COMMISSIONING OF A SUPERCONDUCTING CW HEAVY ION LINAC@GSI

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Abstract

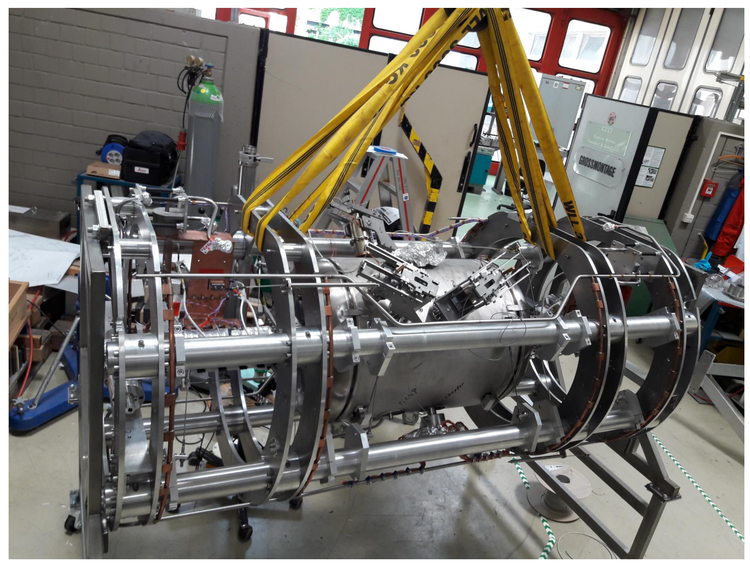
The cw – Linac – demonstrator is a prototype of the first section of the proposed cw-LINAC@GSI, comprising a superconducting CH-cavity embedded by two superconducting solenoids. The sc CH-structure is the key component and offers a variety of research and development. The beam focusing solenoids provide maximum fields of 9.3 T at an overall length of 380 mm and a free beam aperture of 30 mm. The magnetic induction at the fringe is minimized to 50 mT at the inner NbTi-surface of the neighboring cavity. The fabrication of the key components is finished, as well as the cold performance testing of the RF cavity. The cryostat is assembled and the test environment is completely prepared. After successful testing of the RF-Power coupler, the components has been assembled to the suspended frame under cleanroom conditions. Alignment, assembly, under cleanroom condition issues will be presented.

General Parameters of the sc cw-LINAC Demonstrator

Solenoids		
Bore	mm	30
Overall length	mm	380
Max. field	T	9.3
Nominal current	A	110
CH-Cavity		
β		0.059
max A/Q		6
Resonance Frequency	MHz	217
Gap number		15
Total length	mm	690
Cavity Diameter	mm	409
Aperture	mm	20
Effective gap voltage	kV	225
Accelerating gradient	MV/m	5.1
Cryostat		
Inner length	mm	2200
Inner diameter	mm	1120
Material		Al
Operating temperature	°K	4.4
Operating pressure above atmosphere	bar	< 1

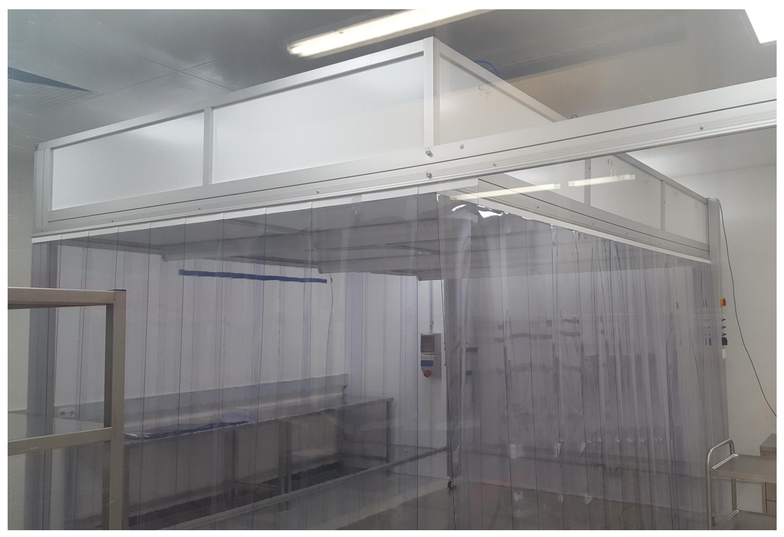
Demonstrator string assembly

5 kW power coupler assembled to cavity and cryostat

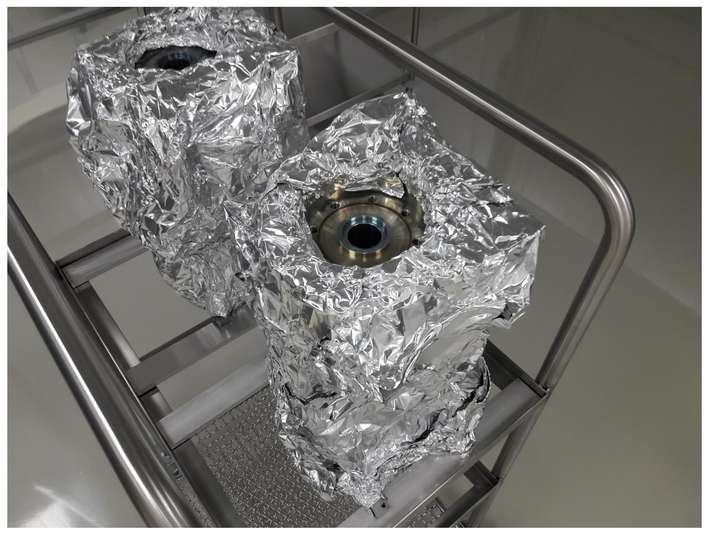


Demonstrator string. CH-Cavity embedded by two solenoids, hanging in a support system

Cleanroom upgrade at GSI

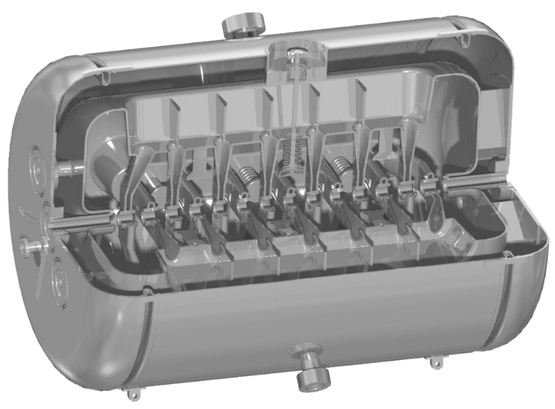


Cleanroom upgrade ISO 8 to ISO 4



Cleaned solenoids and prepared for installation

217 MHz CH-Cavity



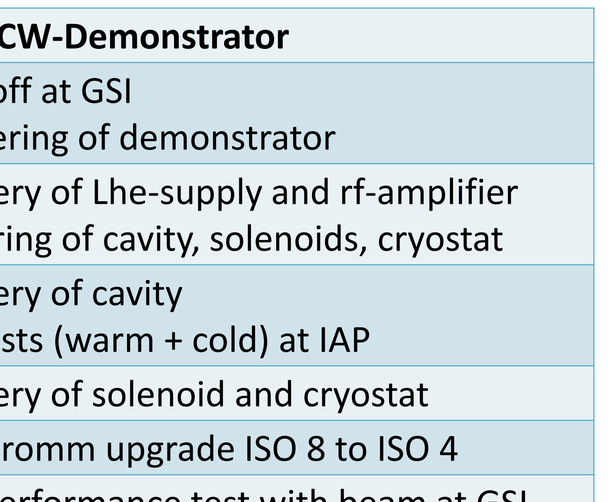
Cross section view of the CH-Cavity (Research Instruments)

TIME SCHEDULE CW-Demonstrator	
2010	Kick-off at GSI Tendering of demonstrator
2011	Delivery of Lhe-supply and rf-amplifier Ordering of cavity, solenoids, cryostat
2013	Delivery of cavity 1st tests (warm + cold) at IAP
2015	Delivery of solenoid and cryostat
2016	Cleanromm upgrade ISO 8 to ISO 4
Jun 2017	Full performance test with beam at GSI HLI

SETUP @GSI HLI

3D layout of the GSI High Charge State Injector with the cw-Demonstrator environment

Testing Area



Protection cave for the cw-Demonstrator at GSI

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