Pushing SRF technology for heavy ion research to the limit:
RF-Test@horizontal cryostat/GSI (2016)

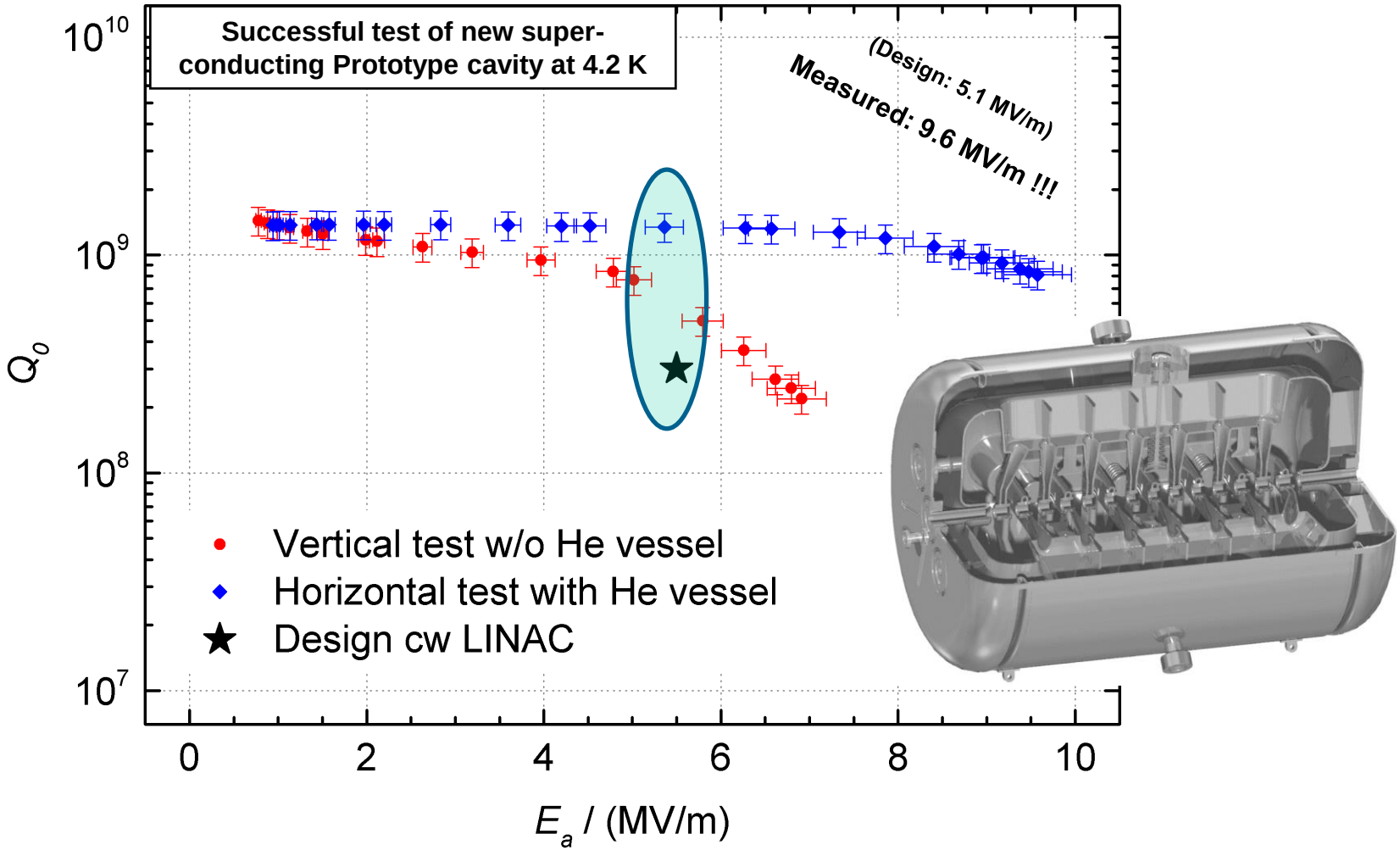
Multigap SRF „CH“ structures designed by Goethe University, Frankfurt and realized together with GSI and HIM/Mainz:

- **It seems that the potential of the „CH“ to facilitate for heavy ion research is not only existing, but it is larger than anticipated !**

→ Research should be done to create a sound basis for future accelerator projects and/or upgrades

Pushing SRF technology for heavy ion research to the limit:

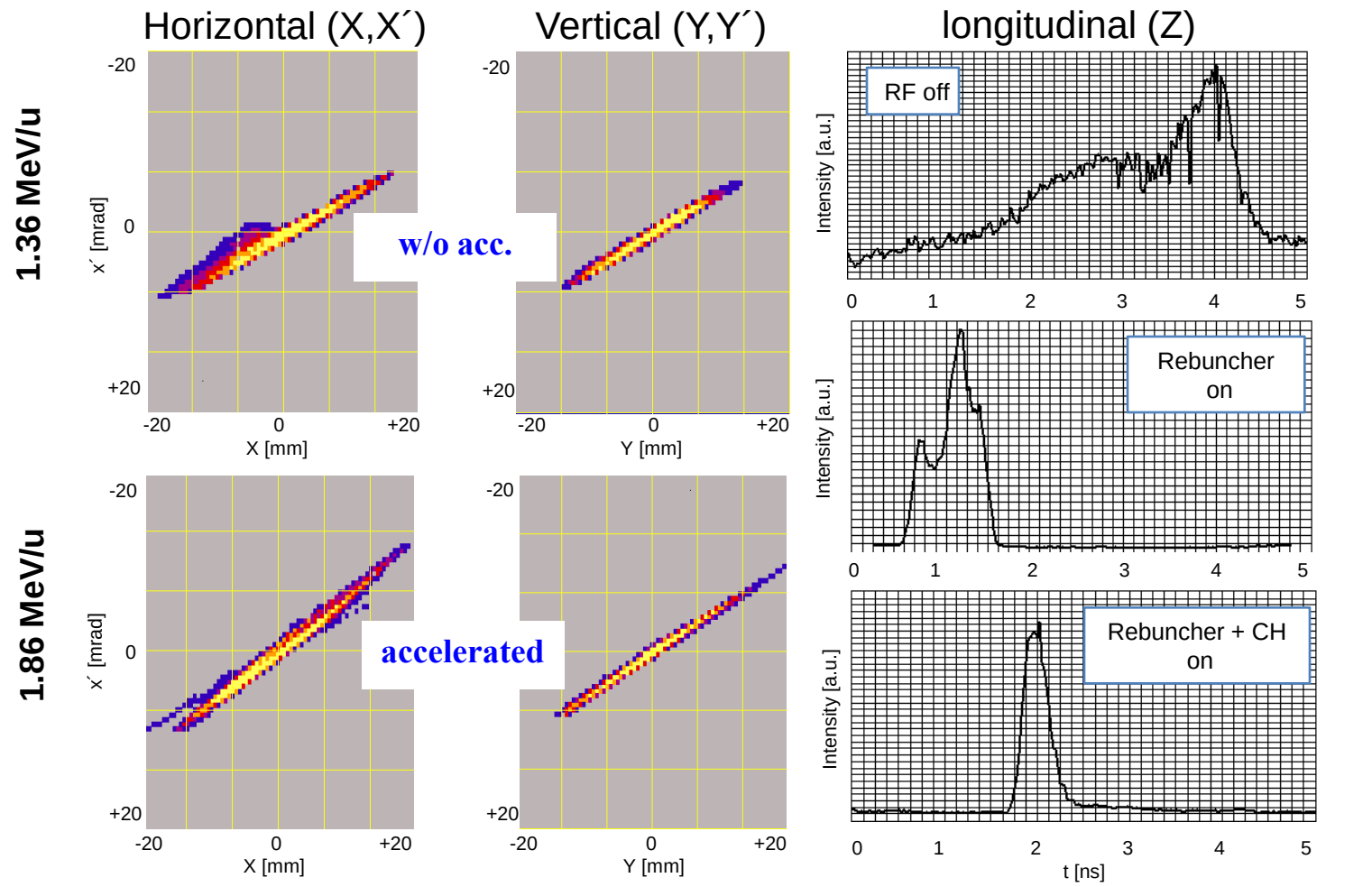
RF-Test@horizontal cryostat/GSI (2016)



cw SRF for heavy ion beams at GSI

Full beam transmission
≈15% (transversal emittance growth)
≈300 ps (FHWM)
Up to 0.8 MeV/u (ΔW)

July 2017: First heavy ion beam test with sc CH-cavity@GSI

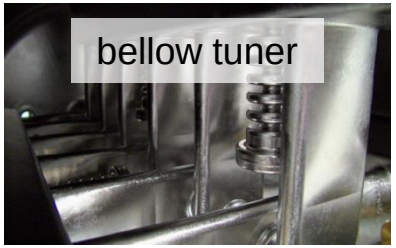


M. Heilmann, GSI
S. Yaramyshev, GSI

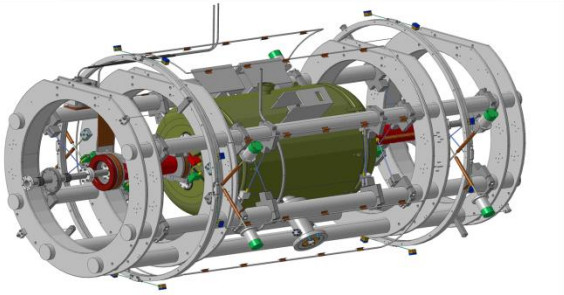
F. Dziuba, HIM
T. Kürzeder, HIM
M. Miski-Oglu, HIM
V. Gettmann, HIM
F. Maas, HIM
K. Aulenbacher, HIM
M. Amberg, former HIM

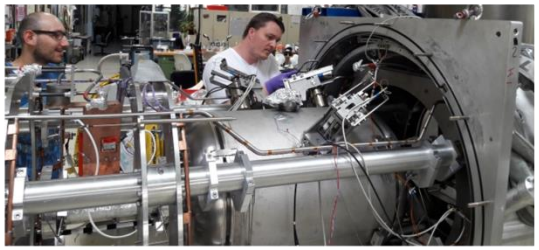
H. Podlech, GUF-IAP
M. Busch, GUF-IAP
M. Basten, GUF-IAP
D. Mäder, GUF-IAP
U. Ratzinger, GUF-IAP
M. Schwarz, GUF-IAP

RF-Cavity Development



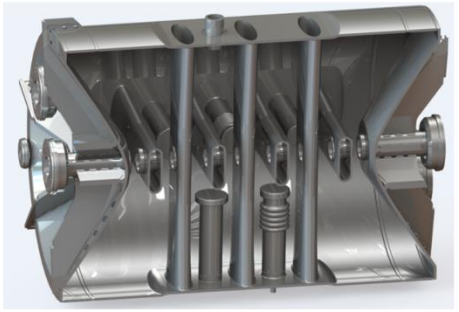
Demonstrator Project





Cryostat with CH-cavity, high field solenoids, cold warm transitions and support system (Cryogenic)

Short Cavity for Cryomodule1

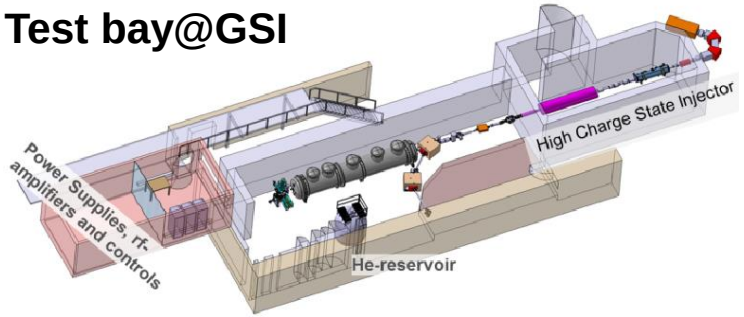


Parameters/Short Cavities (CM1)

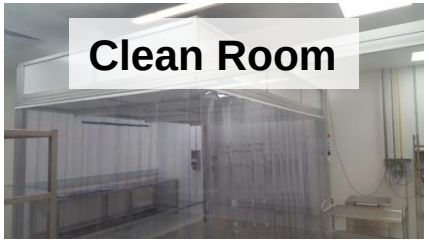
β		0.069
Frequency	MHz	216.816
Cell number	#	8
Length (βλ-definition)	mm	381.6
Cavity diameter (outer)	mm	400
Cell length	mm	47.7
Aperture diameter	mm	30
Static tuner	#	3
Dynamic bellow tuner	#	2
Wall thickness	mm	3-4
Accelerating gradient	MV/m	5
E_p/E_a		5.2
B_p/E_a	mT/(MV/m)	<10
G	Ω	50
R_a/Q_0		1070

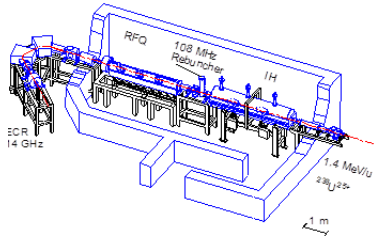
SRF-Infrastructure

Test bay@GSI



HLI





- **High Pressure Rinsing (HPR)**
- **RF testing (warm & cold cavities)**
- **Cleanroom environment**
- **Bake out oven (max. 180°C)**

- **Clean room upgrade@GSI** *(class ISO 5 (required: ISO 6), at FFU unit: class ISO 2 (required: ISO4))*
- **High Charge State Injector Linac**
- **Area for beam test**

Conclusion/Objectives

- **We plan research in order to exploit the present competitive edge achieved by the succesful development of multi-gap SRF ion accelerator structures**
- **Complementary infrastucture (GSI-beam installations, JGU cleanroom and rf test-infrastructure) long standing expertise (GUF)**
- **Characterization and optimization of different cavities, beam dynamics, cleaning techniques, gradient optimization**
- **Objective → Clarify potential of multigap SRF for all kinds of projects,**

(Gradient saves space and cost but needs to be technically sound and suitable beam dynamics must exist!)