08 08:12:45.728  
FAIR.SELECTOR.C=1:T=200:S=1:P=3  
Module Status  
Connected ADC  
Acquisition Status  
Error Busy Over Under

ROI

1.98E-4

Beam On - Beam Off

1.92E-4

cmwpro00a.acc.gsi.de:5021

WARN [08 Sep 2017 07:56:22,393] (LanguageTranslator.java) - Duplicated key definition: "Interlock"

# Ionenquelle



Ionsource Application

CRYRING Deutsch 13. September 2017 08:50 Über

MINIS Menu kleines Inkrement

<b>Cathode (YRT1IN1K)</b> status: power on 1.870 V 9.026 A	<b>Extraction (YRT1IN1X)</b> status: power on 19948 V 0.203 mA	<b>Gas Control (YRT1IN1G)</b> status: open 0.054 sccm
<b>Electro-Magnetic coil (YRT1IN1M)</b> status: power on 10.36 V 0.214 A	<b>Lens (YRT1LE1)</b> status: power on -12951 V 0.017 mA	
<b>Discharge (YRT1IN1E)</b> status: power on 89.00 V 0.326 A		

```
op@tcl1001:~  
[op@tcl1001 ~]$
```

cmwpro00a.acc.gsi.de:5021

Detailed Status

WARN [12 Sep 2017 20:08:18.102] (CrySourceTrafoController.java) - Disconnected from 'CrySourceTrafo\_DU.sddsc022': no heart-beat from server 'tcp://sddsc022:14651/...' at sun.reflect.NativeConstructorAccessorImpl.newInstance0(Native Method) ~ [2:1 8 0 131]

Crying Source Trafo

English 2017-09-13 08:50:38

2017-09-13 08:51:14.649  
FAIR\_SELECTOR.C=1:T=200:S=1:P=3  
Module Status  
Connected ADC  
Acquisition Status  
Error Busy Over Under

ROI

2.38E-4

Beam On - Beam Off

2.27E-4

Average Data: 4 Display Raw Data

Trend FFT Trend: 10 min Clear

Mean Current / A

Time

ParamModi (SEPARATE BUNCHING)

File Edit Extra Help

CRYRING P

English September 13, 2017 9:07 AM About

ParamModi ParamModi - Resident Trim

Element # Isotope 1 Charge 1 Filter

**RING\_RAMP\_COOLER\_August2017**

Ring RF	Ring bunching	Ring injection	Ring magnets	Ring pre extraction	Ring ramp	Injection beam-line optics	RF
Total	Search		Beam settings				
<b>Ion optics before RFQ</b>							
YRT1LD21 1st doublet 1st lens			-0.35	kV			
YRT1LD22 1st doublet 2nd lens			0.39	kV			
YRT1LT31 1st triplet 1st lens			0.36	kV			
YRT1LT32 1st triplet 2nd lens			-0.51	kV			
YRT1LT33 1st triplet 3rd lens			0.62	kV			
YRT1LT41 2nd triplet 1st lens			-1.4	kV			
YRT1LT42 2nd triplet 2nd lens			1.4	kV			
YRT1LT43 2nd triplet 3rd lens			-1.45	kV			
<b>Ion optics after RFQ</b>							
YRT1LD51 2nd doublet 1st lens			11.0	kV			
YRT1LD52 2nd doublet 2nd lens			-8.5	kV			
YRT1QD61 1st quad. doublet 1st gr...			3.0	1/m			
YRT1QD62 1st quad. doublet 2nd gr...			-2.25	1/m			
YRT1QD71 2nd quad. doublet 1st gr...			1.9	1/m			
YRT1QD72 2nd quad. doublet 2nd g...			-2.5	1/m			
GHTYQD41 quad. doublet 1st gradi...			1.0	1/m			
GHTYQD42 quad. doublet 2nd gradi...			-0.9	1/m			
<b>Corrections before RFQ</b>							
YRT1LD21 horizontal steering			0.0	%			
YRT1LD21 vertical steering			-6.0	%			
YRT1LD21 asymmetry			0.0	%			
YRT1LD22 asymmetry			0.0	%			
YRT1MH1 correction angle to 90 deg			28.0	mrاد			
YRT1KH1 1st hor. steerer angle			0.0	mrاد			
YRT1KV1 1st ver. steerer angle			8.0	mrاد			
YRT1LT31 asymmetry			0.0	%			
YRT1LT32 asymmetry			0.0	%			
YRT1LT33 asymmetry			0.0	%			
YRT1LT41 asymmetry			0.0	%			
YRT1LT42 asymmetry			0.0	%			
YRT1LT43 asymmetry			0.0	%			
<b>Corrections after RFQ</b>							
YRT1LD51 asymmetry			0.0	%			
YRT1LD52 asymmetry			0.0	%			
YRT1KH2 2nd hor. steerer angle			-3.8	mrاد			
YRT1KV2 2nd ver. steerer angle			1.5	mrاد			
YRT1MH2 correction angle to 35 deg			-24.1	mrاد			
GHTYKV3 ver. steerer angle			-3.0	mrاد			

Send to hardware Discard Changes

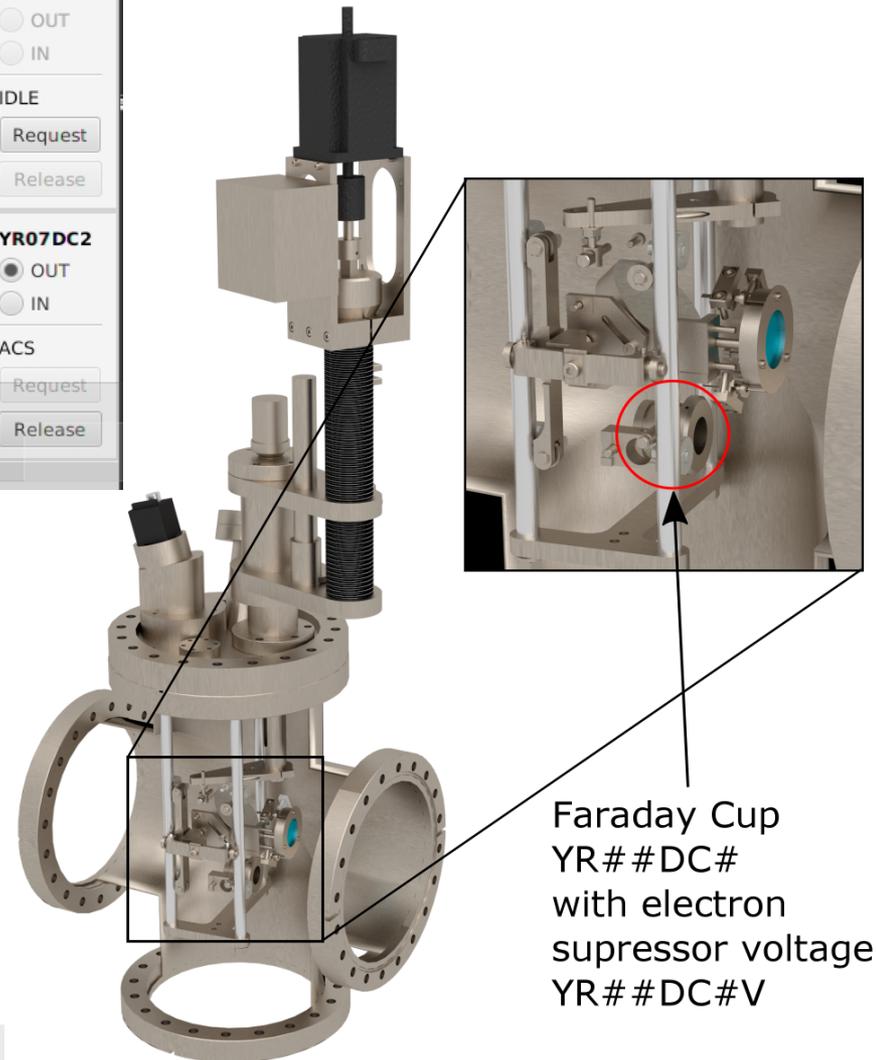
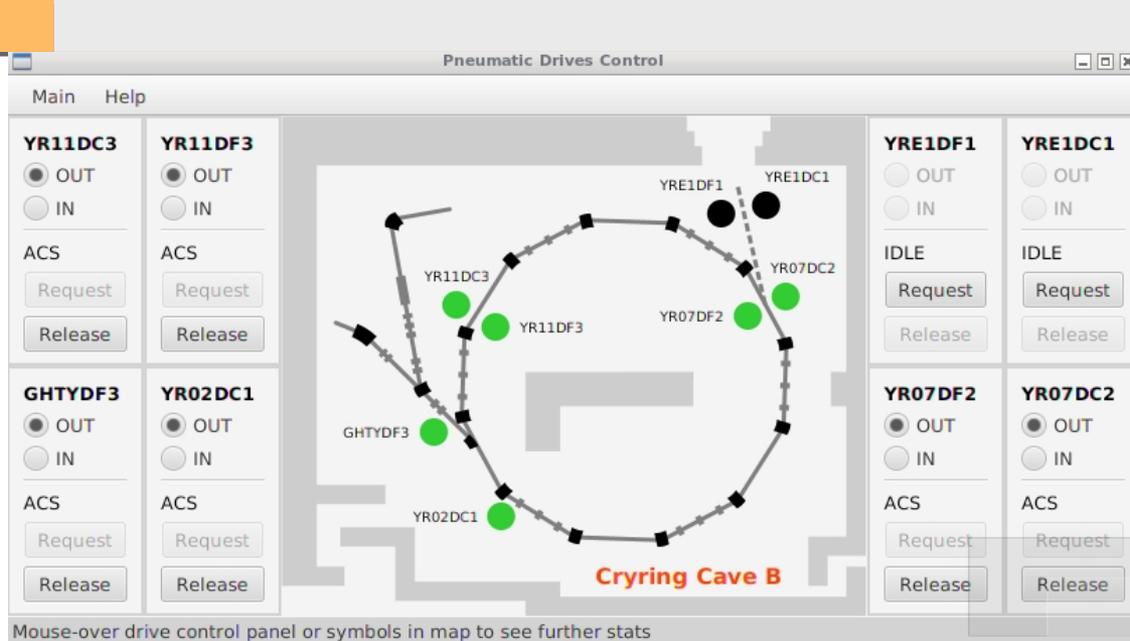
Console Running tasks

```

13.09.2017 08:46:39 4 parameter(s) were updated, 12 parameter(s) were sent to hardware
13.09.2017 08:49:07 Save successful
13.09.2017 08:49:07 4 parameter(s) were updated, 12 parameter(s) were sent to hardware
13.09.2017 08:51:02 Lines exported: 179 (2017-09-13_06-50-56_RING_RAMP_COOLER_August2017.txt)
    
```

06:51:02 - Lines exported: 179 (2017-09-13\_06-50-56\_RING\_RAMP\_COOLER\_August2017.txt)

# Diagnose fahren



# Diagnose fahren

DeviceControl

CRYRING

Deutsch 13. September 2017 10:23 Über

Kontext: **RING\_RAMP\_COOLER\_August2017.C1.YRT1LC1\_TO\_YRT1MH2.TRANSFER\_INJECTION.1**

Ausgewählte Beschleunigerzone(n): YRT1LC1\_TO\_YRT1BR1, YRT1BR1\_TO\_YRT1MH2  $^1\text{H}^{+1}$  0.01MeV/u

Gerätetabelle

Anwahlmodus	Gerätetyp	Y 1 2	R 3	Y 0 3	R 1 6	Y T 7
---	---					
Fahren	Faradaytasse	☑	☑		☑	☑
---	---					
Fahren	Schrittmotor	☑	☑	☑	☑	☑
---	---					
Fahren	Leuchttarget			☑		
---	---					
---	---					

Geräteüberwachung

Vergleich: Soll(Gerät)/Ist

Abweichungen: **Aktuell liegen Abweichungen vor**

YRT1DC6

YRT1DF6  
Min=-2.7mm  
Aktuelle Position: 84.7mm

Status **Motor in äußerer Endlage**

Fahren Schließen

prozentuale Abweichung: 0.1

Referenz:

den richtigen Kontext auswählen!

CryCup
English
August 29, 2017 8:38 AM

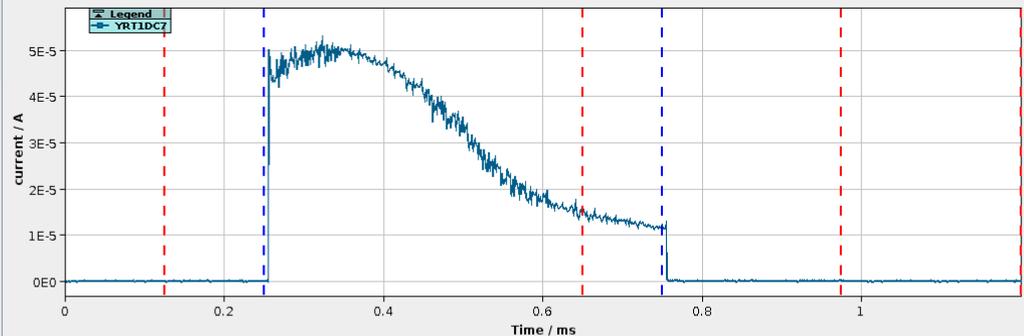
Device: YRT1DC7

Beam Selector: 3  filtered

Operation: Integration Expert

Amplifier Gain:  $10^4$

Display:  Average Data  Display Raw Data Mode: Autoscale Current Ranges: 10mA



Trend: 10min Clear



Baseline: slope =  $1.201e-08$  intercept = 2.246

2017-08-29 08:39:28.634  
FAIR\_SELECTOR.C=1:T=202:S=1:P=3

Hardware Status

Connected	ADC	I/O
Switch	Power	FCBox

Acquisition Status

Error	Busy	Over	Under
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[Range of Interest]

Mean Current:  $3.55E-5$  A

Max. Current:  $5.65E-5$  A

[Beam On - Beam Off]

Mean Current:  $3.09E-5$  A

Max. Current:  $5.65E-5$  A

Status: Status  OK Power State  On Op Ready  YES Modules Ready  YES Interlock  NO Control  Remote

Detailed Status		Module Status		Error Messages	
Label	Status	Label	Status	Timestamp	Code
Fileout	false	ADC	OK		
AdcOk	OK	IO	OK		
IoOk	OK	Controller	OK		
SwitchOk	OK				
PowerOk	OK				
FCConnectOk	OK				

Cupid - YRT1DF7V

YRS: YRT1DA10 | YRT1DF2V | YRT1DF3V | YRT1DF6V | **YRT1DF7V** | YR01DF3V | YR07DF2V | YR11DF3V

### YRT1DF7V

Camera: Stop, Stop All, Reset

Acquisition:  Acquire image, Freeze

Basic | Expert | I/O

Camera Label/Iris: closed, open, Set

LED: **switch on**

Load Standard Set.

Standard Mode

Status: Camera: Active OK

Init Timeout CPS Conn  
CPS Timeout CPS Cmd

Lens Control: --- Iris Position: --- Disk output remaining: 0

References: Store Show Hide

Profile: Mode:  normalized  averaged Scale:  automatic

Display: Mode: Rainbow Brightness: Zoom: 1x 2x 4x Fit 1x 2x 3x  Show Grid  Show Marker Center

Info: Cyclename: FAIR\_SELECTOR.ALL Acq Time: 2017-08-23 11:27:37.677 Integral: 1841242 Profile Max. Pos. X: -3.3 mm Center X: -2.6 mm FWHM X: 4.6 mm Profile Max. Pos. Y: 0.0 mm Center Y: 0.1 mm FWHM Y: 1.4 mm

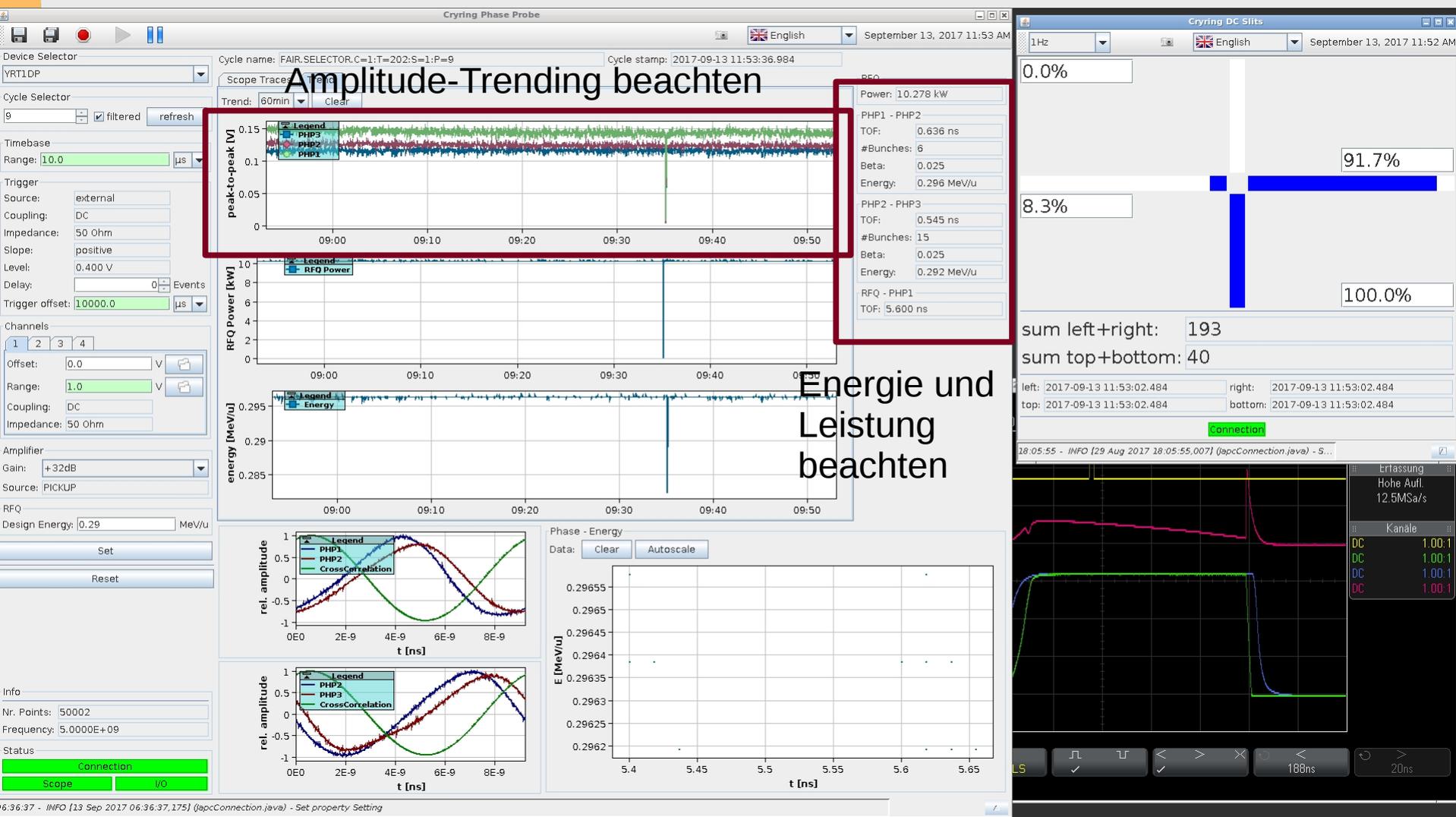
Histogram: Counts vs Brightness

Average Intensity vs X Position / mm

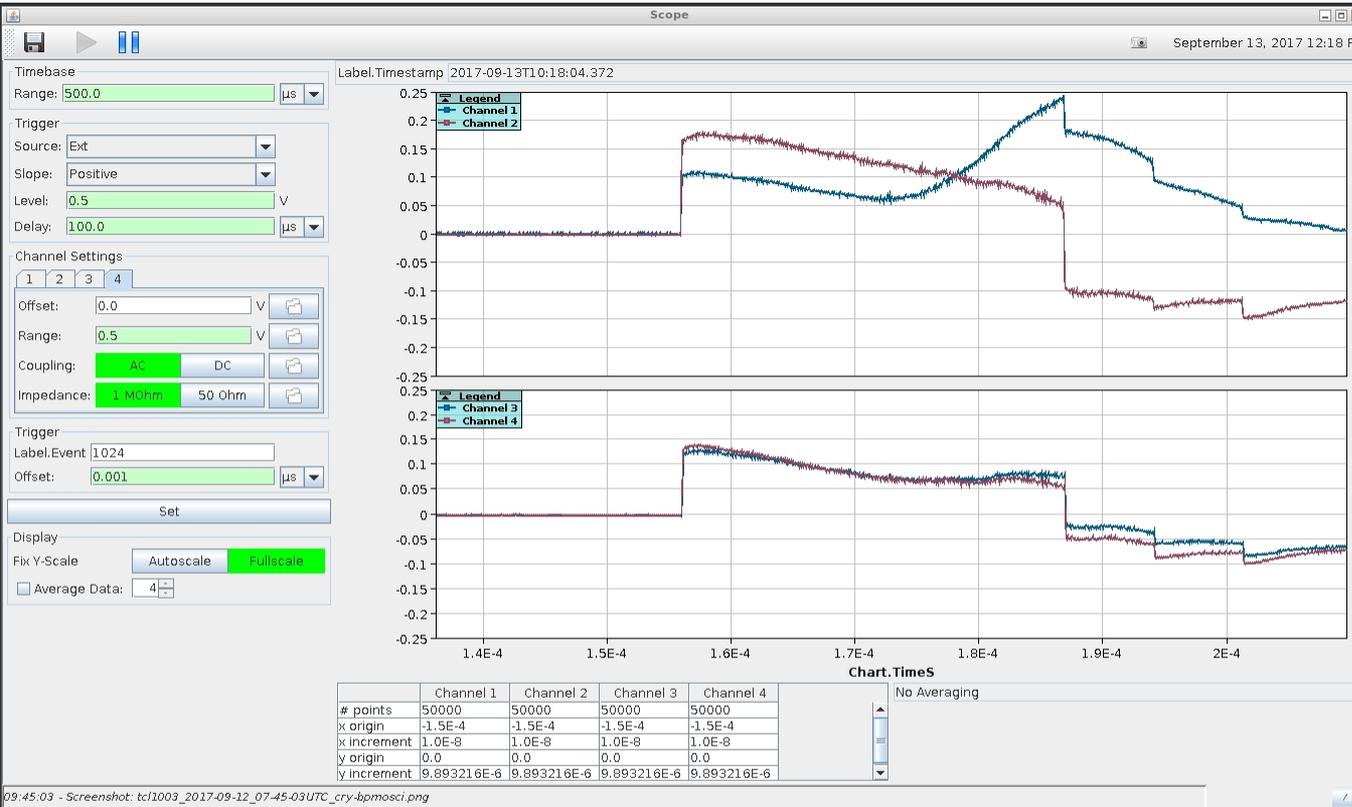
Average Intensity vs Y Position / mm

Marker: x = 0.0 mm ( 0 px) y = 0.0 mm ( 0 px) value = 121

11:25:34 - INFO [23 Aug 2017 09:25:34,650] (japConnection.java) - Set property Power



# Injektion in den Ring



Crying BPM Preselect Application

File Mode 2017-09-13 12:18:05

BPM Signal Preselection SDAOSZI012

Horizontal (L, R) / Vertical (B, T)

- YR02DX1H / YR02DX2V
- YR03DX1H / YR03DX2V
- YR03DX4H / YR03DX3V / YR03DX3V
- YR06DX1H / YR06DX2V
- YR07DX1H / YR07DX2V
- YR08DX1H / YR08DX2V
- YR10DX1H / YR10DX2V
- YR11DX1H / YR11DX2V
- YR12DX1H / YR12DX2V
- YR09DX1H / YR09DX1V

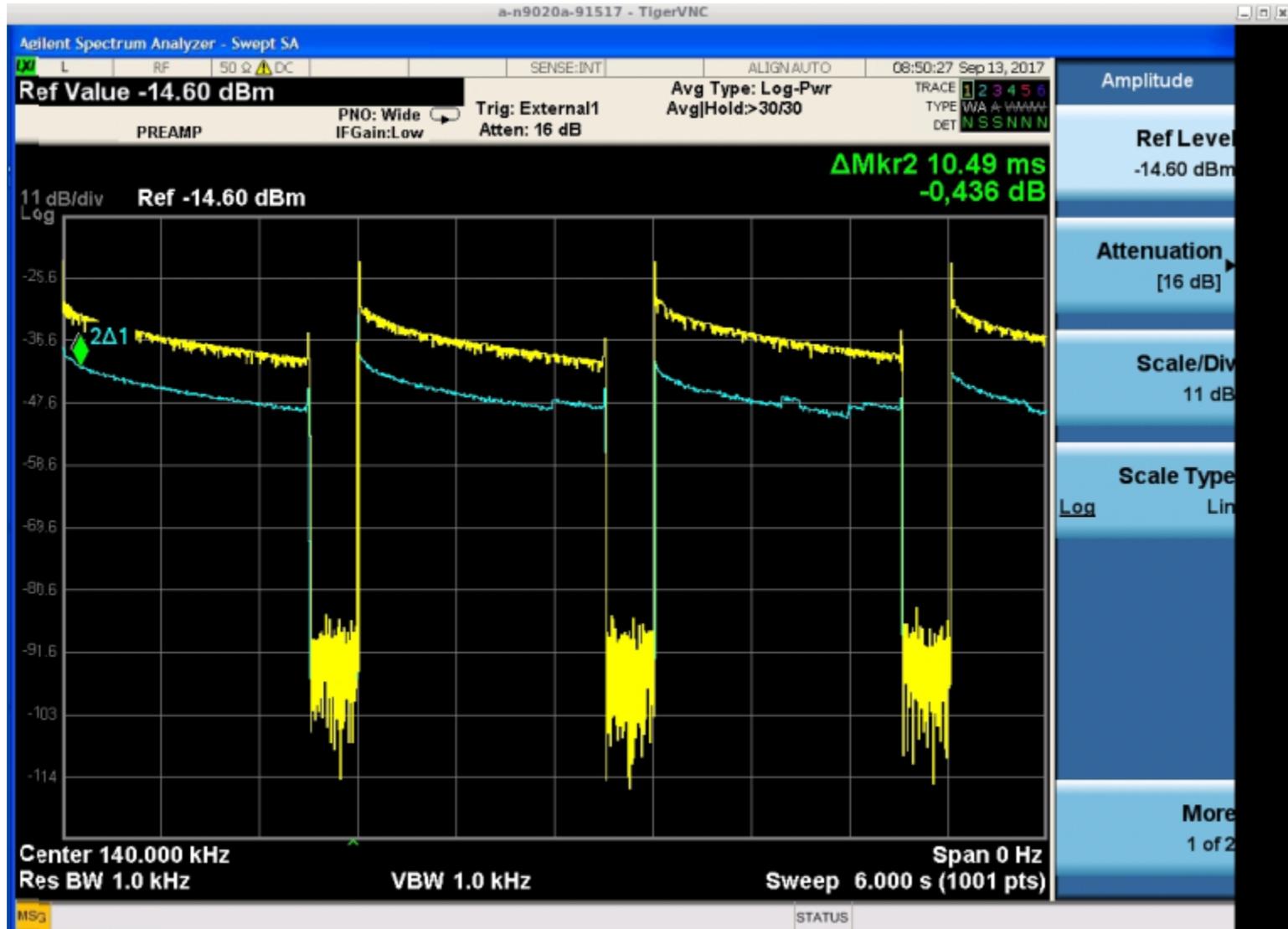
Connection: OK Modules: OK **Exit**

13:36:49 - INFO [12 Sep 2017 13:36:49.041] (apcc...

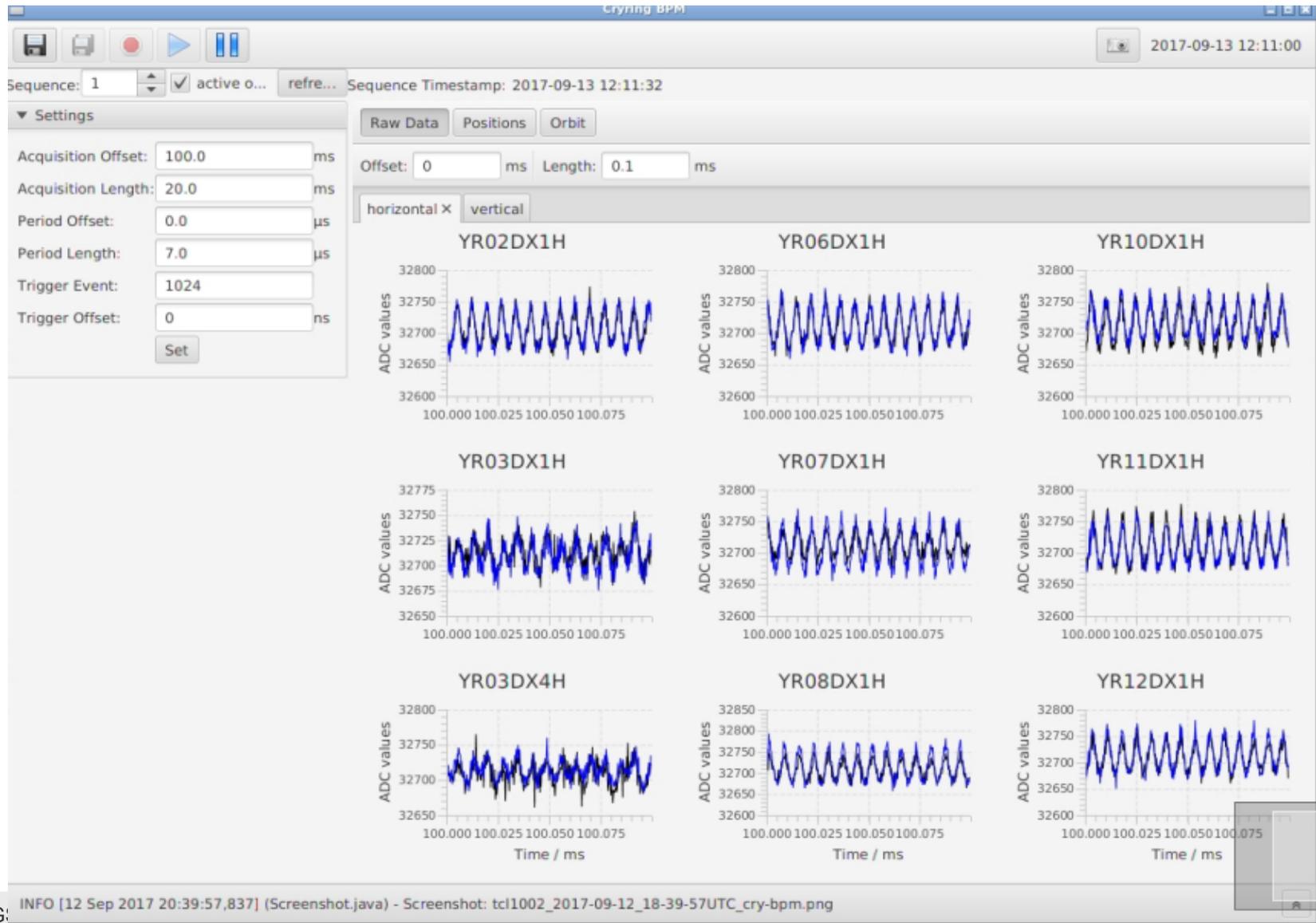
## Wichtige Parameter:

- Chopper Timing Delay soll auf dem Trafo-Maximalwert sitzen
- YRT1MH1 Dipole optimieren wenn die Quelle sich verschiebt
- RFQ Trending überprüfen und ggf. Beamline nachjustieren
- eventuell ein paar Steerer/Quads anfassen
- $Q_h/Q_v$  horizontal/vertical Tune (sowohl Injektion als auch Ramp)
- Ring magnets – Main Dipole Wert überprüfen
- Zero-Span Schottky und BPMs schauen

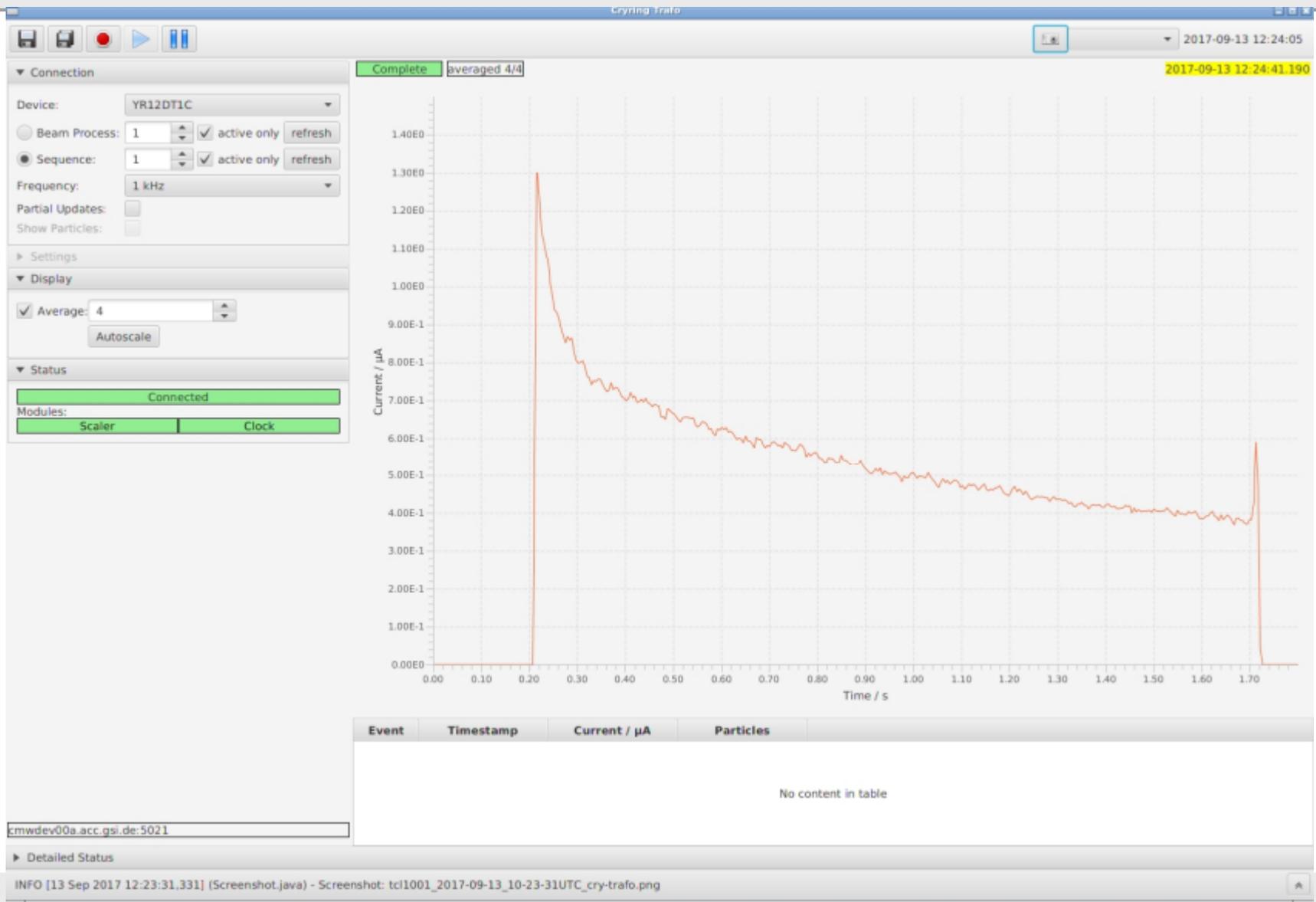
# Zero-Span Schottky



# BPMs



# Ring Trafo



# Olog schreiben

OLOG - Mozilla Firefox

https://olog.acc.gsi.de/olog/shiftoverview/shiftoverview

Schichtdaten

Schichtpersonal 4

Operateur  
Zoran Andelkovic  
Log CRYRING  
Frank Herfurth  
Gleb Vorobjev

Rufbereitschaftseinsatz

Globale Einstelldaten

Ionenquellen 1

CRYRING MINIS 2 H 1+  
13:39 2017-07-12

Hilfsgas = ...

Experimente 1

YR00 (C000)  
06:00 17-08-29 /  
CRYRING MINIS 2 H 1+

Schicht Übergreifend

Kein Filter aktiv

DE EN Di 2017-09-12 24h-Schicht

170912\_192125\_20170912\_191036.jpg

Screenshot  
170912\_192106\_20170912\_191259.jpg

Experiment -YR00 (C000/2H) 19:19-19:23 |  
Beschleunigerabschnitt -CRYRING 19:19-19:23 |

Di., 18:54 Di., 18:58 Info 61650  
2017-09-12 2017-09-12 Optimization of the injection

We found a setting which brings higher injection efficiency and good lifetime. In this setting the beam is also more centered. Screen shots from Schottky zero span and BPM orbit are attached.  
The major change was the frequency set to 139.500 Hz, amplitude is no changed (137 V).  
RFQ phase probe measured energy 295 keV.

Screenshot  
170912\_190043\_20170912\_185334.jpg

170912\_190116\_wi1002\_20170912\_165407utc\_srvbpm.png

Experiment -YR00 (C000/2H) 18:54-18:58 |

Di., 18:09 Di., 18:13 Info 61640  
2017-09-12 2017-09-12 Tune Setup

A Better setup for the injection line plus tune in the Ring was tried out.  
A systematic scan of the horizontal and vertical tune was performed giving better survival of the stored beam.

Screenshot  
170912\_181532\_20170912\_181145.jpg

ParamModi

YR00(C000)

