Status of the superconducting 217 MHz CH-cavity*

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Presently the demonstrator for the sc cw-LINAC at GSI is under construction and its successful beam operation will be the first milestone realizing the new sc cw-LINAC at GSI [1]. The construction of an advanced demonstrator will be the second milestone towards the sc cw-LINAC at GSI. The presently design of the sc cw-LINAC consists of the demonstrator as first cavity and 4 to 5 additional cryomodules with 2 CH-cavities per cryomodule [2,3]. The design of the advanced demonstrator will be used for all cavities in the sc cw-LINAC after the demonstrator. The cavity is designed and optimized for high power applications, consisting of 8 accelerating cells. The design gradient is 5 MV/m. Its frequency is the second harmonic of the High Charge Injector (HLI) at GSI, Darmstadt. Table 1 shows the main parameters of the sc 217 MHz CH-cavity. In Figure 1 the layout of the sc 217 MHz CH-cavity is depicted.

Cavity Design

The design of the cavity is based on 8 equidistant gaps without girders and with stiffening brackets at the front and end cap to reduce pressure sensitivity. The new design avoids girders because they lead to high fabrication costs and extended fabrication duration. Additionally the girders reduce the mechanical stability of the cavity caused by a break of the cylindrical symmetry. The design of the advanced demonstrator without girders is cylindrically symmetrical which leads to significantly higher stability. Additionally the stiffening brackets at both ends of the cavity increase the mechanical stability of the cavity so that the pressure sensitivity is below 5 Hz/mbar.

Parameter	Unit	
β		0.069
Frequency	MHz	215.5
Accelerating cells		8
Length (βλ-definition)	mm	381.6
Cavity diameter	mm	412
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)	8.5
G	Ω	51
R_a/Q_0		1045

Table 1: Specifications of the 217 MHz CH-cavity

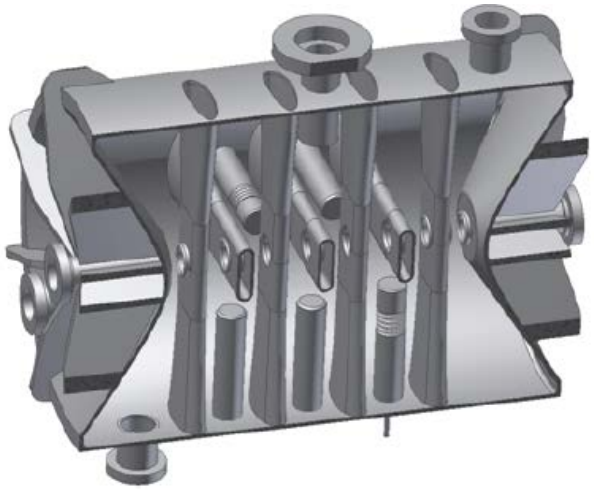

Figure 1: Layout of the sc 217 MHz CH-cavity.

Status

The basic design of the 217 MHz CH-cavity was finished in 2014. Several simulations with CST-Microwave-Studio have been performed to determine parameters as the optimum drift tube length, optimum stem width and cavity diameter [4]. The missing girders in the 217 MHz-cavity require a new design for the dynamic and static tuners. Because of that many simulations concerning the layout and performance of the bellow tuners have been performed to find the optimum geometry. The call for tender started in december 2014 and will end on february 2015. So the communication with the company will start in february 2015 and will be followed by the production start.

References

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