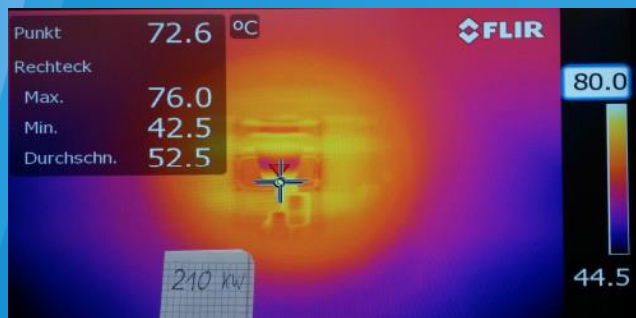


News from BESSY II, MLS and bERLinPro

Bernhard Schriefer,

Helmholtz-Zentrum Berlin for materials and energy (HZB)

21th ESLS-RF Meeting 15.-16.11.2017 at Solaris



- **BESSY II + MLS**
 - **Problems with Vacuum at Cavities caused by Couplers and Bellow**
 - **Problems with Vacuum at Cavity 2**
- **bERLinPro**
 - **Issues with 290 kW Klystrons**
 - **High Power on the Waterloads**
 - **Status**
 - **Pictures Installation**

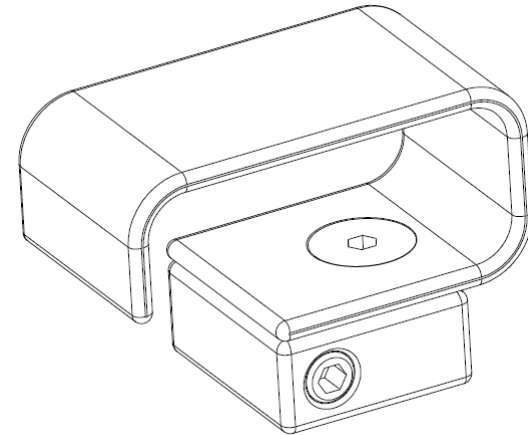
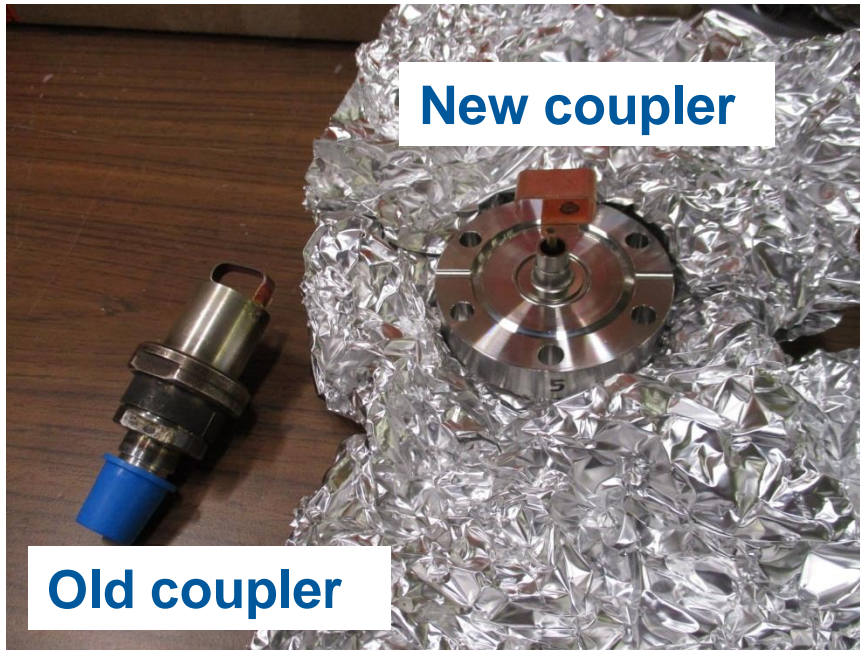
Vacuum problems → three of four field probes leaky

- Temporary workaround: Differential pumping



Vacuum problems

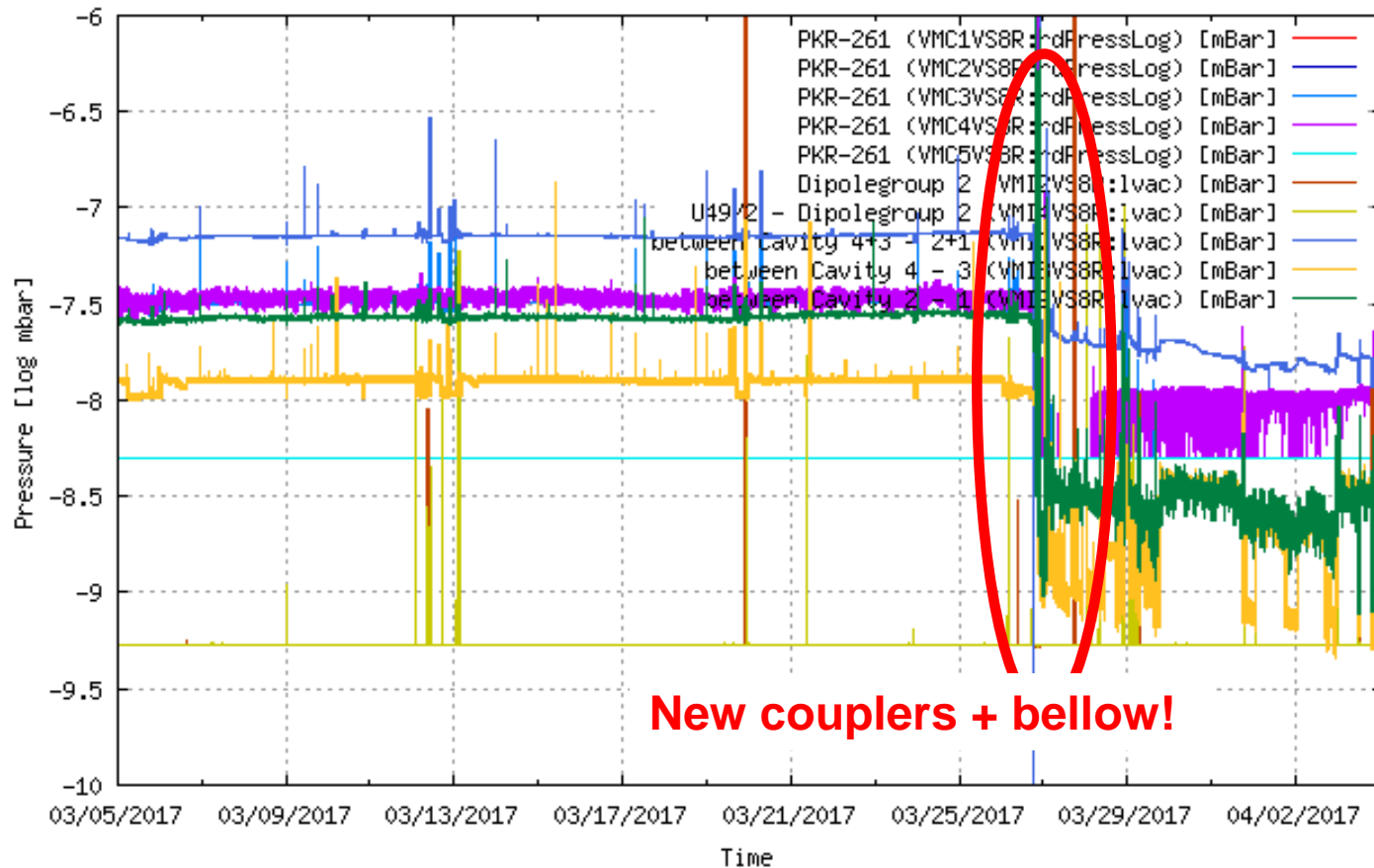
- New couplers → ALBA design!



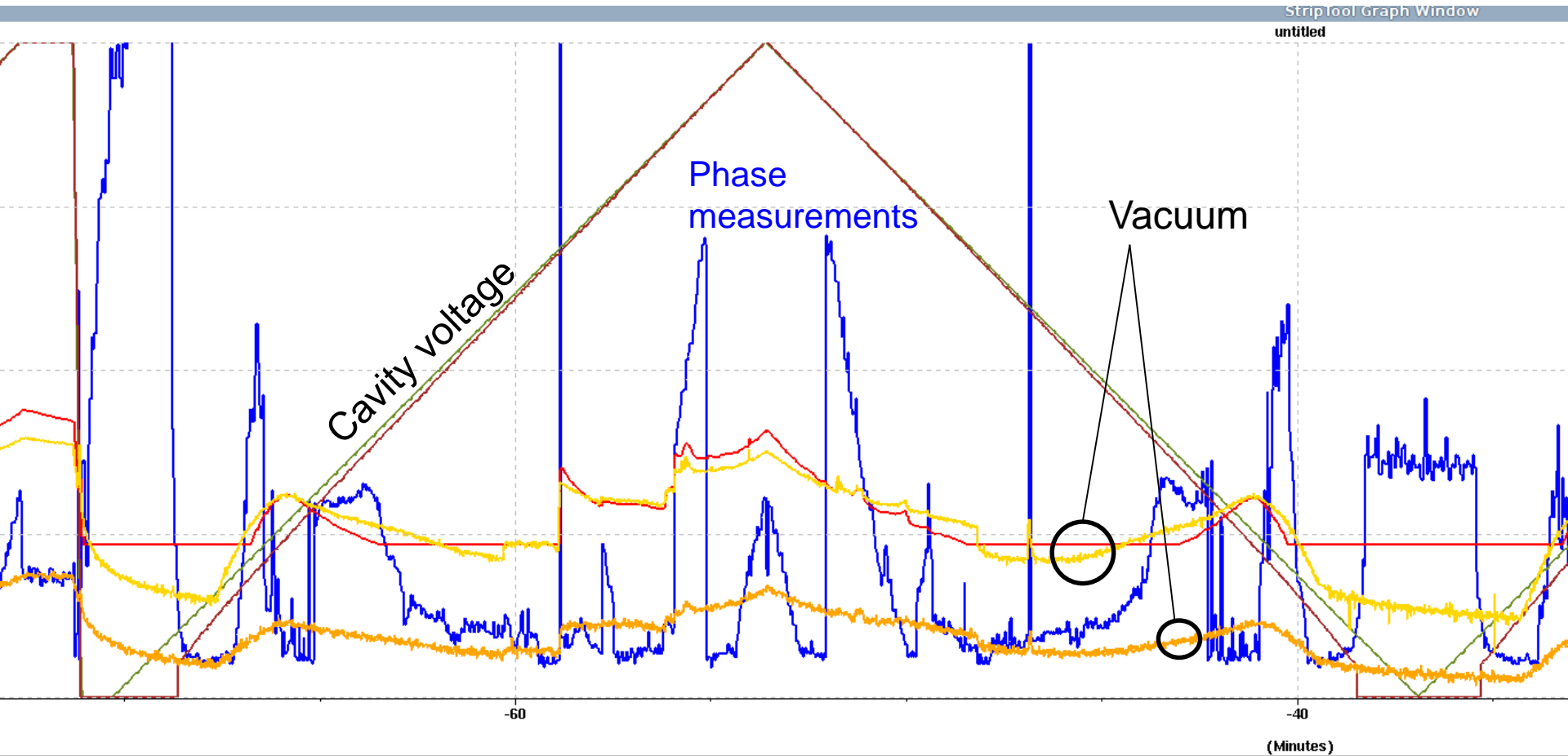
→ New solution is ALBA design, thanks for help!



BESSY Channel Plot [raw data](#) / [gnuplot command file](#)



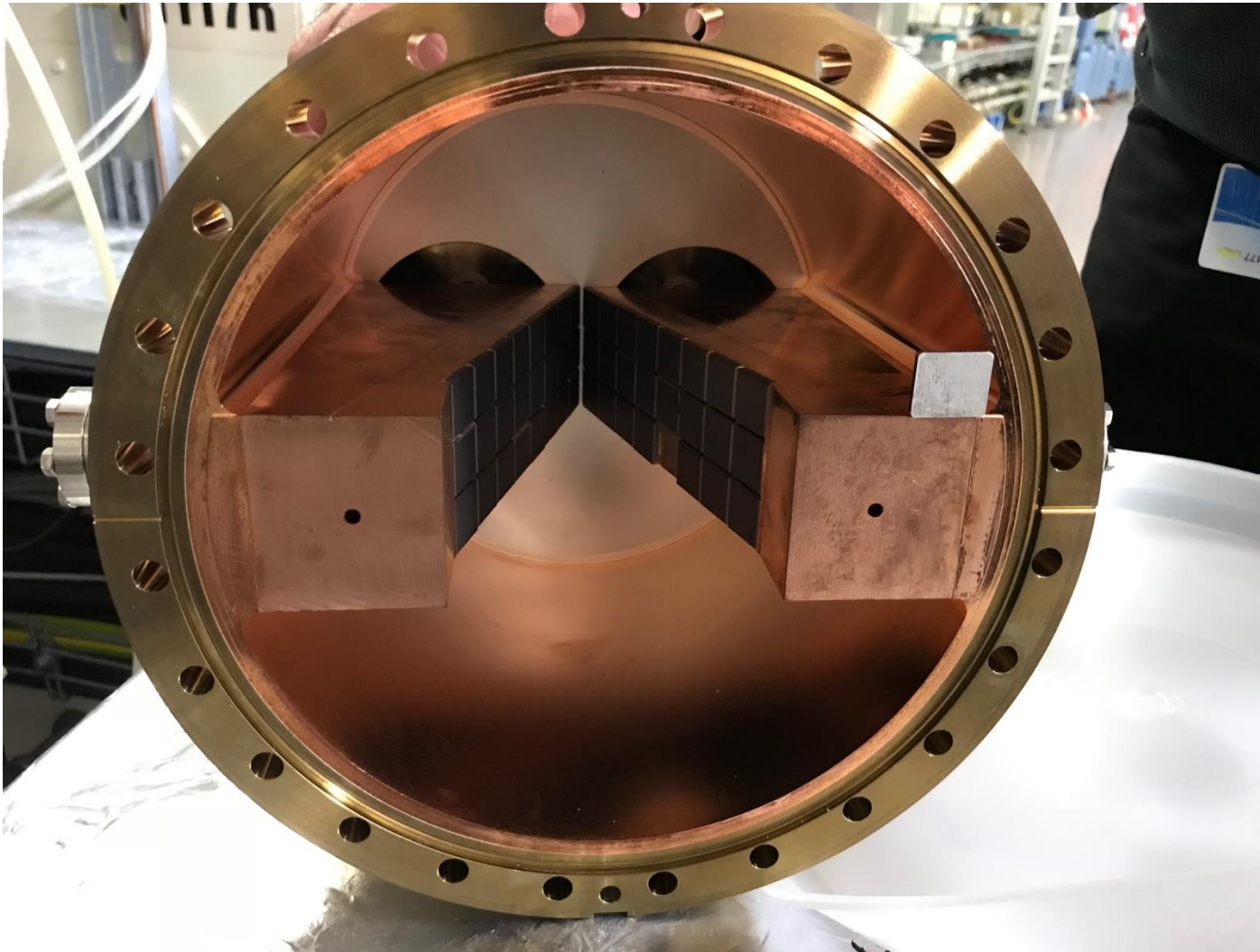
Problems with vacuum at cavity 2: Multipactor effects





Cavity 2 is being replaced this week

Discovery along the way: Loose ferrite tile at cavity 4



Timeline

- 2011 Call for bids on three 290 kW 1,3 GHz klystrons
- 2011 Order them from CPI
- 2013 Factory approval of first klystron
- 2015 Factory approval of second (May) and third (September) klystron
- May 2015: Delivery of first klystron
 - Swagelock connection not correct
- October 2015: some attempts to match water connection
 - Pipe diameter incorrect, does not allow for mounting procedure as planned
- January 2016: Getter pump installed for permanent operation
 - Vacuum was found to be surprisingly bad
 - Klystron has to be sent back to CPI (turned out to be damage due to bump at transportation)
- March 2016 klystron #1 is sent to CPI, klystron #2 arrives at HZB

Timeline

- May 2016 CPI finds leak at klystron #1 and repairs it (turned out to be bad solder joint)
- May 2016 First time operation with cooling water
 - Loud noise at 1.2 kHz produced by water is observed
- September 2016 first time with HV on klystron #2
 - Body loss a lot higher than expected at 25 kV already
 - Klystron has to be sent back to CPI to evaluate the issue
 - Second klystron twisted by hard bump at transportation
 - both klystrons shipped back to CPI and repaired
 - Meanwhile klystron #3 is sent to HZB
- February 2017 start with klystron #3 at HZB
- June 2017 Output power limited to 75 kW due to restrictions of water-load
- August 2017 more than 200 kW achieved with modified MEGA load

Ferrite Loads

- Specifications: 300 kW CW / 1290-1310 MHz / VSWR 1.10:1 max.
- 3 Loads bought in late 2012
- During first operation in 2017: Arcing at power levels up to 50 kW
- 3 Water loads are sent back to Ferrite Microwave Technologies (May 2017)



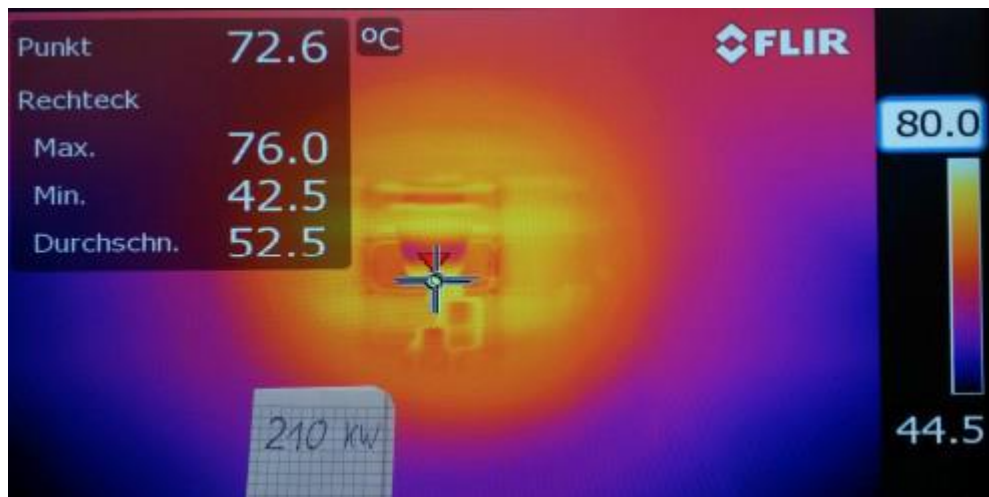
150 kW Load by MEGA on stock

- MEGA Load 100 kW / 150 kW / 200 kW
- Not sure: Bought in 2008 as 200 kW, some drawings indicate 150 kW while some emails state 100 kW
- Most likely 150 kW (Drawing matched actual load with fabrication number)
- June/July 2017: Load withstands 75 kW typ. But certainly not more than 100 kW due to cone made of Rexolite instead of Teflon
- August 2017 cone is replaced, Rexolite -> Teflon



MEGA Load

- August 2017 more than 200 kW are tested with new Teflon Cone



bERLinPro: Status

- All 600 kW DC Power supplies are delivered
- Start Commissioning of first transmitter in bERLinPro building: 01/2018
- Writing specifications for 15 kW LINAC transmitters, order planned for the beginning of 2018



- **Cabling**
 - Installation of cables started
- **Power lines**
 - Coaxial cables installed
 - Waveguide installation started
- **Mains**
 - Mains are installed operable
 - First two 600 kW power supplies for injector transmitter connected
- **Water cooling**
 - Piping installed
 - First injector power supply connected
 - Water is not circulating



Cables and water installation



- **Time schedule**
 - 1/2018 start commissioning first injector transmitter at bERLinPro
 - 1-3/2018 high power coupler conditioning in testing hall
 - 4/2018 moving prototype transmitter to bERLinPro building
 - 2018 get all injector transmitters operable at bERLinPro
 - 2019 delivery, installation and commissioning of SSA

Thank you !