

# STEPS TOWARDS SUPERCONDUCTING CW-LINAC FOR HEAVY IONS AT GSI

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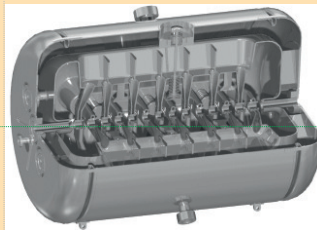
## Abstract

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

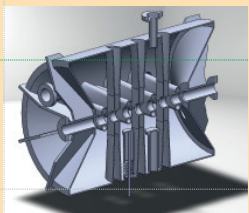
entire linac an advanced cryo modules comprising up to five CH cavities is envisaged for 2019 serving for first user experiments at the coulomb barrier.

## Demonstrator cavity



$\beta$	0.059
Frequency	216.8 MHz
Cells	15
Aperture	20 mm
Total length	691 mm
R/Q	3418 $\Omega$
$E_s$	5.1 MV/m

## Short cavity

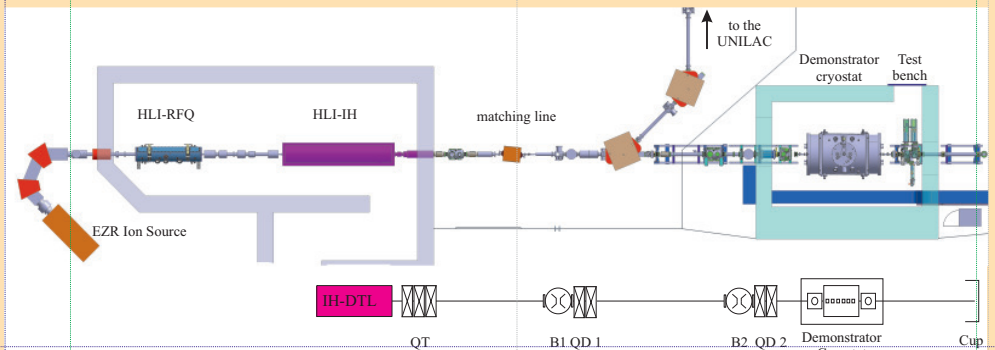


$\beta$	0.069
Frequency	216.8 MHz
Cells	8
Aperture	30 mm
Total length	593 mm
R/Q	1081 $\Omega$
$E_s$	

## Time schedule

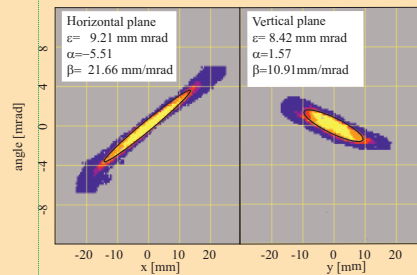
2015	tendering for the short CH-cavity is completed, two cavities are ordered
Q4/2015	delivery of the CW demonstrator cryostat
Q1/2016	delivery of the demonstrator-cavity, SAT and offline system tests, tendering for 2nd cryostat
Q2/2016	beam test of CW demonstrator
Q4/2016	He test of 1 short cavity
Q4/2017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

## Footprint of Demonstrator Test Environment at GSI

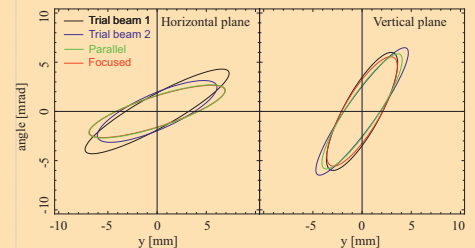


## Preparation for Commissioning

### measured Ar<sup>18+</sup> emittance

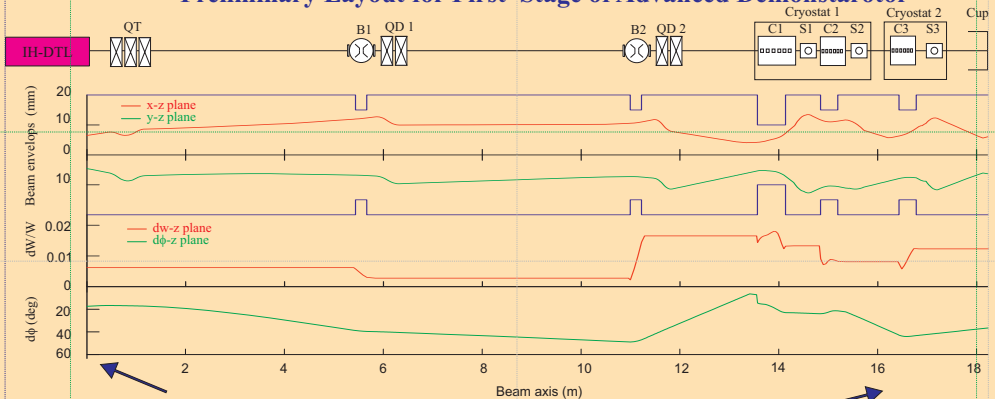


### Backwards calculated phase space ellipses @ IH for different quadrupol settings



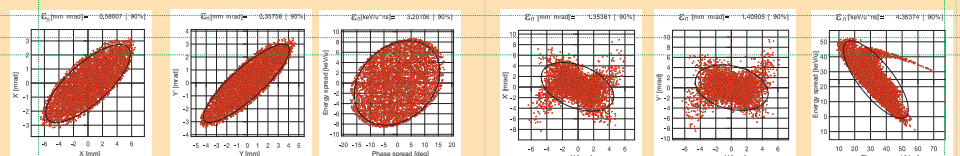
## Measured Twiss Parameter are Starting Point for Beam Dynamic Calculations

## 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	1 mA	1.4 MeV/u	2.2 MeV/u