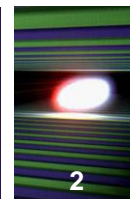
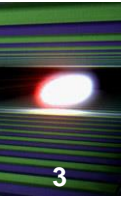


European-XFEL summary: Cavities/Modules performance



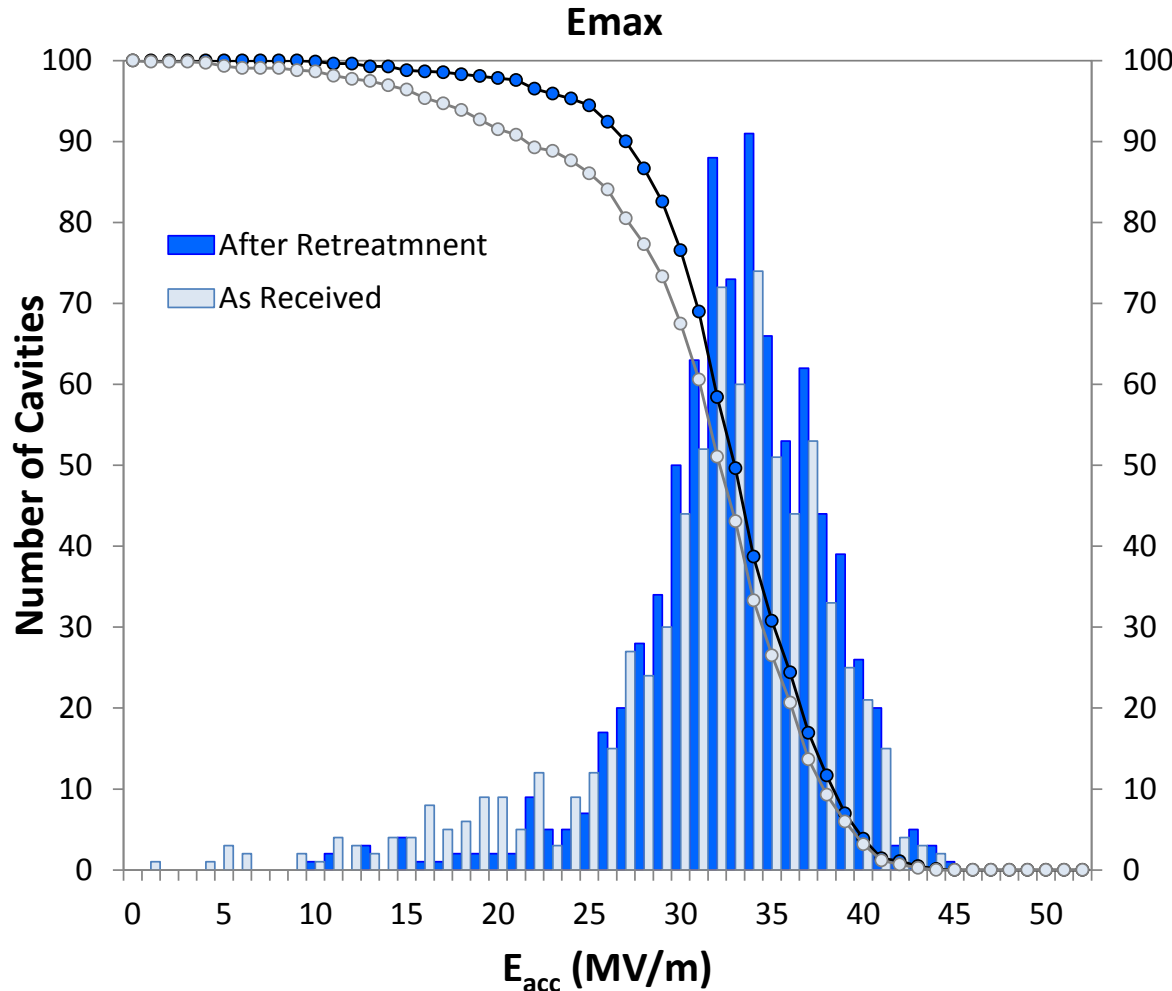


1. European-XFEL cavities statistics data;
2. European-XFEL modules statistics data;
3. Conclusion.



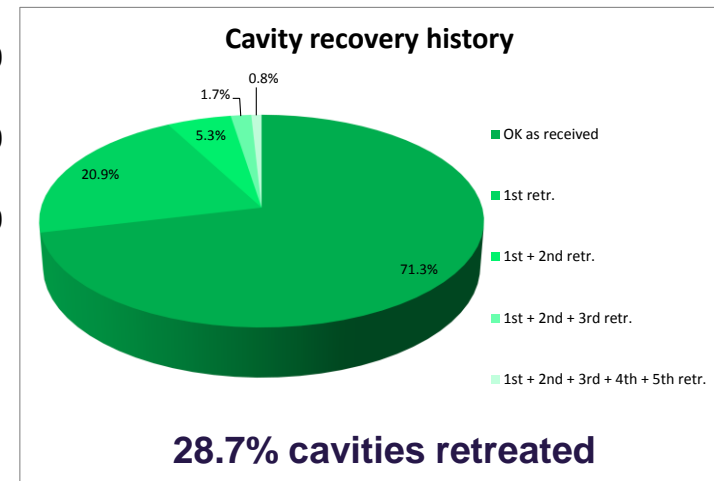
Maximum Gradient Statistics: VT

Total Number: 832



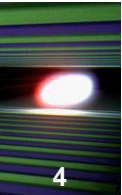
Before Retreatment (754):
E max 31.4 ± 6.7 [MV/m]
 ■ RI (377): E max 33.0 ± 6.5 [MV/m]
 ■ EZ (375): E max 29.8 ± 6.6 [MV/m]

After Retreatment (832):
E max 33.1 ± 4.9 [MV/m]
 ■ RI (417): E max 34.7 ± 4.4 [MV/m]
 ■ EZ (415): E max 31.5 ± 4.9 [MV/m]

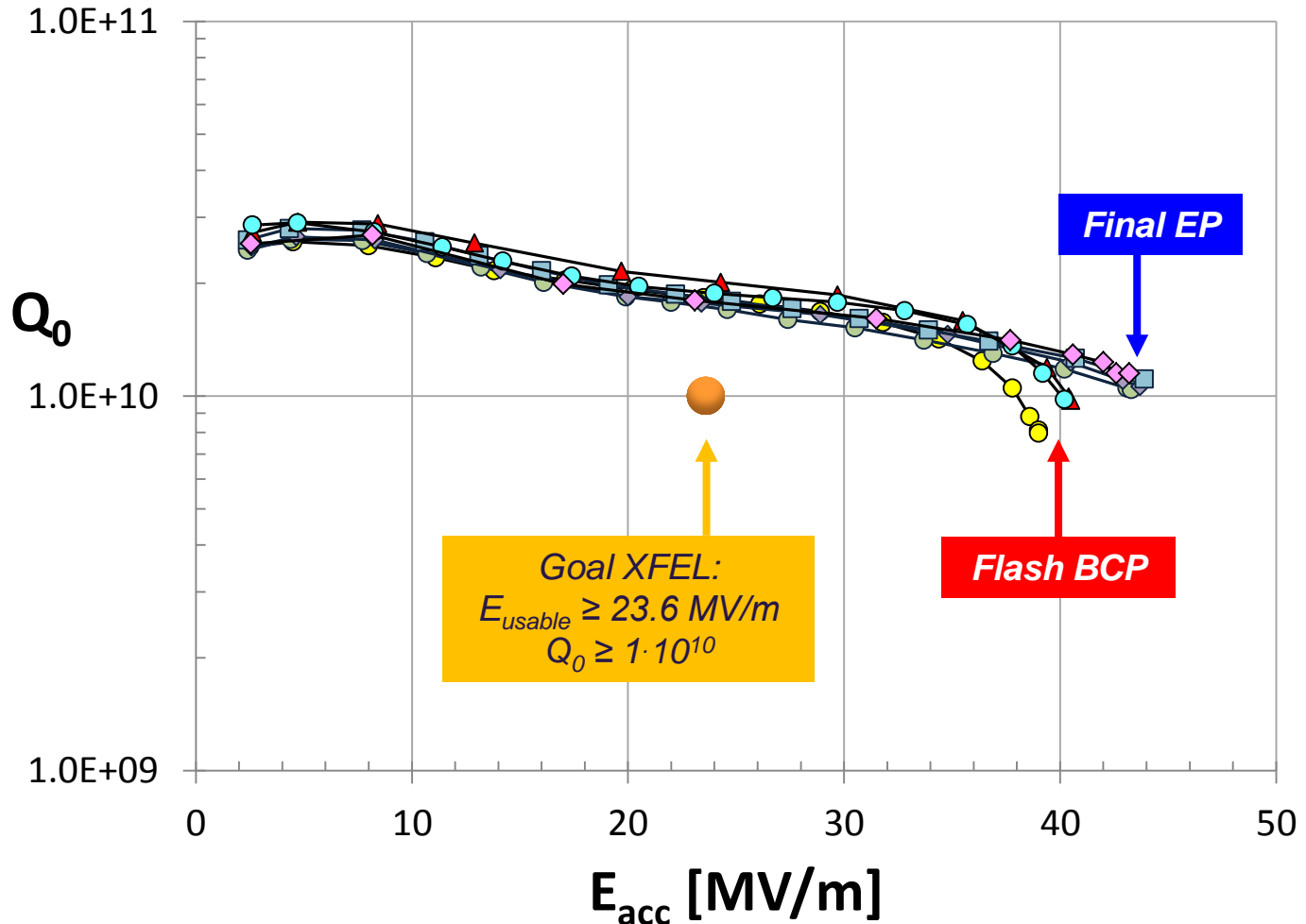


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European-XFEL cavities statistics data



Best Performances Cavities (Eacc)



Laura Monaco

European-XFEL cavities statistics data

ILC TDR assumed VT acceptance $> 28\text{MV/m}$ (XFEL $>20\text{ MV/m}$)

- Average of 35 MV/m (XFEL: 26 MV/m)
- Assumed first-pass yield: 75%
- 29% cavities retreated to give final yield of 90% $>28\text{ MV/m}$ (35 MV/m average)
- 10% over-production assumed in value estimate

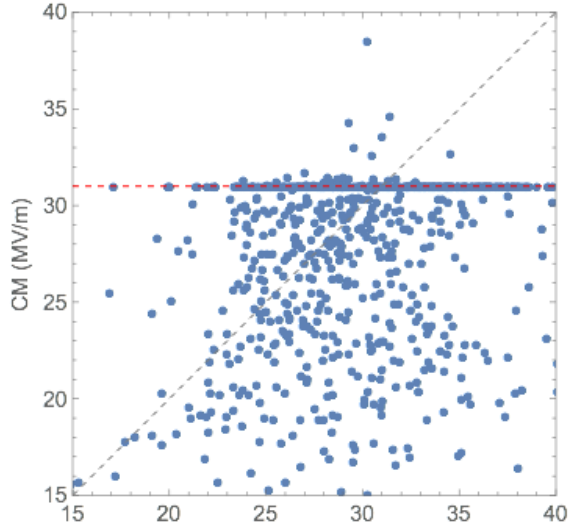
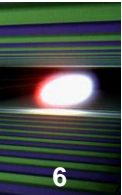
RI results only (ILC recipe)		ILC TDR (assumed)	XFEL	
			max	usable
First-pass	Yield $>28\text{ MV/m}$	75%	85%	63%
	Average $>28\text{ MV/m}$	35 MV/m	35.2 MV/m	33.5 MV/m
First+Second pass	Yield $>28\text{ MV/m}$	90%	94%	82%
	Average $>28\text{ MV/m}$	35 MV/m	35.0 MV/m	33.4 MV/m
First+Second+third pass	Yield $>28\text{ MV/m}$	-		91%
	Average $>28\text{ MV/m}$	-		33.4 MV/m

More re-treatments - but mostly only HPR

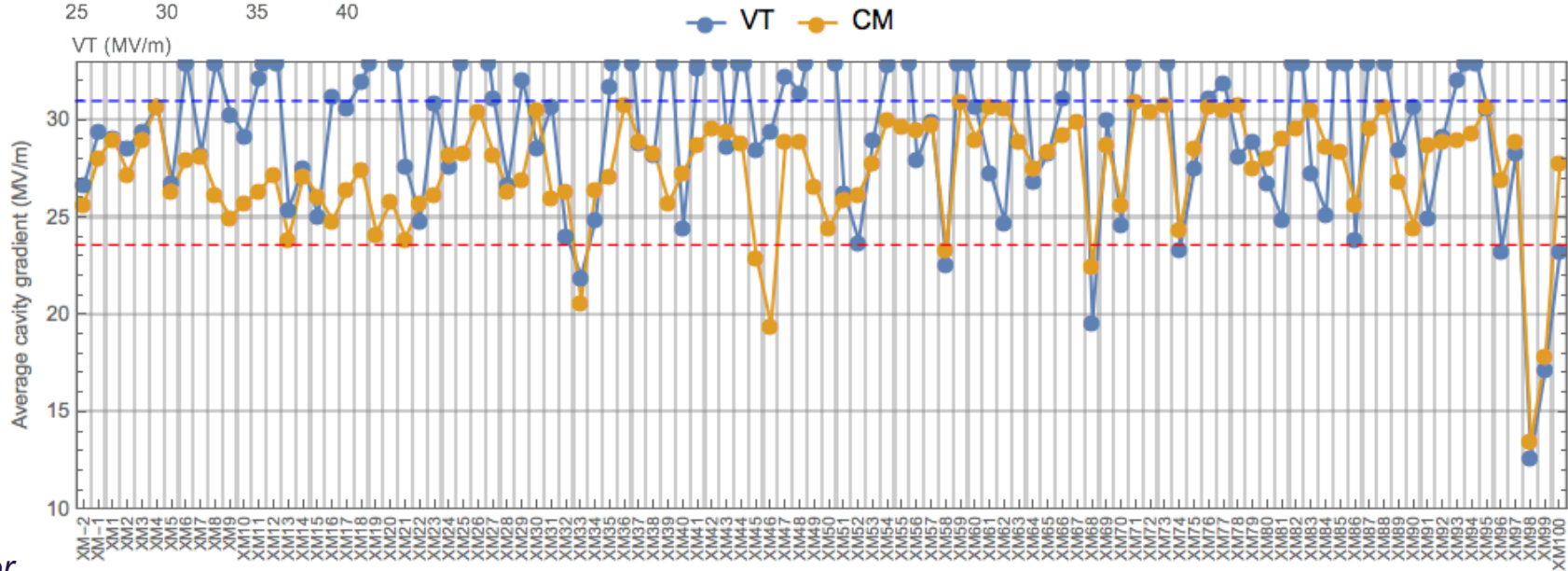
Number of average tests/cavity increases from 1.25 to 1.55 (1st+2nd) or 20% over-production or additional re-treat/test cycles

Nick Walker

European-XFEL modules statistics data

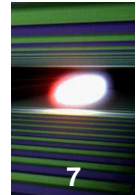


	N_{cavs}	Average	RMS	min	max
VT	815.	29.7	5.1	10.	43.7
CM	815.	27.5	4.8	0.	38.5

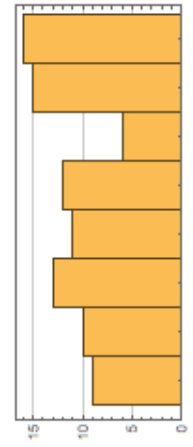
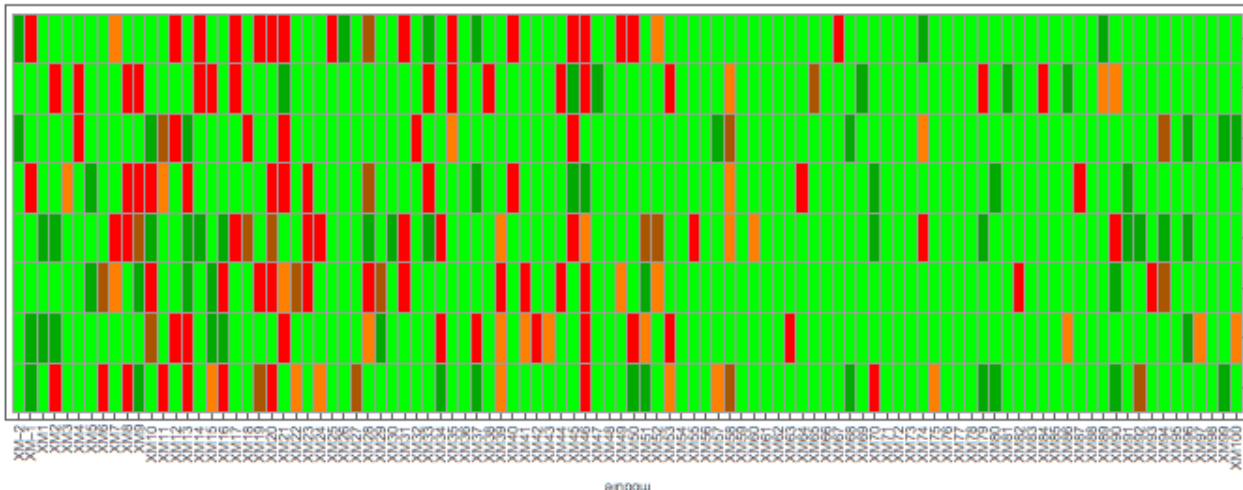
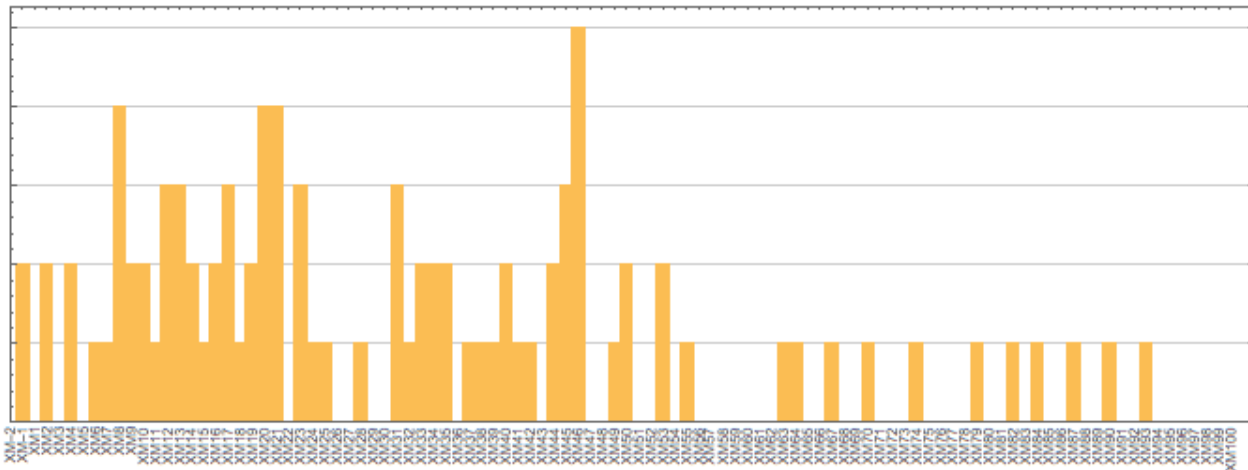


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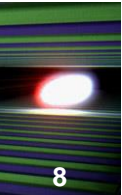
European-XFEL modules statistics data



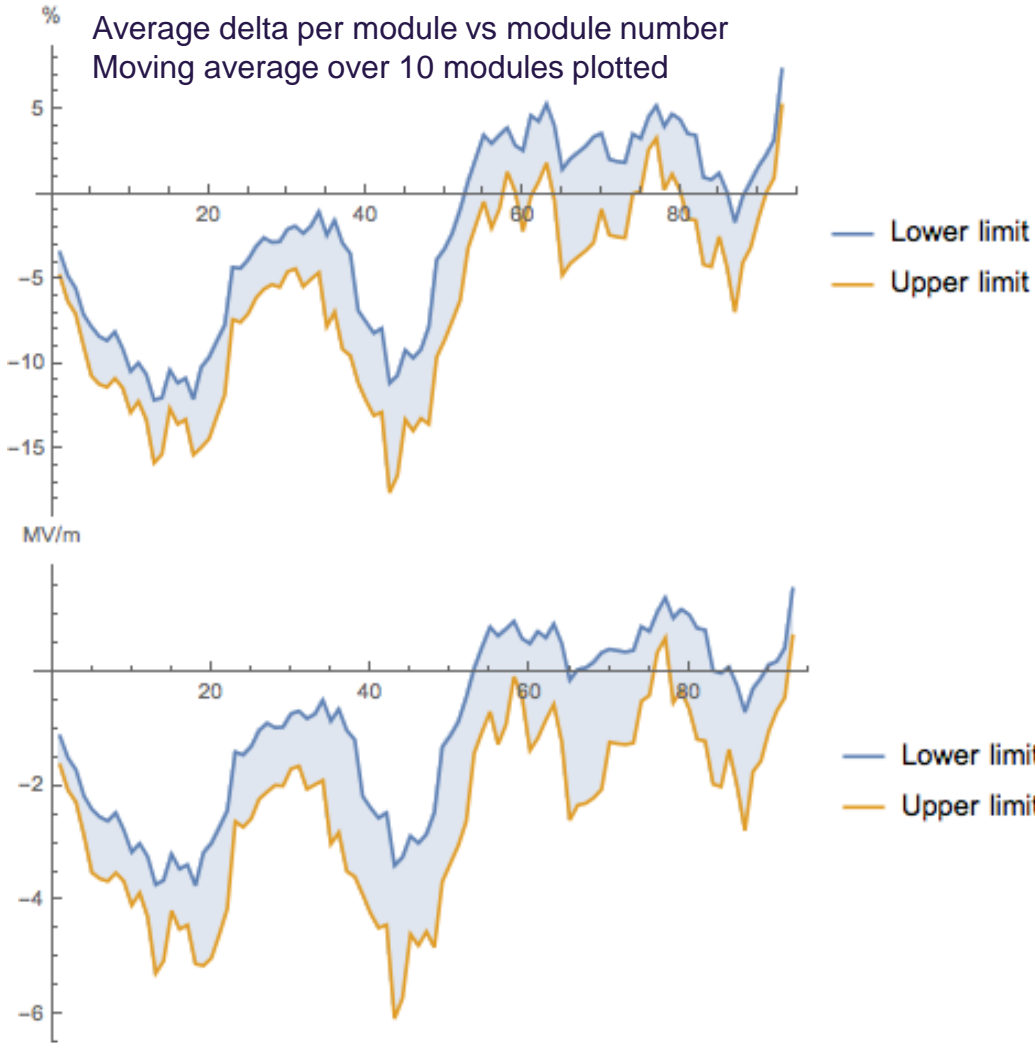
degradation matrix:
count cavities with $\Delta G \geq 20\%$



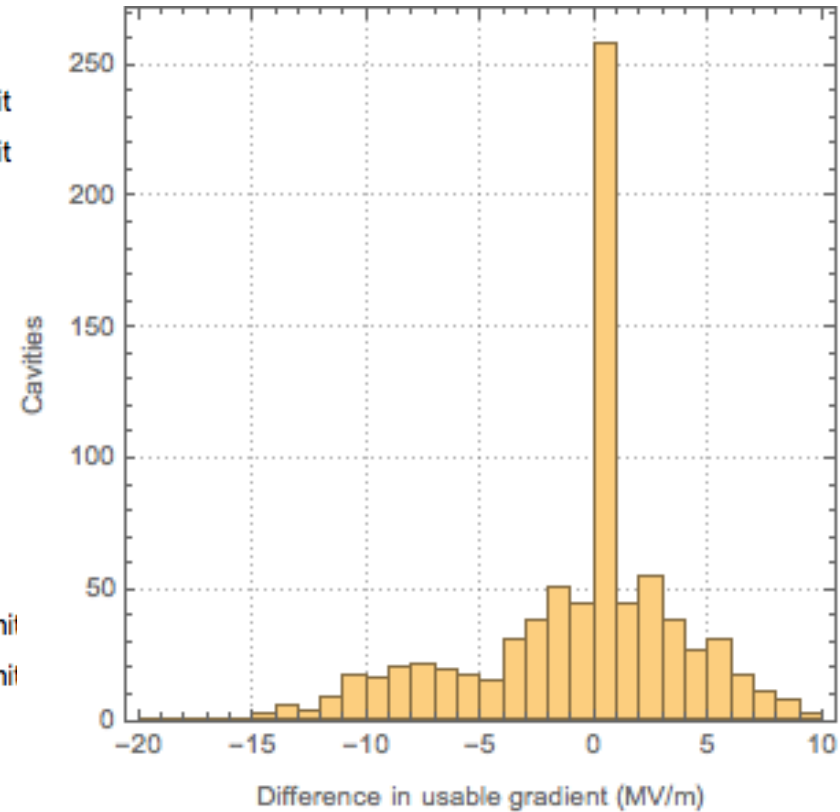
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Rolling average of difference VT - CM

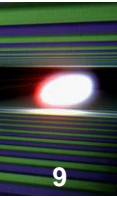


VT → CM difference statistics

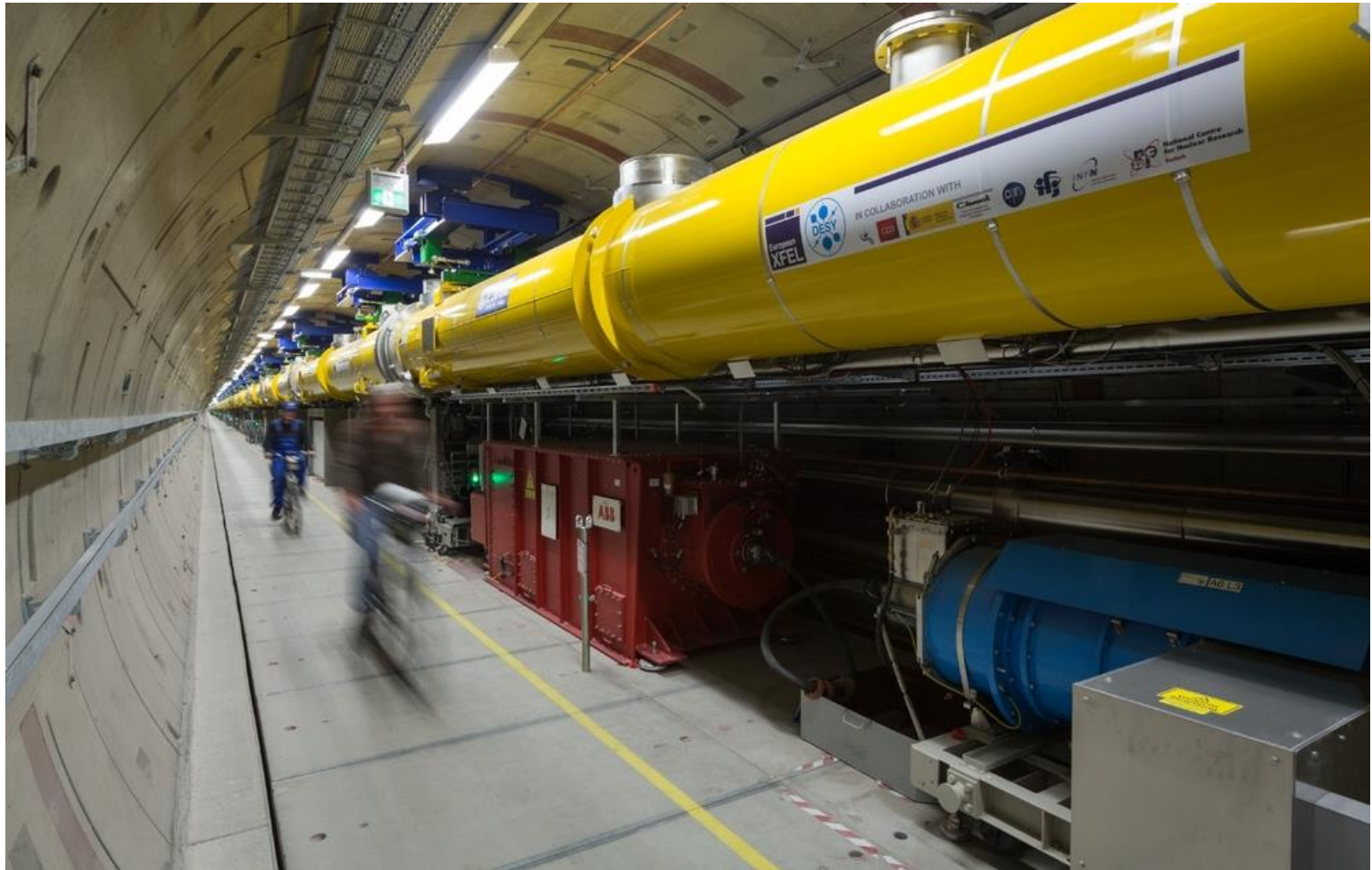
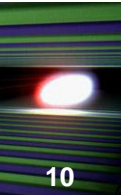


CM test is limited at 31 MV/m
VT is clipped at 31 MV/m

Nick Walker



1. European XFEL cavities Vertical Tests statistics shows, that ILC cavity performance specifications (at least for the maximum gradient) are possible;
2. More cavities re-treatments are needed - but mostly only HPR, and number of average tests per cavity increases from 1.25 to 1.55 (1st+2nd) or 20% over-production or additional re-treat/test cycles are to be considered;
3. European XFEL Cryo Modules Tests shows some cavities performance degradation compared to the Vertical Test results, so the CM assembly needs some additional R&D attention and improvement;
4. CM Tests statistics clearly shows an improvement of CM performance and decrease of CM – VT difference with CM production;
5. There are clearly lessons to be learned and a room for improvements;



Thank You for Your attention