REMARKS ON 3 YEARS SSPA OPERATION AT THE SUPERCONDUCTING LINAC ELBE

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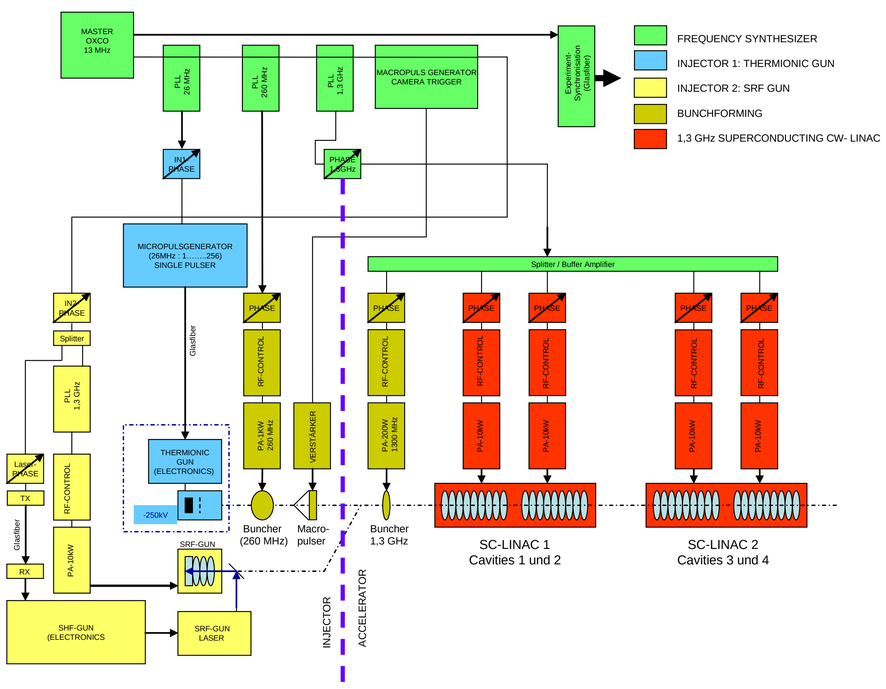
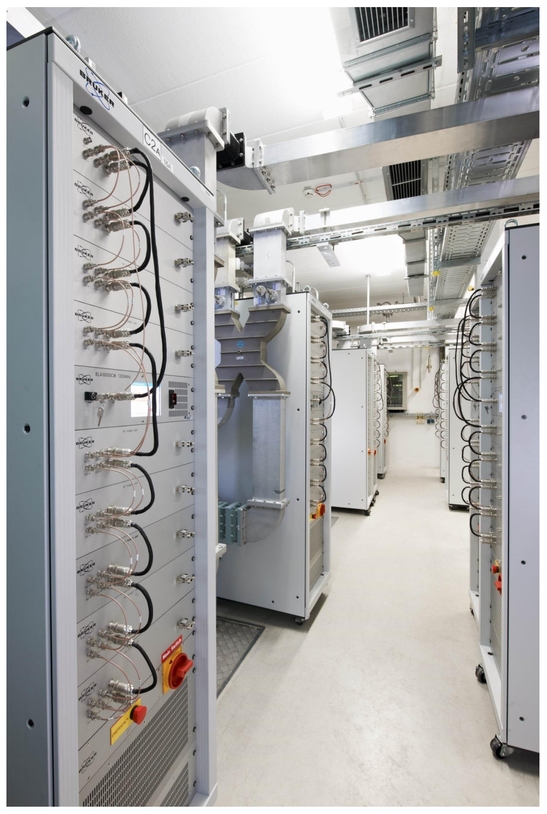
Introduction

- Since February 2012 the RF system of the superconducting CW- linac ELBE is in operation with eight 10 kW solid state power amplifiers.
- Except minor breakdown the SSPA system is nearly maintenance free and reliable.
- The poster presents also two accessories which might be of interest to others.

RF System and Experience



THE ELBE RF-SYSTEM



SSPA GALLERY

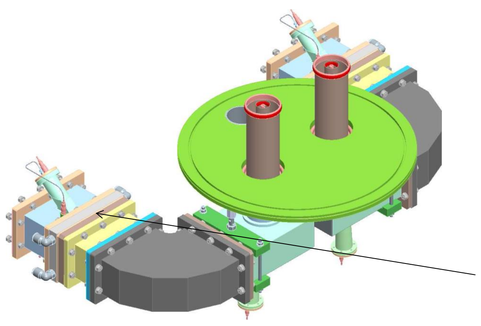
FAILURES:

(8 SSPA in use, with 576 LDMOS)

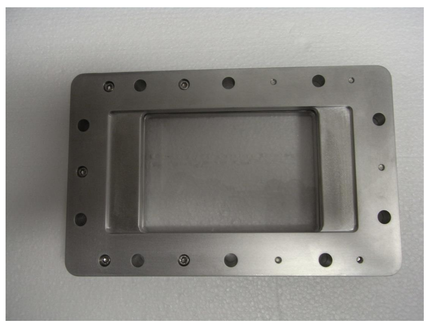
- 5 LDMOS lost (only in the first year),
  -no impact on beam time at ELBE
- 2 power supply failures in the first year
  -spare part used, 4 hours repair
- Power supply line breaker 3 x 63A triggered,
  -Substitution by 3 x 63A (P) time-lag fuses,
  -LED indicators added at the power supplies
- Intl. water flow sensors failed (removed)
- Several CanBus interlocks due to slack joints,
- RF-overdrive (Interlock) due to spikes by a GaS switch in LLRF controller:
  -Limiters added at all SSPA inputs

Summary: smooth, stable, reliable

New quartz waveguide windows



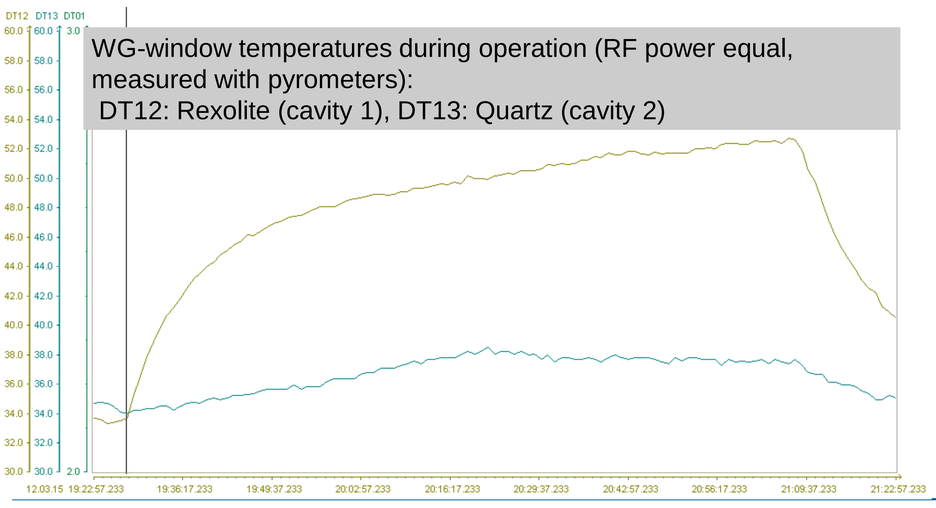
RF-PORT (2cavities)



WR650-WG-window (Quartz)
MEGA 0G9Y7-78995-702

	REXOLITE WG-window	QUARTZ WG-window
Vacuum at the window	1 x 10-6 mBar	5 x10-7 mBar
Dielectric constant	2,53	4,34
tan d	3,3 x 10-4 @3 GHz	6 x 10-5@3GHz
Thermal conductivity	0,04 W/(K m)	11,7 W/(K m)

QUARTZ:
Better thermal stability, better vacuum performance, no RF-burning

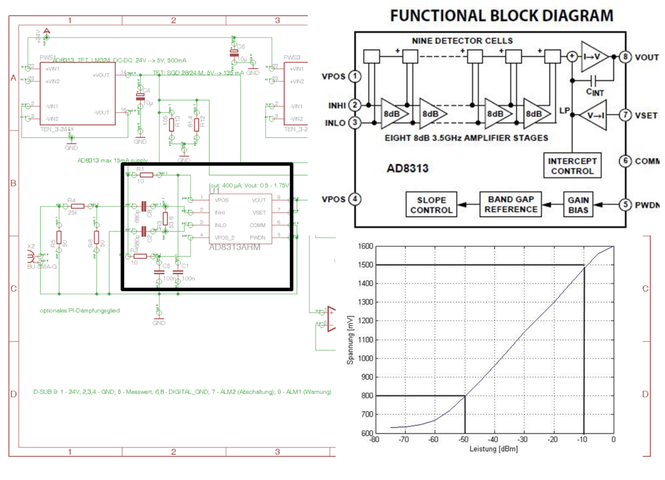


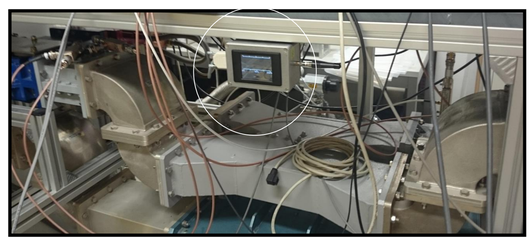
WG-window temperatures during operation (RF power equal, measured with pyrometers):
DT12: Rexolite (cavity 1), DT13: Quartz (cavity 2)

New RF EMC Sensors (home made)

In the framework of a student trainee RF-sniffers have been developed, built calibrated and implemented into the ELBE control system to fit the EMC regulations.

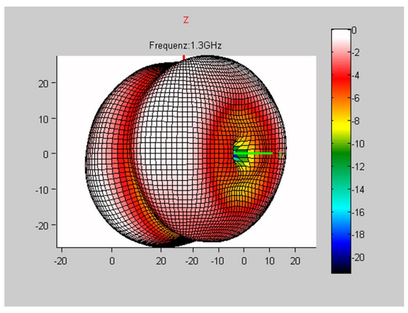
EMC Sniffer at SSPA Gallery



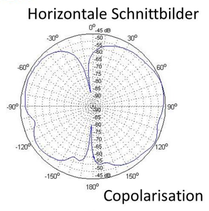


EMC Sniffer at the Resonant Ring

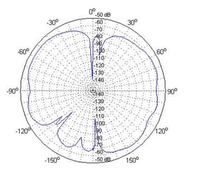
Antenne – Messlabor der TU Dresden

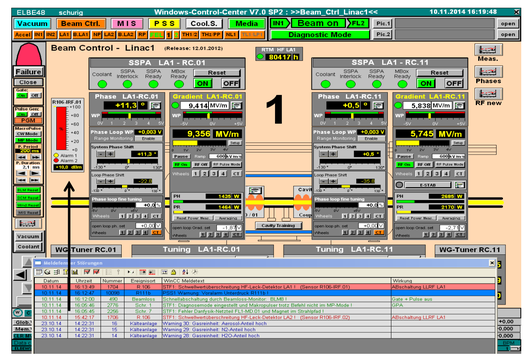


Horizontale Schnittbilder



Copolarisation





WinCC RF-Control Terminal

References:

H.Büttig et.al. Proc.CWRF Workshop 2012, Port Jefferson, NY, http://www.bnl.gov/cwrf2012/
R.Schurig and T.Gottfried: RF-leveldetector, EMC interlock at ELBE, Internal report HZDR,FWKE (2015).

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