

# Status of activities on WP 5,4

## Dry ice cleaning

WP Leader D.Reschke DESY Hamburg

- Until **end of September 2006 the new infra-red heater system (see QR 1/06) was successfully used** for several cleaning procedures of single-cell cavities with achieved gradients up to 38 MV/m. The gas alarm system is installed and operable, but **additional technical requirements of the DESY safety department need further installation effort.**
- With respect to the results **there is a contradiction between excellent cleaning results on samples (WP6.3.)** compared to most of the cavity tests still suffering on fieldemission loading. The **reason can be either the cleaning parameters or a contamination of the cavity during the final assembly** after the dry-ice cleaning.
- Together with the experts in dry-ice cleaning of the Fraunhofer Institute for Manufacturing Engineering and Automation (Fraunhofer IPA) **the nozzle system and cleaning parameters are under re-investigation**, which will take until the beginning of 2007. In addition further sample measurements are on the way.

# WP 5,4 Dry Ice Cleaning

WP Leader D.Reschke DESY Hamburg

5.4.1		Installation of full system for 1-3 cell cavities	
	.1	Installation of CO2 piping	Done for 1-3 cells

<b>5.4.1.3</b>	<b>Installation of control system</b>	<b>Done must be modified (CO gas and IR heater safety regulations inside cleanroom)</b>
<b>5.4.1.4</b>	<b>Commissioning</b>	<b>Done re commission after modifaction necessary</b>
<b>5.4.1.5</b>	<b>Installation finished</b>	<b>Delayed improvement of system &amp; Procedures needed</b>

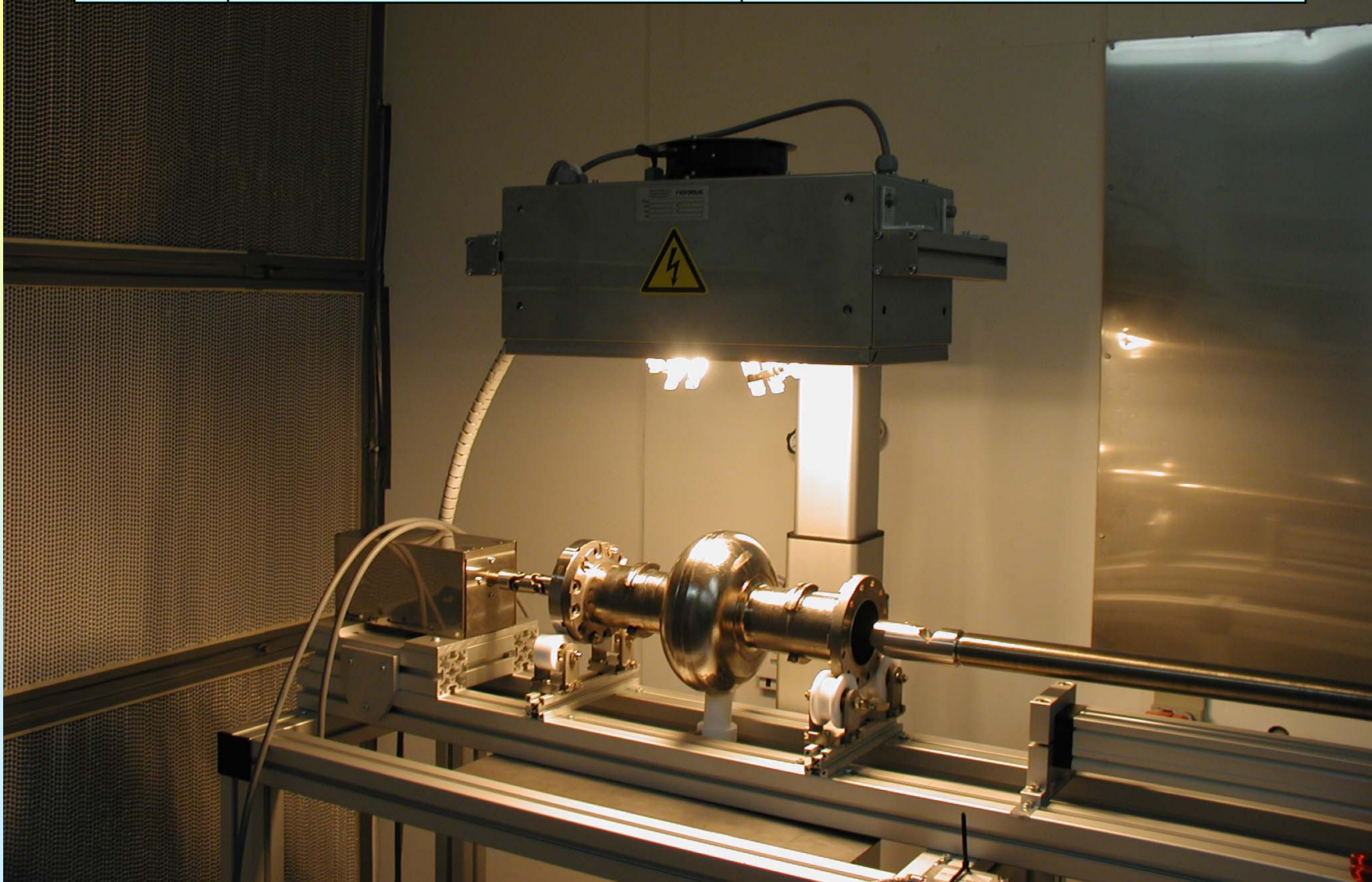
5.4.2		Optimization of cleaning parameters	
	.1	Sample cleaning	See Talk A. Dangmal

<b>5.4.2.3</b>	<b>Fix best cleaning parameters</b>	<b>Delay Improvement of heater and nozzle geometry</b>	
	.4	Cleaning parameters fixed	Delayed see 3+

5.4.1	Installation of full system for 1-3 cell cavities	done
5.4.1.1	Installation of CO2 piping	Done for 1-3 cells
5.4.1.2	Installation of motion system	Done for 1-3 cells

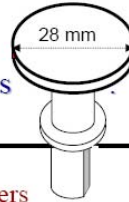


5.4.1.4*	Commissioning	Done re commission after modifaction
5.4.1.5*	Installation finished	Delayed need to be discussed an re defined



## Niobium Samples

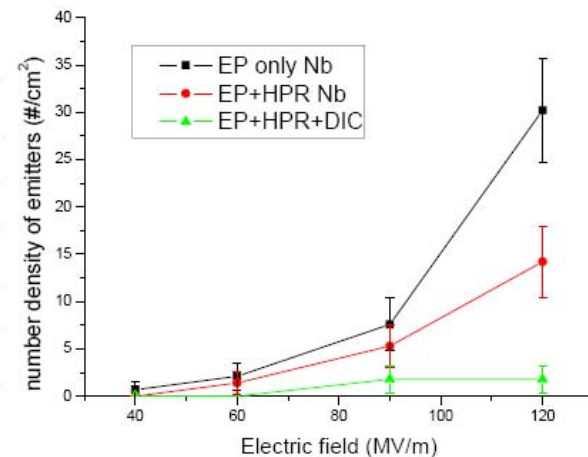
for fundamental investigation of new cleaning techniques



Sample names	Surface treatment	Parameters
SEP1	Electropolished Nb (HF: H <sub>2</sub> SO <sub>4</sub> volume ratio 1:9)	Removal of 150 μm Nb
SEP2		Removal of 140 μm Nb
SEP2*	High pressure rinsed at DESY	Cavity rotation speed 4-5 rpm; Pump pressure= 150 bar
SEP1†	Dry ice cleaned at DESY	T <sub>(liquid CO<sub>2</sub>)</sub> = -5 to -40 °C CO <sub>2</sub> pressure = 45 bar N <sub>2</sub> pressure = 12-18 bar
SEP2*†		

$$\diamond E_{\text{peak}} = 2 \times E_{\text{acc}}$$

E (MV/m)	Number density N (#/cm <sup>2</sup> )		
	EP only	+ HPR	+ DIC
40	0.7	0	0
60	2.1	1.4	0
90	4.2 - 7.6	2.1 - 5.3	0-1.8
120	30.2	14.2	1.8

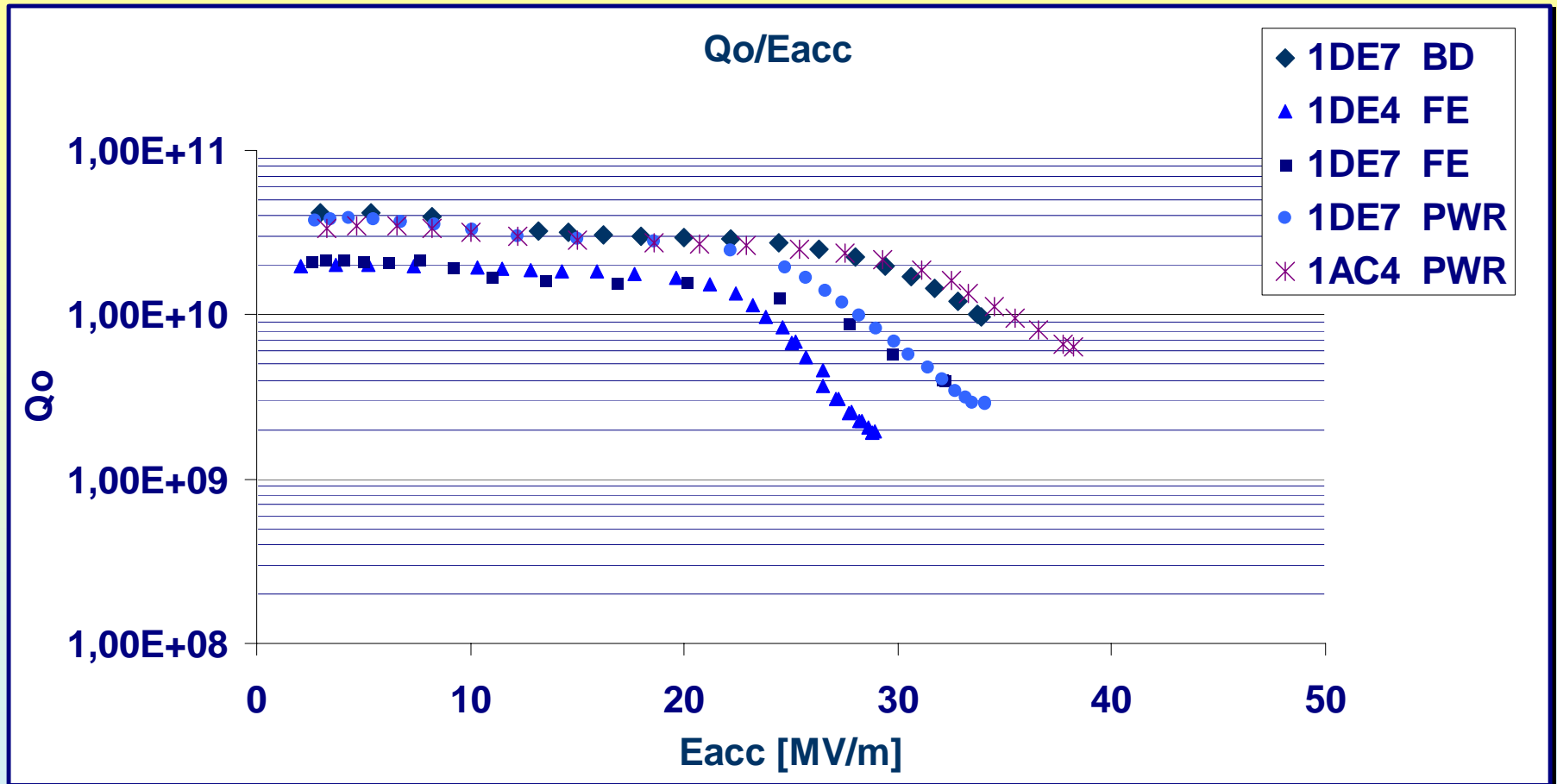


Surface treatments	on EP Nb	after HPR	after DIC
First occurrence of FE @	40 MV/m	60 MV/m	90 MV/m
@120 MV/m, N ( #/cm <sup>2</sup> )	≈ 30	< 1/2 of EP Nb	< 1/7th of HPR Nb

Parasitic Field Emitters  
on Nb surfaces

Arti Dangwal

10th October 2006 @ DESY



Q(E)-performance of latest rf-tests after dry-ice cleaning

5.4.3		VT 9-cell cleaning apparatus
	.1	Design 9-cell apparatus VT
	.2	Fabricated 9-cell apparatus
	.3	Installation of 9-cell apparatus
	.4	Commissioning of 9-cell apparatus
	.5	VT Cleaning Installation finished
5.4.4		VT Cleaning of 9-cell cavities
	.1	Continuous cleaning
5.4.5		Design & construction of H 9-cell cleaning apparatus
	.1	Design 9-cell apparatus VT
	.2	Fabricated 9-cell apparatus
	.3	Installation of 9-cell apparatus
	.4	Commissioning of 9-cell apparatus
	.5	Start H 9-cell cleaning
5.4.6		Cleaning of horizontal nine-cell cavity
	.1	Continuous cleaning
	.2	Evaluation of experimental results

Not started !!!  
 Will be delayed until  
 Experiences; test  
 and optimization  
 of 1-3 cell set up is done

**Needs discussion  
 and rescaling !!!!!**