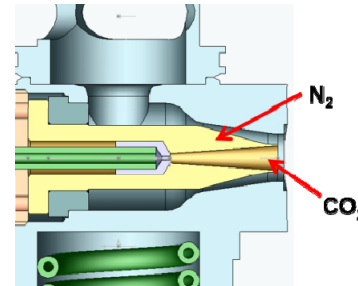


Poster MOPRC032

A.Brinkmann, J.Ziegler, DESY, Hamburg

- Basics
- Cleaning Cu RF Photo Guns
- Latest developments:
 - Cleaning of Transverse Deflecting Structures
 - Cleaning of 9-cell TESLA-type Nb-Cavities
- Results, Conclusion

Basics

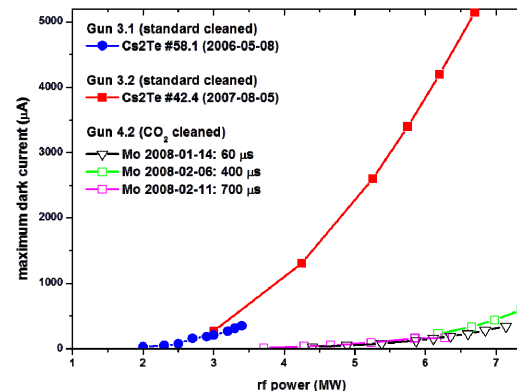
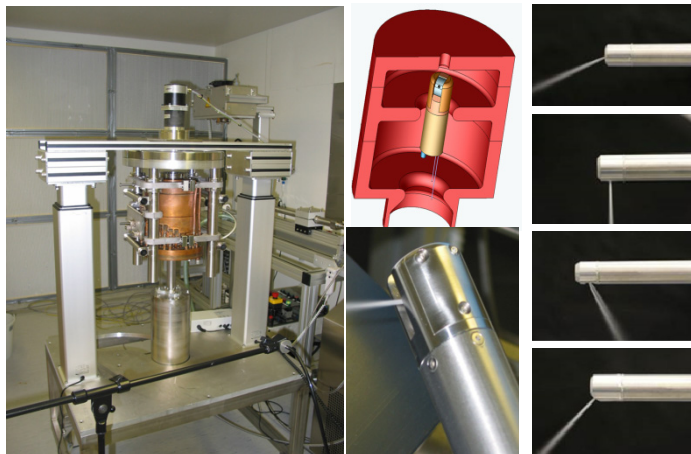


■ Cleaning mechanism:
Acts by thermal-mechanical and chemical forces:
Breaking up the contaminations by shock-freezing
Applying high shearing forces due to high momentum of the snow crystals and increasing of the volume by a factor of 500 after sublimation of the snow. (Temp.diff. needed !)
Carbon dioxide further acts as a good chemical solvent for hydrocarbons and silicones.

- CO₂ jet surrounded by N₂ jet
- CO₂ : Gas with 45-50% percentage snow at -79 C
- N₂: Gas at room Temp. at 12 -18 bar used for acceleration and keep the jet concentrated

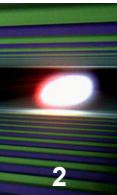
■ Patented Design: Fraunhofer Institut, IPA, Stuttgart, Germany

Cleaning Cu RF Photo Guns for XFEL, FLASH and REGAE

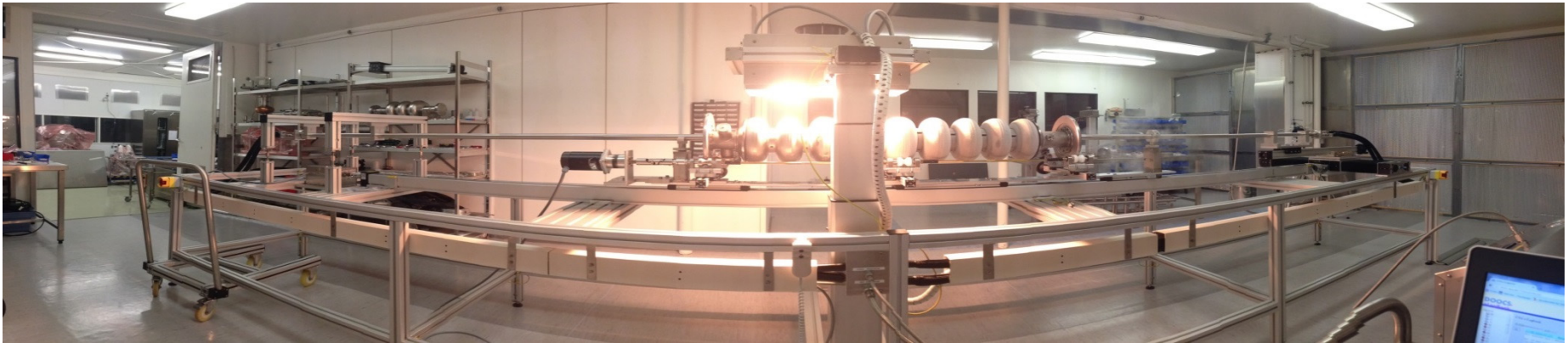


- Maximum dark currents/RF-Power
- Standard liquid cleaned/dry-ice cleaned
courtesy of F. Stephan

- Present Dark Currents:
- FLASH: 5 µA
- XFEL: 20 µA
- REGAE: very good



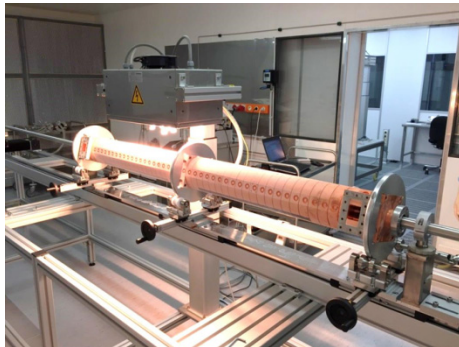
■ **Cleaning of Transverse Deflecting Structures for XFEL and 9-cell TESLA type Nb-Cavity**



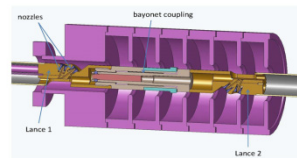
■ Entire new multi-purpose set-up (Dimensions: 6 m x 1 m x 0.7 m) shown with a 9-cell Cavity during cleaning

Challenge: Development of a set-up using > 2m long lances, no bending allowed, clean in horizontal position

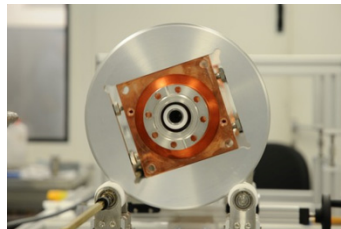
Solution: 2 coupled lances (30mmØ) with a built-in pretension (adjustable wire), lances stays in fix. position, TDS moves



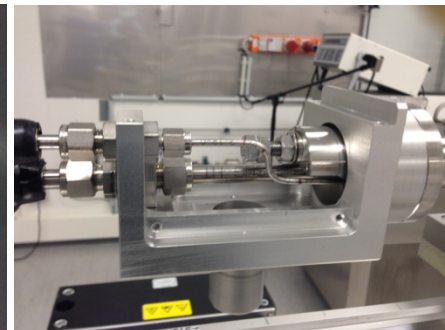
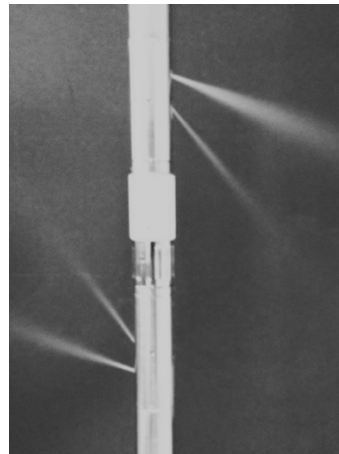
TDS dimensions:
1700mm long, 40mm beam pipe Ø



Sketch of 2 coupled lances
inside TDS

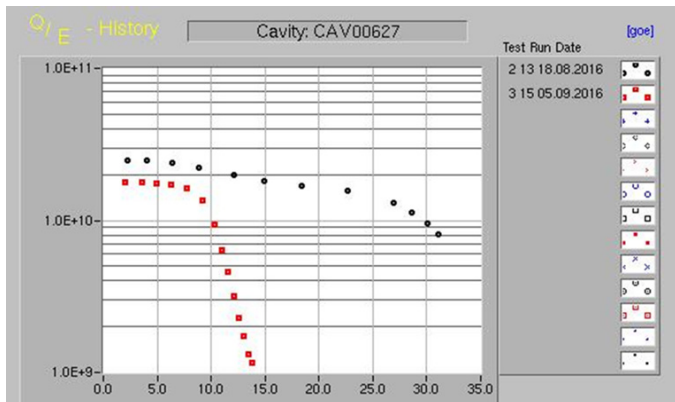


Frontview of TDS with lance inside (no bending)



Lance contains gas media supply for
both gases and pretension wire

- Results and Conclusion:
 - Proven and well established method for Cu RF-Photo Guns
 - - very low dark currents, no liquids required (Water, Alcohol, citric acid)
 - Proven to clean Transverse Deflecting Structures
 - - very good method to clean longer RF-structures liquid free in horizontal position
 - - Vacuum/RF-Dept. were happy: very short conditioning time after installation
 - First tests done with 9-cell Cavity:
 - after 1. attempt: bad RF test result:



- RF-test result after 1. attempt of cleaning: a 9-cell Cavity
- Black curve before cleaning max. Grad.: **31MV/m limited by FE**
- Red curve after Dry-Ice cleaning max. Grad.: **14MV/m limited by FE starting at 9MV/m**

Reason: Assembly procedure after cleaning not done according to standard preparation rules for Nb-Cavs. One unsolved issue for all applications is still to keep an sufficient temperature difference between surface and the gas-jet, since this has a large influence of the cleaning process. Here we have to consider more elegant solutions, ideas needed