

STEPS TOWARDS SUPERCONDUCTING CW-LINAC FOR HEAVY IONS AT GSI

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Abstract

Providing heavy ion beams for the ambitious experiment program at GSI, the Universal Linear Accelerator (UNILAC) serves as a powerful high duty factor (25%) accelerator. Beam time availability for SHE-research will be decreased due to the limitation

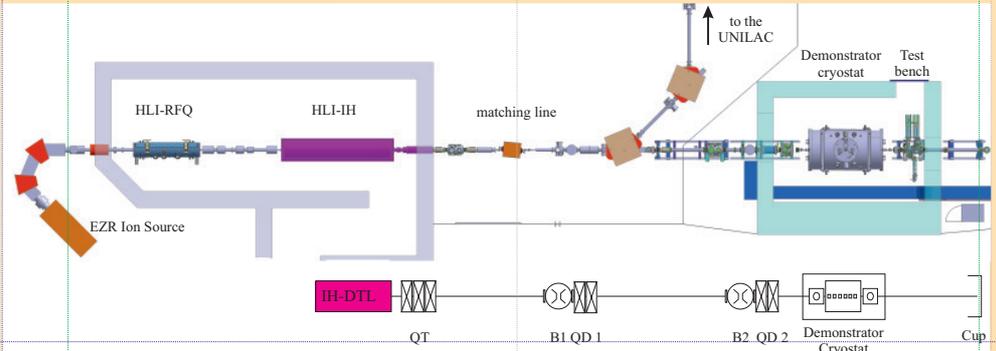
of the UNILAC providing a proper beam for FAIR simultaneously. To keep the GSI/SHE program competitive on a high level, a standalone sc cw-LINAC in combination with the upgraded GSI High Charge State injector is planned to build. In preparation

for this the first linac section (financed by HIM and partly by HGF-ARD-initiative) will be tested in 2015 as a demonstrator. After successful testing the construction of an extended cryomodule comprising two further, but shorter CH cavities is foreseen to

test until end of 2017. In this contribution the measurement of the beam parameters at the entrance of CW-Demonstrator, the preliminary simulation of beam dynamics and the preliminary mechanical layout of the entire string comprising three rf cavities and three solenoids in a cryo environment will be presented. As a final R&D step towards an

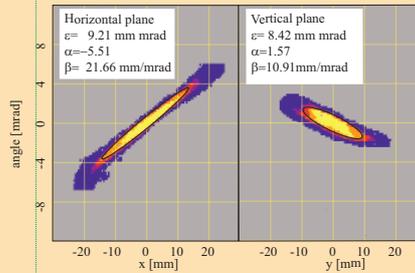
entire linac an advanced cryo modules comprising up to five CH cavities is envisaged for 2019 serving for first user experiments at the coulomb barrier.

Footprint of Demonstrator Test Environment at GSI

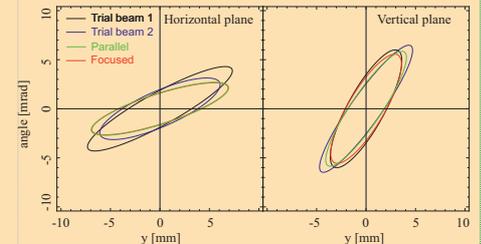


Preparation for Commissioning

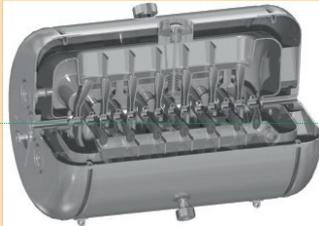
measured Ar¹⁸⁺ emittance



Backwards calculated phase space ellipses @ IH for different quadrupol settings

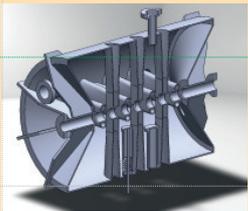


Demonstrator cavity



β	0.059
Frequency	216.8MHz
Cells	15
Aperture	20mm
Total length	691mm
R/Q	3418 Ω
E_s	5.1 MV/m

Short cavity



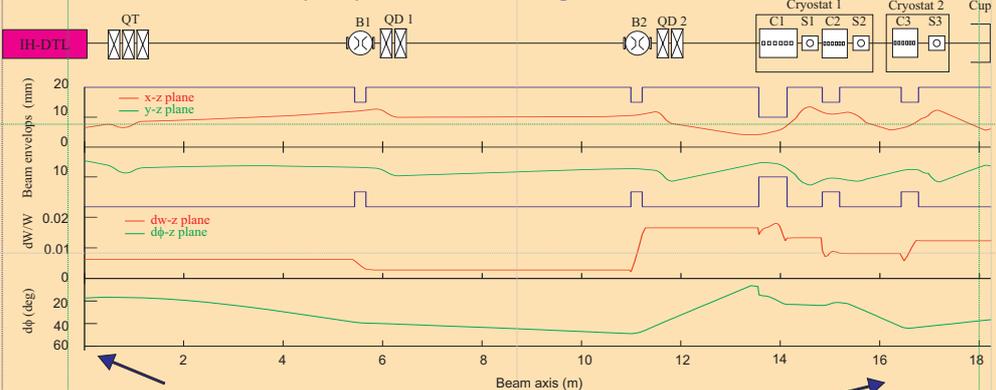
β	0.069
Frequency	216.8MHz
Cells	8
Aperture	30 mm
Total length	593 mm
R/Q	1081 Ω
E_s	

Time schedule

2015	tendering for the short CH-cavity is completed, two cavities are ordered
Q4/2015	delivery of the CW demonstrator cryostat
Q1/2016	delivery of the demonstrator-cavity, SAT and offline system tests, tendering for 2nd cryostat
Q2/2016	beam test of CW demonstrator
Q4/2016	He test of 1 short cavity
Q4/2017	delivery of two short cavities and cryostat
Q4/2017	tendering and ordering of further 6 CH-cavities and cryostats
2019	delivery of cavities, cryostats, beam test of advanced demonstrator

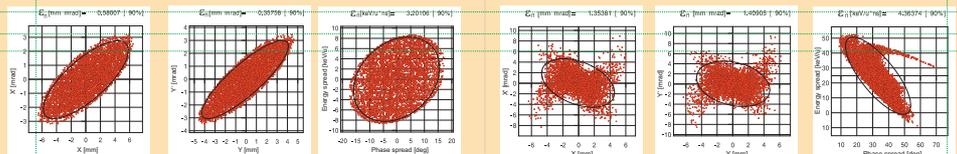
Measured Twiss Parameter are Starting Point for Beam Dynamic Calculations

Preliminary Layout for First Stage of Advanced Demonstrator



Input (homogeneously filled 6D ellipsoid)

Output



Design Parameters of the First Stage of Advanced Demonstrator

Mass/Charge	Frequency	Beam current	Injection energy	Output energy
6	217 MHz	1mA	1.4 MeV/u	2.2 MeV/u

