

R&D status of the new Superconducting CW heavy Ion LINAC@GSI

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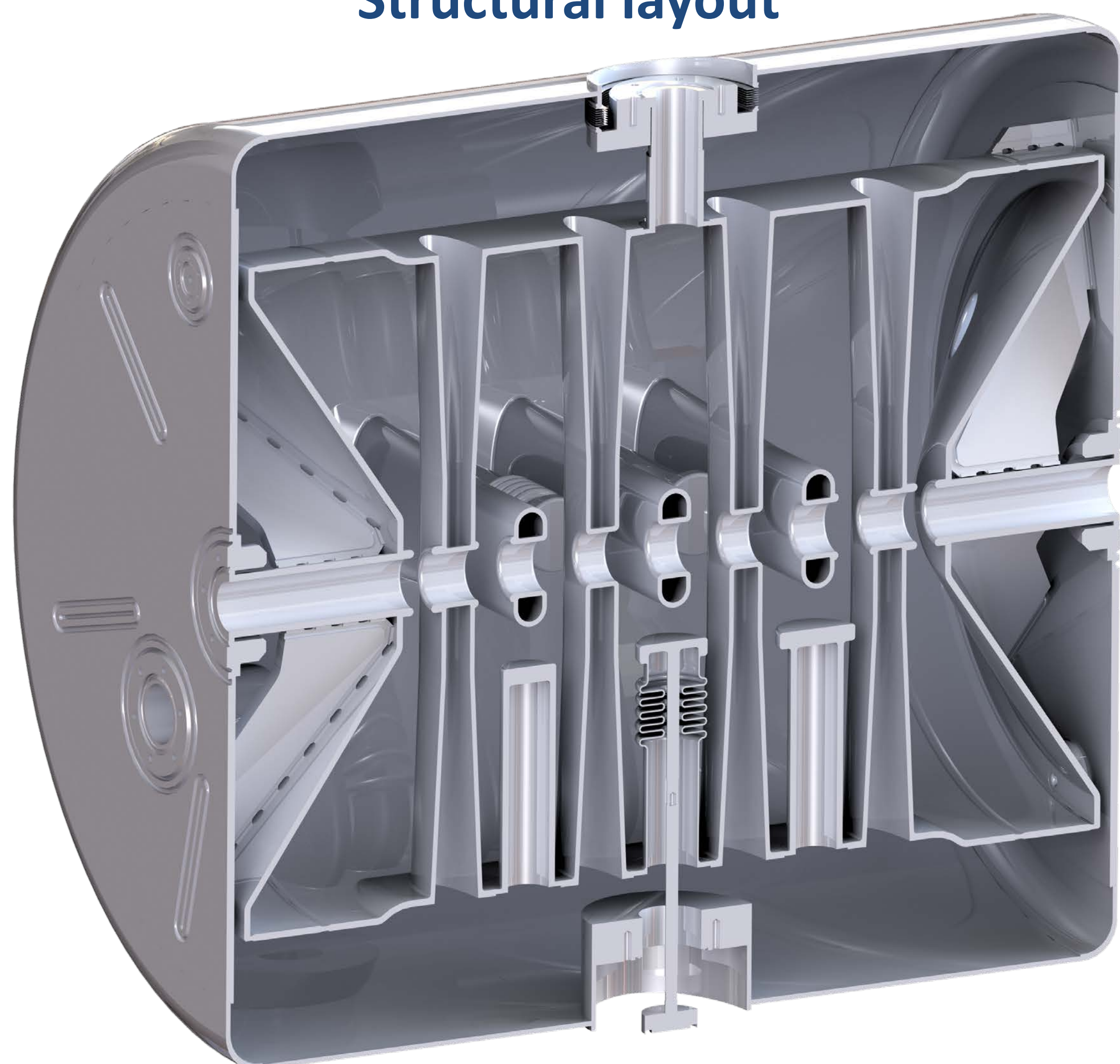
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Abstract:

For future research in the field of Super Heavy Elements (SHE) a superconducting (sc) continuous wave (cw) ion LINAC with high intensity is highly desirable. Presently a multi-stage R&D program conducted by GSI, HIM and IAP is in progress. The fundamental linac design composes a high performance ion source, a new low energy beam transport line, the High Charge State Injector (HLI) upgraded for cw, and a matching line (1.4 MeV/u) followed by the new sc-DTL LINAC for acceleration up to 7.3 MeV/u. The successful commissioning of the first Crossbar-H-mode (CH) cavity (Demonstrator), in a vertical cryo module, was a major milestone in 2015.

The next stage of the new sc cw heavy ion LINAC is the advanced demonstrator comprising a string of cavities and focusing elements build from several short constant-beta sc CH-cavities operated at 217 MHz. Currently the first two sc 8 gap CH-cavities are under construction at Research Instruments (RI), Bergisch Gladbach, Germany. The new design without girders and with stiffening brackets at the front and end cap potentially reduces the overall technical risks during the construction phase and the pressure sensitivity of the cavity. The recent status of the construction phase as well as an outlook for further cavity development of the new cw heavy ion LINAC will be presented.

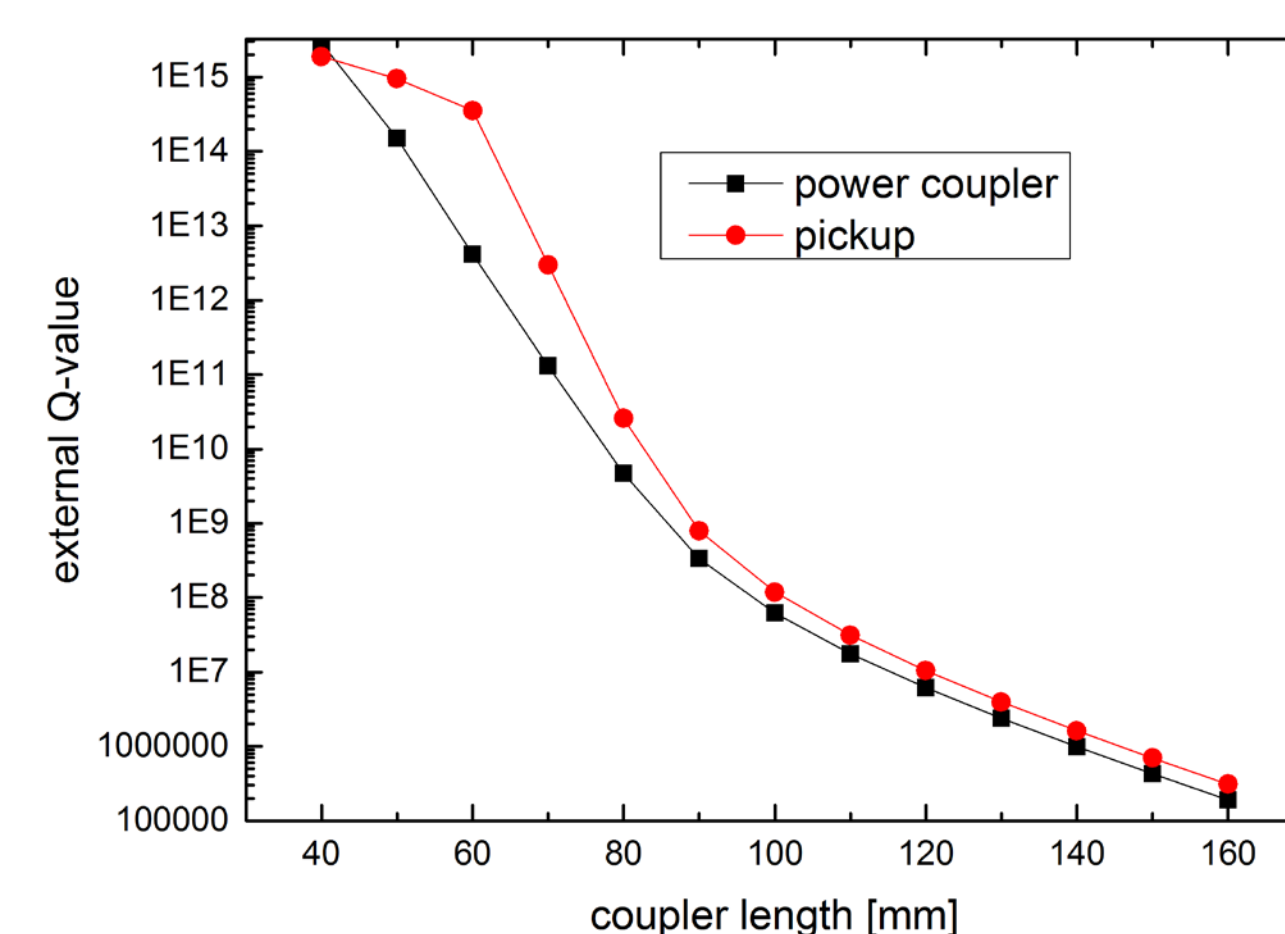
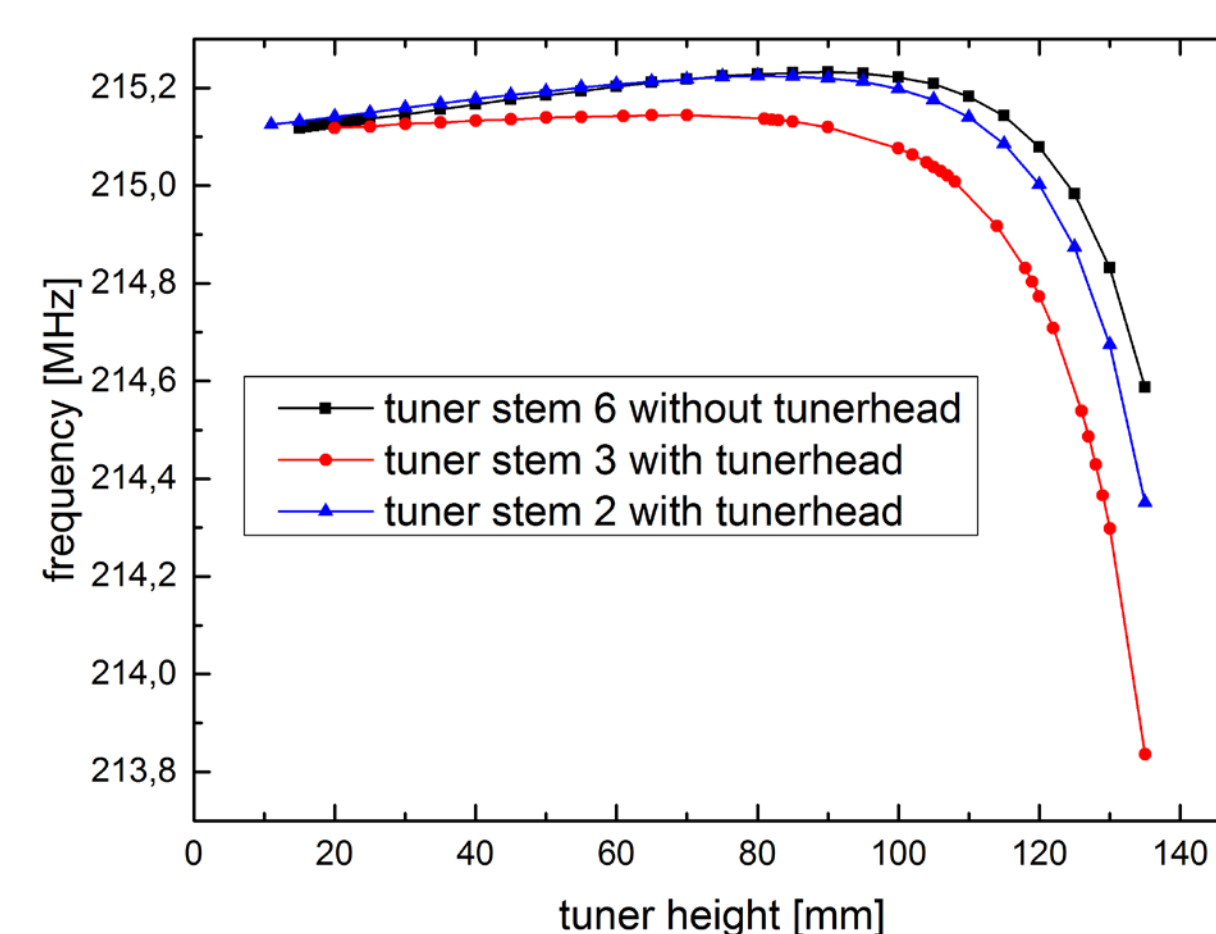
Structural layout



Parameter	β	f	#cells	Eff. Length ($\beta\lambda$ -def.)	Inner diam.	E_a	E_p/E_a	B_p/E_a	G	R/Q
Unit	-	MHz	-	mm	mm	MV/m	-	mT/(MV/m)	Ω	Ω
Value	0.069	216,816	8	381.6	400	5	5.2	< 10	50	1070

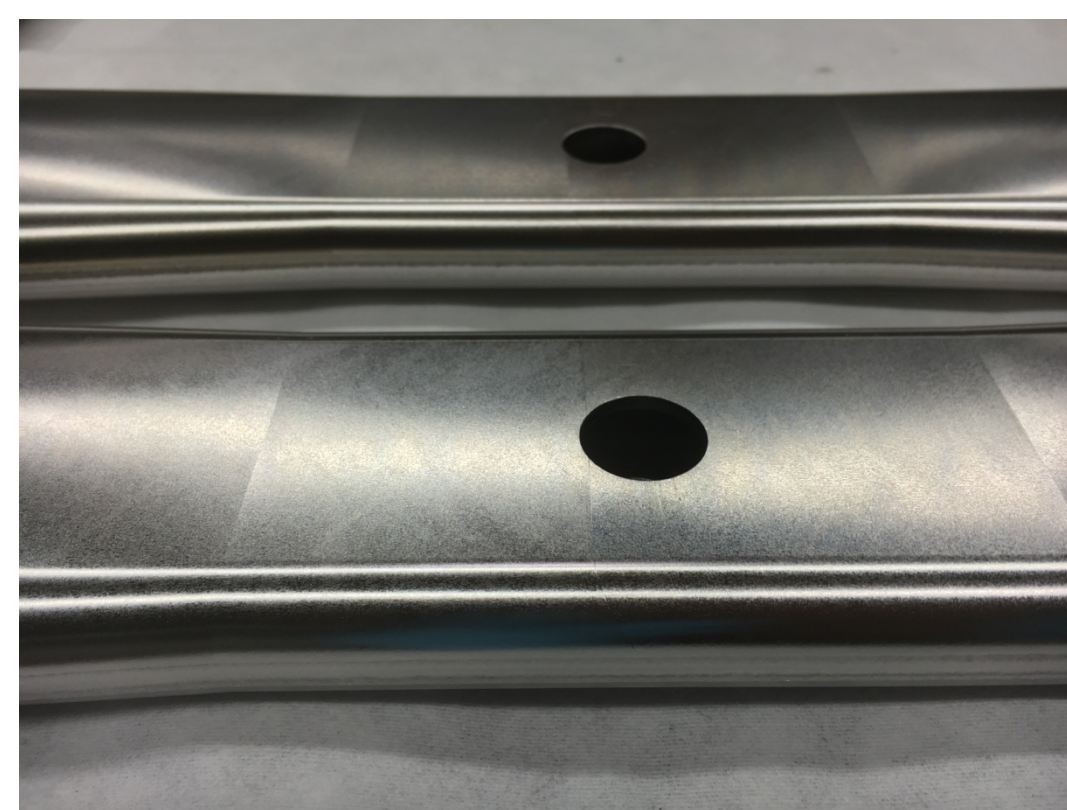
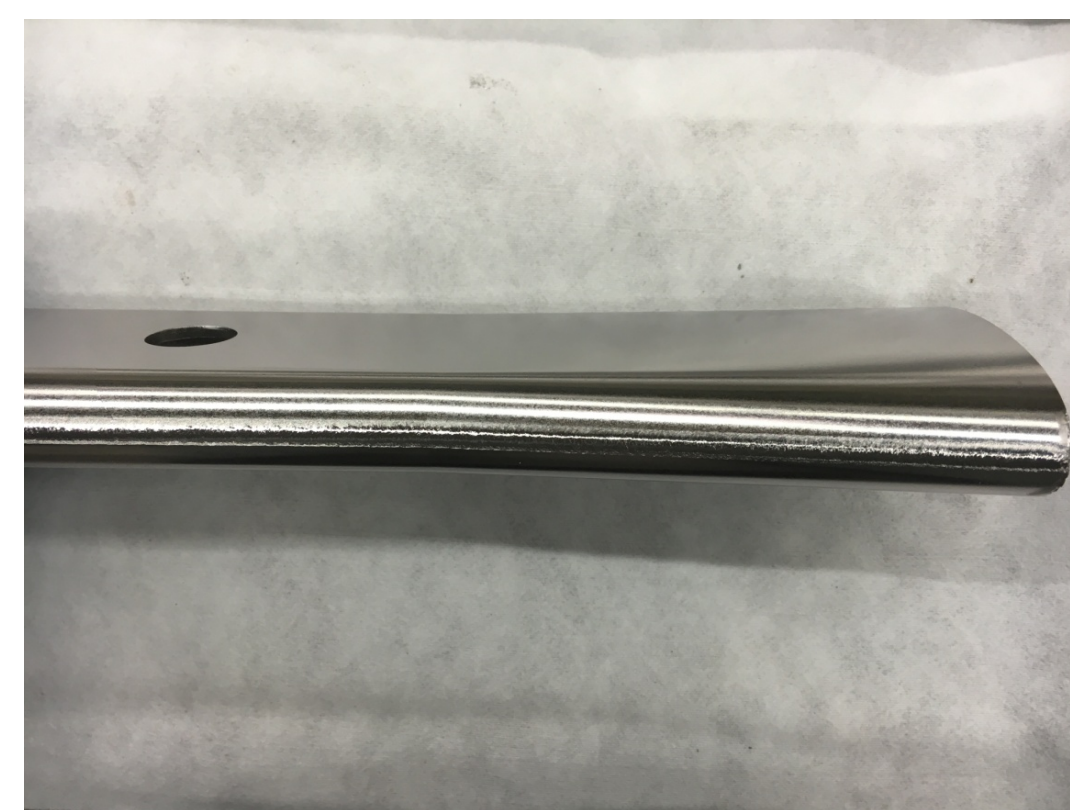
Preparations for first Measurements during the fabrication process

- First measurements are scheduled for the end of 2016
- They include the tuning range of all 3 static tuners, the external Q-value for the power coupler and pickup as well as the field distribution
- To measure the tuning range 3 brass dummy tuner with brass mounts have been fabricated (see box below)
- For measurements of the external Q-values of the couplers several copper tubes have been fabricated to provide for lengths from 20 mm up to 180 mm in 20 mm steps (see box below)
- Simulated tuning range and external Q-values are displayed below

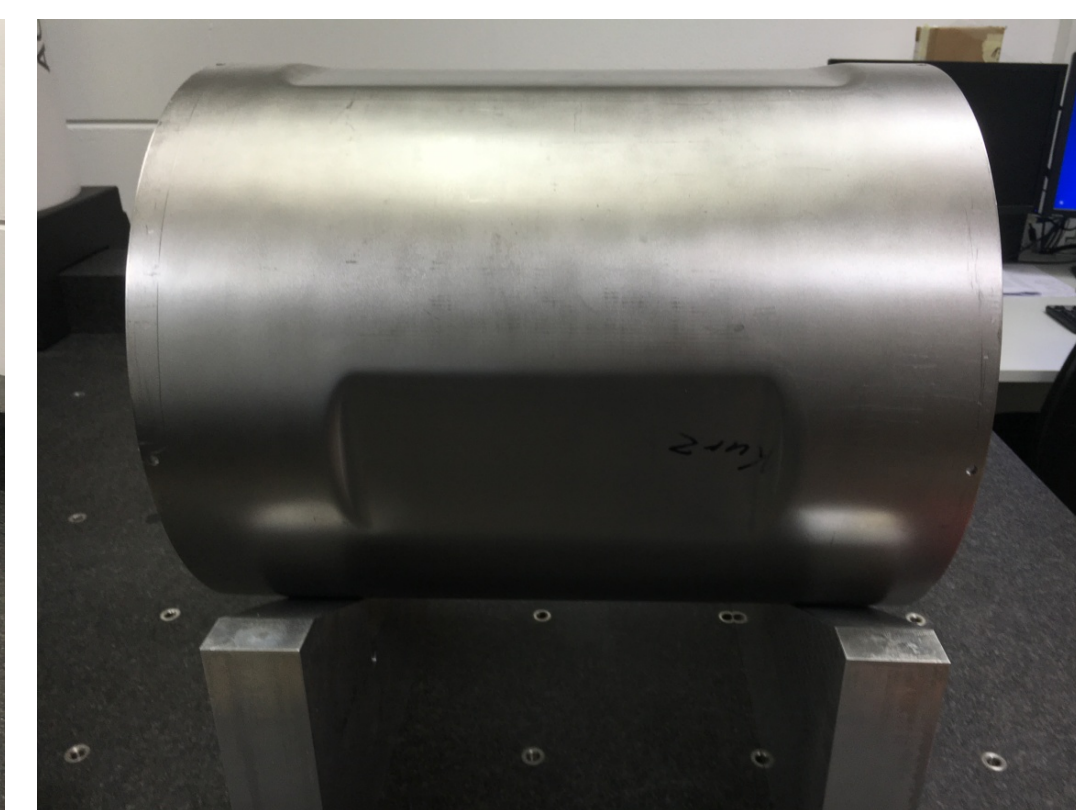
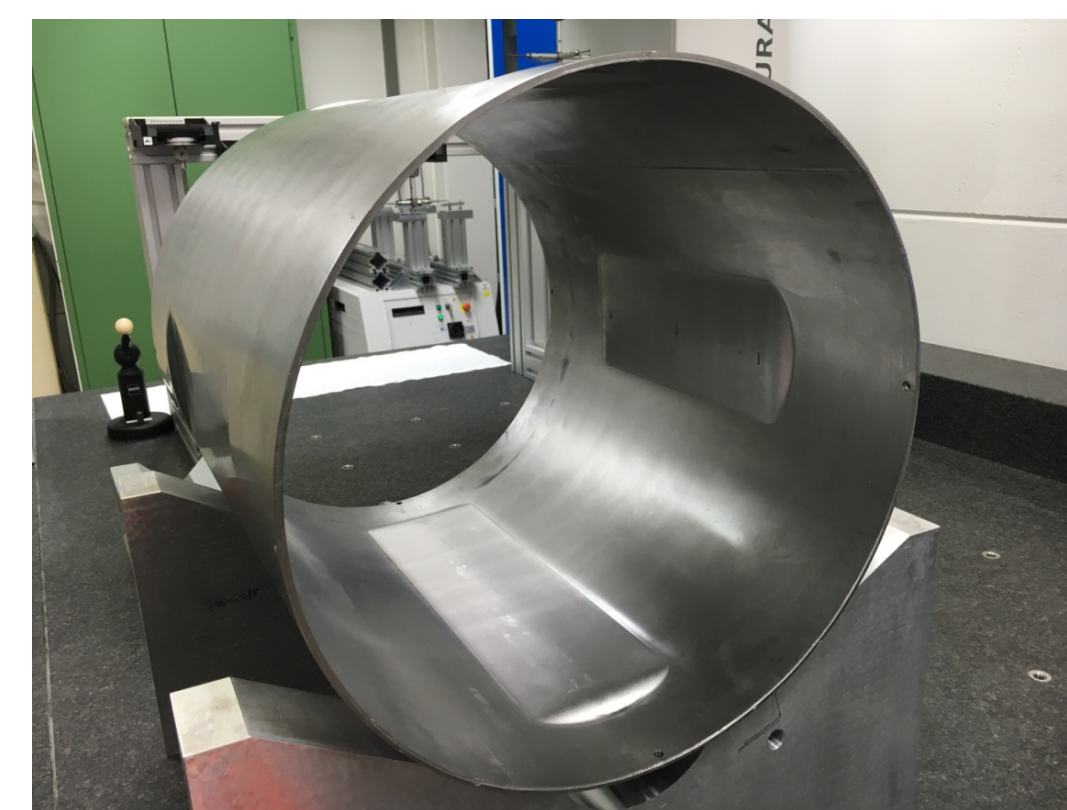


Fabrication status at Research Instruments

- All stems have been fabricated



- The cavity body has been welded and flattened



- The end caps have been hydro formed



- The brass dummy tuners with brass mounts



- Copper coupler tubes for lengths from 20 mm up to 180 mm in 20 mm steps

