# Video-system and Laser BBA

### **Short Intro**



29.01.2015







# Video system





### Video system: The Sattinger's law of electronics: Switch on the camera!









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# Video system: USC Client: Managing the cameras



#### OR

#### http://www-zeuthen.desy.de/pitz/apps/



#### The camera must be connected before you can manage it!

Universal Slow Control File View Help	l Client			
Connection Group:	Device:   þisp1.Scr1 (Bin2x2)	Description:	10	Mode Expert
Name		Description	Readback Val	ue
FGain	generic vid	eo gain	0.0	
FShutter	generic exp	oosure time	100.0	
			in µ5	
			_	
-Edit "EGain" value		unavaila	ble 🔄 unwritable	a generic
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0			25	Apply





### Laser **BBA**





The radial component of the RF field on the axis of symmetry is always identically equal to zero.

-> If an electron sees only the RF field and if it moves along the axis, the trajectory is independent on the RF field phase.

-> For not-aligned beam however the beam trajectory (and therefore the beam position on a screen) will show a dependence on the RF field phase.







# Laser BBA: Fundamental measurement conditions

- If an electron sees only the RF field ...
  - -> All magnets, most importantly both Solenoids must be switched off!!!
  - -> Fundamental limitation: the Earth magnetic field can not be switched off. 😔

- But if the solenoids are switched off, an (on-crest) e-bunch would not be focused and we could not observe it on a screen!

### -> The BBA must be done using off-crest e-beams (ca. -40deg).





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### - All magnets off

- Gun power: 1.0 1.5MW peak (low dark current)
- Gun phase: -50deg to -30deg w.r.t max. mean momentum gain phase (on-crest phase) - Scan range usually ~10deg (smaller for a Gaussian laser profile)
- Laser profile: Flat top, if available. Use long trains (~100 pulses) for signal enhancement.
  -> Check the camera timing! (not to short to see all pulses, not to long to suppress e.g. the dark current effects.))
- Bunch charge: ~10pc (for nominal flat-top laser profile; depends on the transverse size as well)
- Observation screen: Low.Scr1 (the closest one to the gun)





### Laser BBA: Measurement goal & procedure

Move the laser spot on the cathode and find such position, for which the beam spot <u>centroid does not move</u> on the observation screen, <u>as the phase changes</u>.





# Mirror56





# Mirror56: A tool to move the laser on the cathode

### Laser trolley setup



"Mirror56" is capable to move the laser spot on the cathode while keeping fixed the position where the laser hits the in-vacuum mirror.





# Mirror56: A tool to move the laser on the cathode

📣 Mirror56			<u>_   ×</u>
OteTool: "I	Mirror56	"	
- Cathode			
X position	1.200	mm	
Y position .	0.630	mm	4
Vacuum Mirror			Set 0
X position	0.000	mm	
Y position	0.000	mm	New 0
<u> </u>			5
_M56		7	
M5 X right 275894	-Xo = 27	5894	
M5 Y up146012	- Yo = -14	6012	3
M6			GO
M6 X right 358317	- Xo = 358	8317	
M6 Y up 191331	-Yo = 19	1331	
M5 Y up146012 M6 M6 X right 358317 M6 Y up 191331	-Yo = -14 -Xo = 356 -Yo = 19	6012 8317 1331	3 G0

**1:** Define the desired relative *x*-*y* movements of the laser spot on the **cathode** 

**2:** Define the desired relative *x*-*y* movements of the laser spot on the **vacuum mirror** 

3: Press the "GO" button to move the mirrors – and wait

The home position (means that all the values in 1 and 2 are set to 0) is defined as the position at the moment of starting the application.





# Mirror56: A tool to move the laser on the cathode

To run Mirrror56 please start MATLAB under LINUX, then change the directory as follows:

-> /doocs/measure/ Cathodes/\_MatlabScripts and type "mirror56"

Or

#### -> /doocs/measure/scripts and type "otetool mirror56"

- User's guide in the logbook: doc / Procedures / scripts





# The End...



