

Further Tests on the sc 325 MHz CH-Cavity and Power Coupler Test Setup

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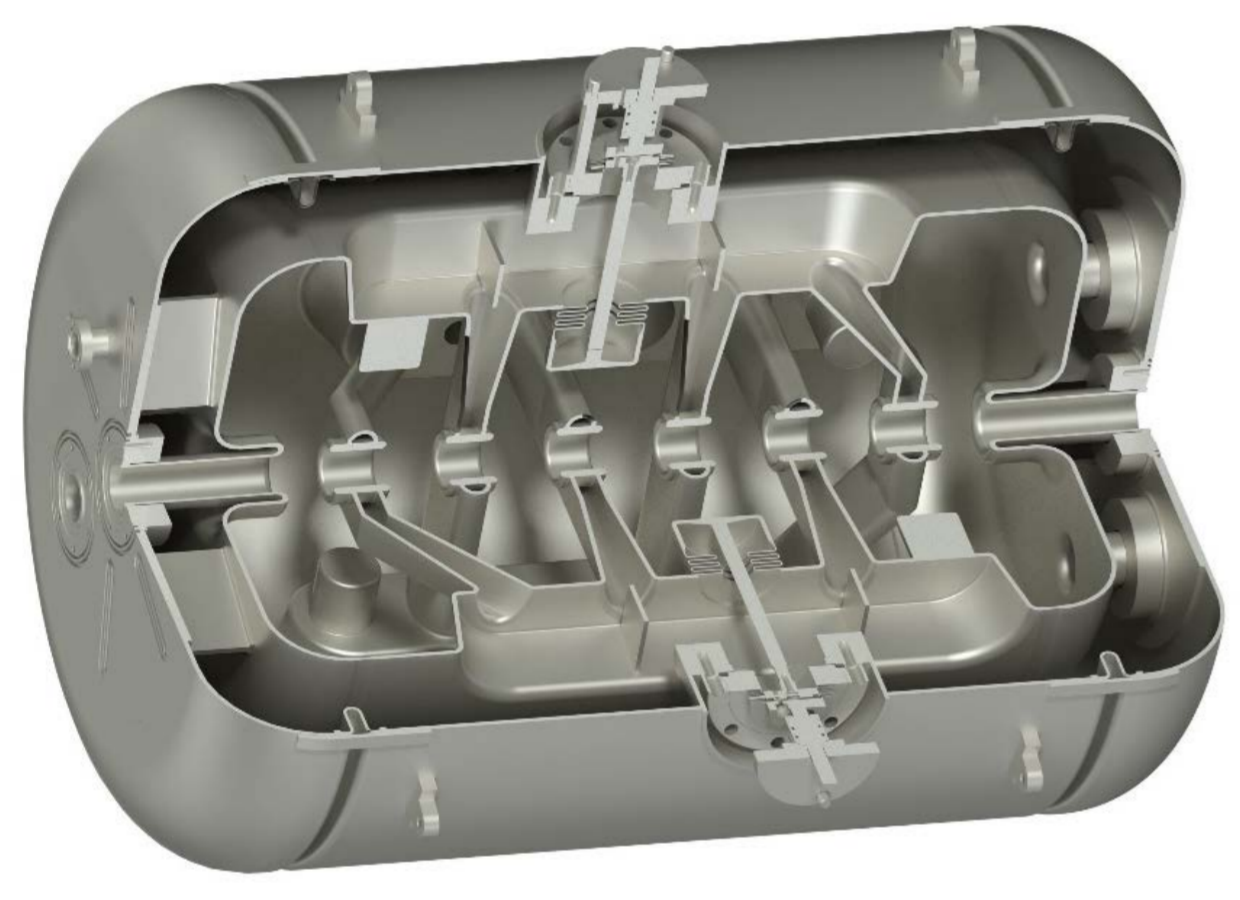
Abstract

The 325 MHz CH-Cavity which has been developed and successfully vertically tested at the Institute of Applied Physics, Frankfurt, has reached the final production stage. The helium vessel has been welded to the frontal joints of the cavity and further tests in a horizontal environment are in preparation. The corresponding 325MHz power couplers have been conditioned and tested at a

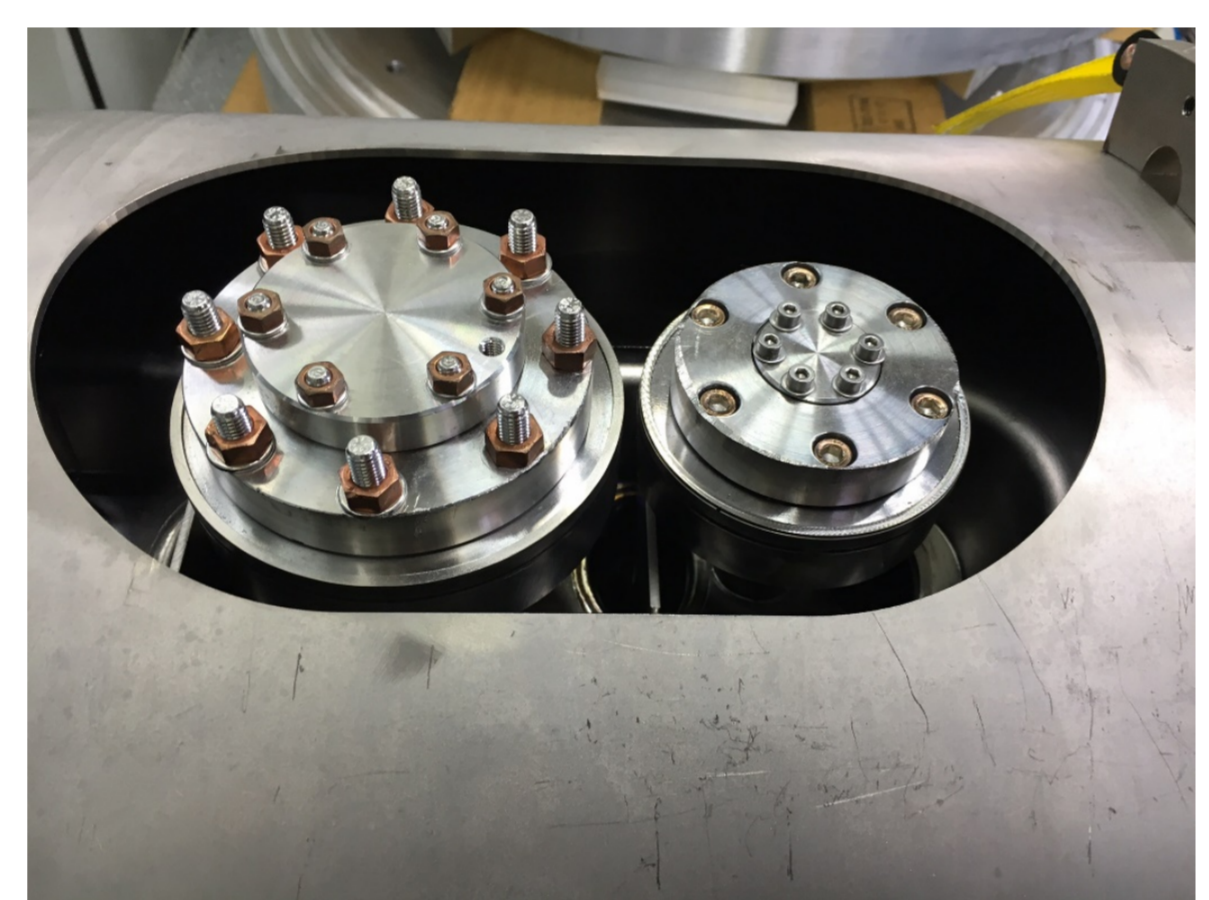
dedicated test stand up to the power level of 40 kW (pulsed) for the targeted beam operation. Furthermore a test setup for 217 MHz power couplers for the sc cw LINAC at GSI has been investigated, simulated and built. This quite compact layout, based on a quarter-wave type geometry, acts as a broadband waveguide making it possible to test two FPC's in different configurations.

325 MHz CH-Cavity Status Update

After successful tests with gradients up to 14.1 MV/m at 2 K the cavity was sent back to Research Instruments for final weldings of the helium vessel. Unfortunately the final leak tests discovered a small leak inside the membrane bellow within the port for the power coupler. Due to the complex position it was decided to cut out a race track profile around the coupler ports including the membrane bellows. A replacement structure has been produced and welded into the vessel thereby closing the leak. The next steps for the CH-Cavity are further vertical measurements and preparations for tests in a horizontal environment.



Cut view of the 325 MHz CH-Cavity.



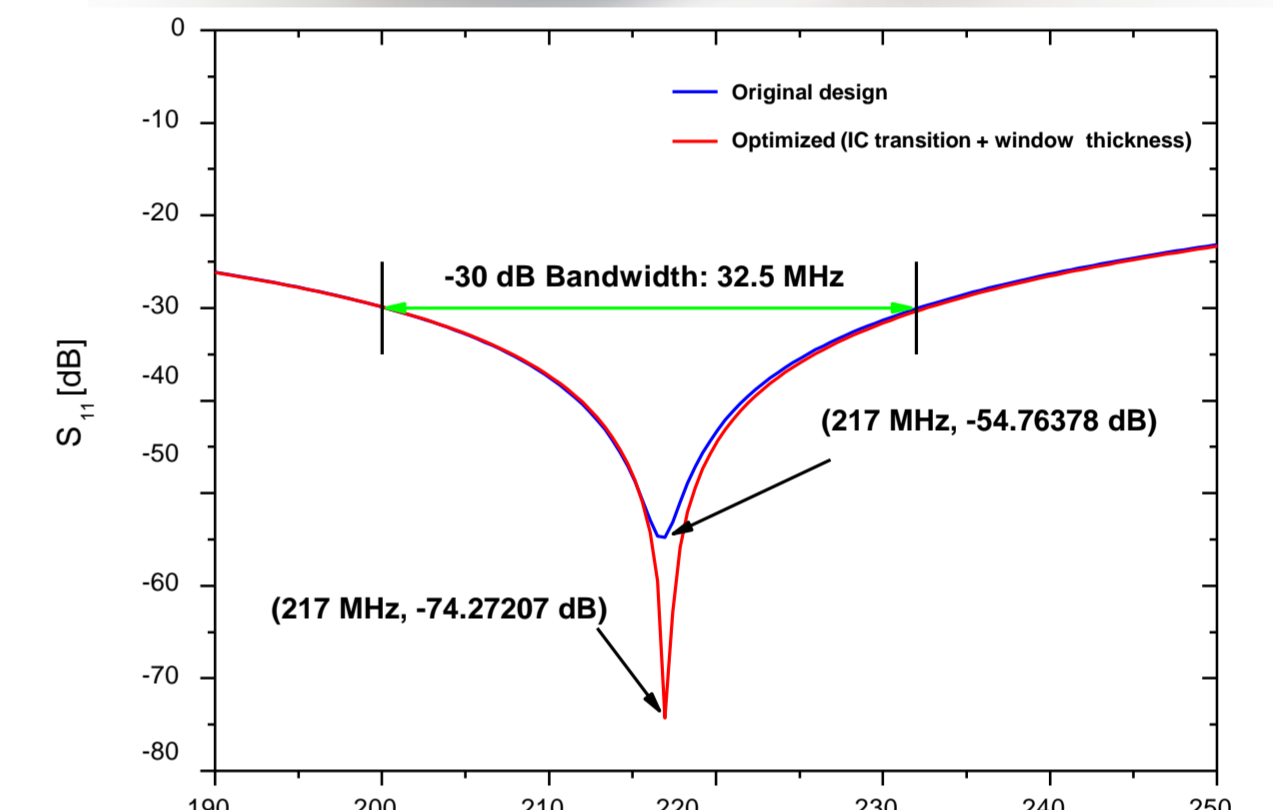
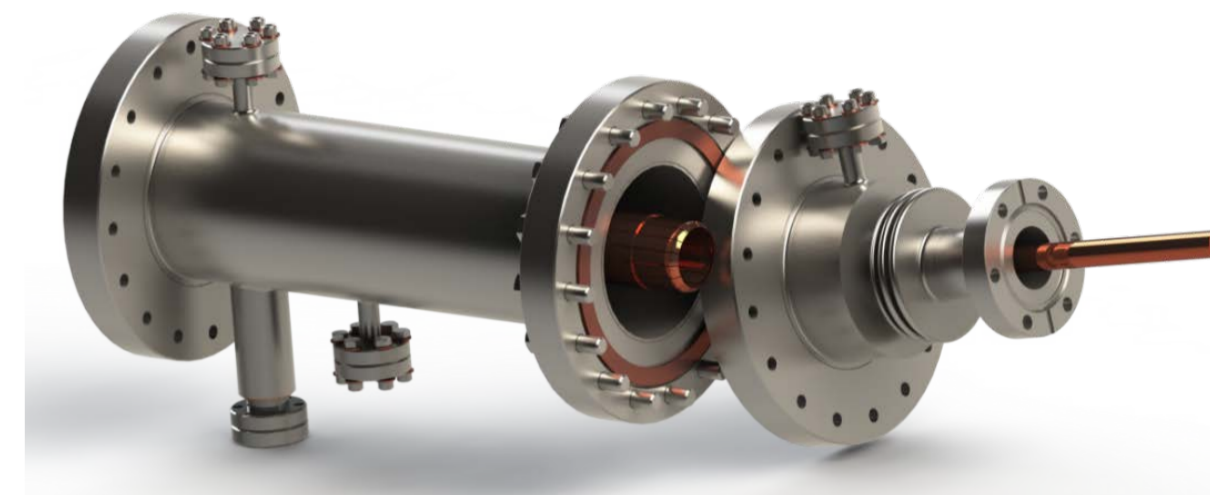
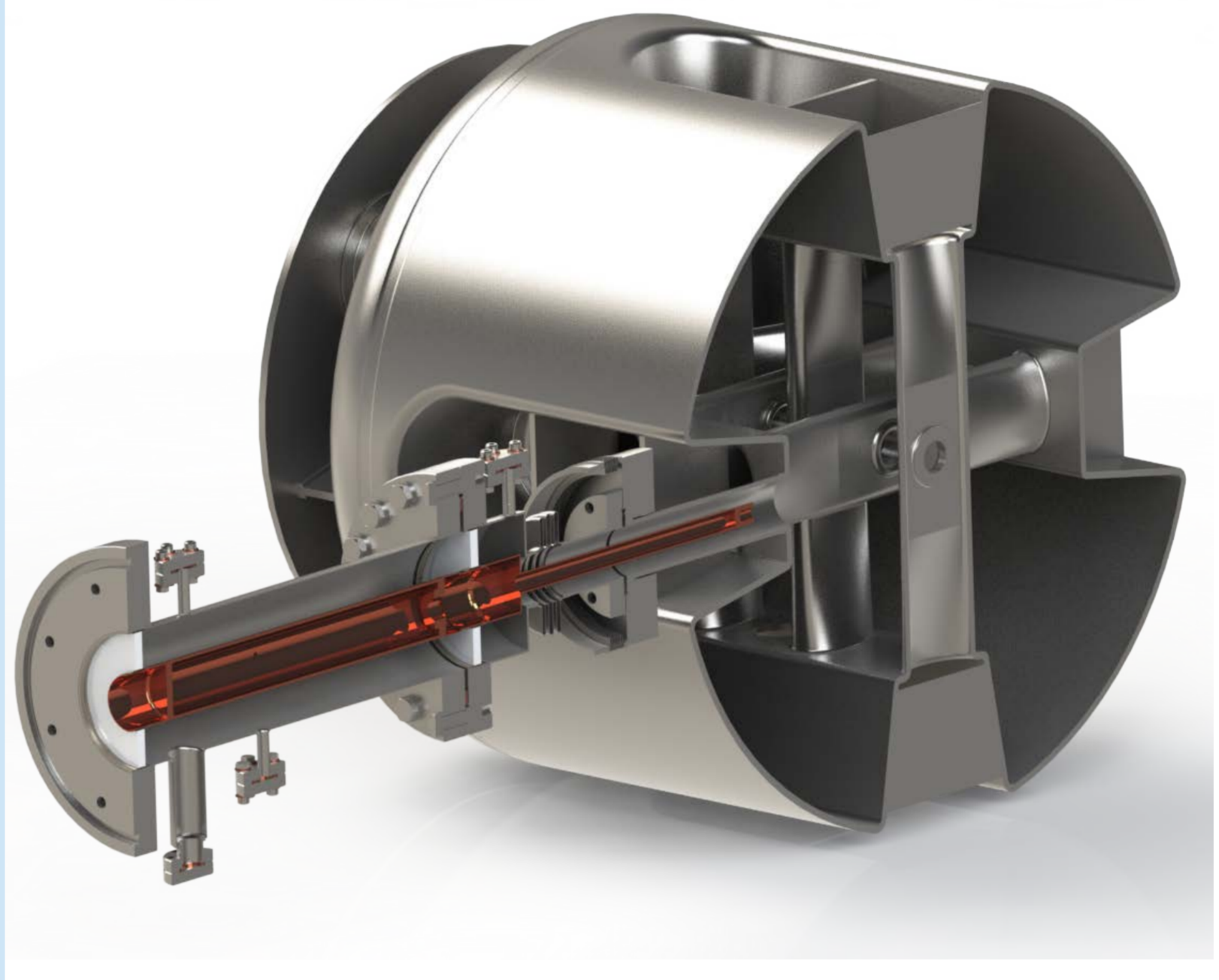
Cut out race track profile.



Trough profile as replacement for the leak bellows.

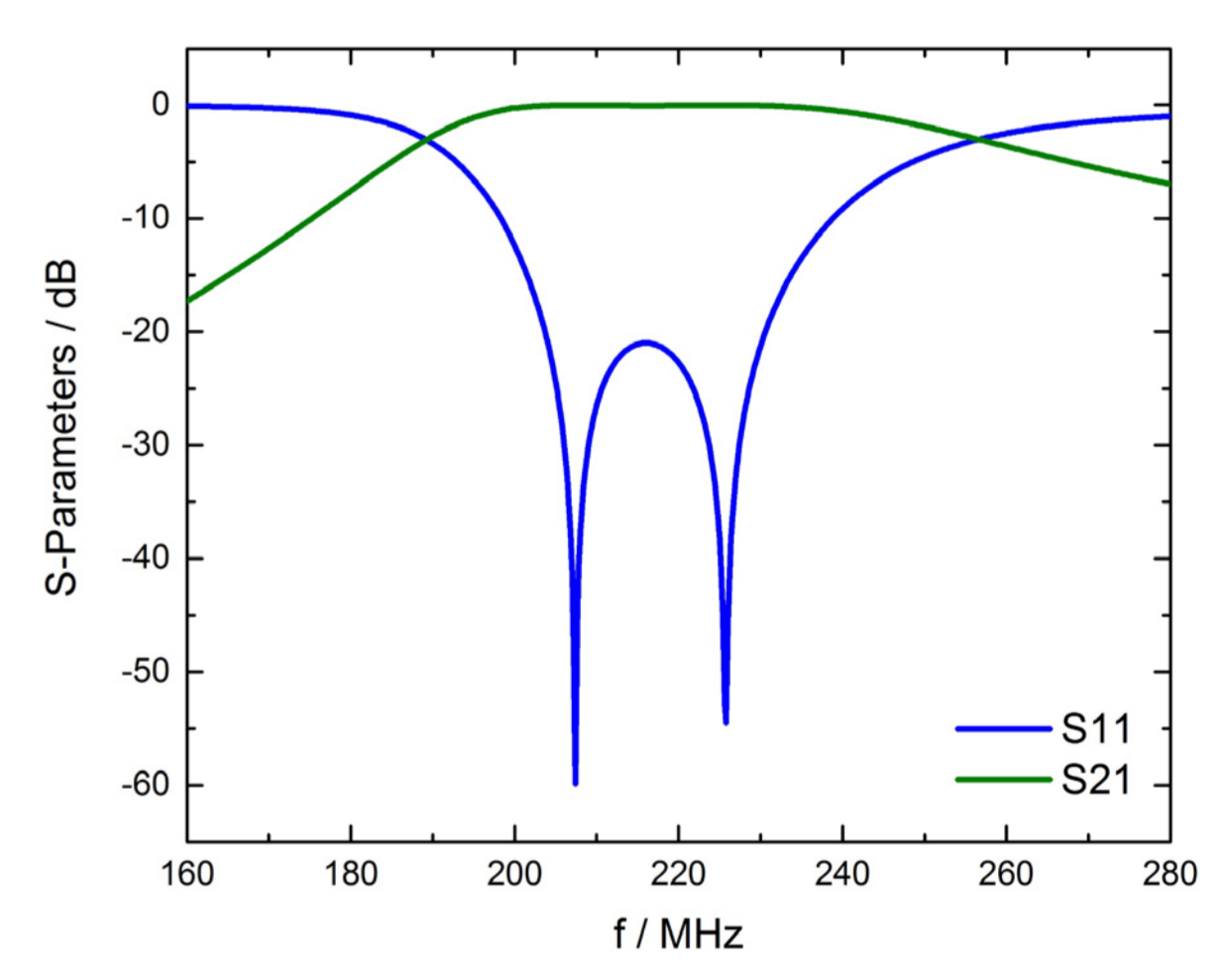
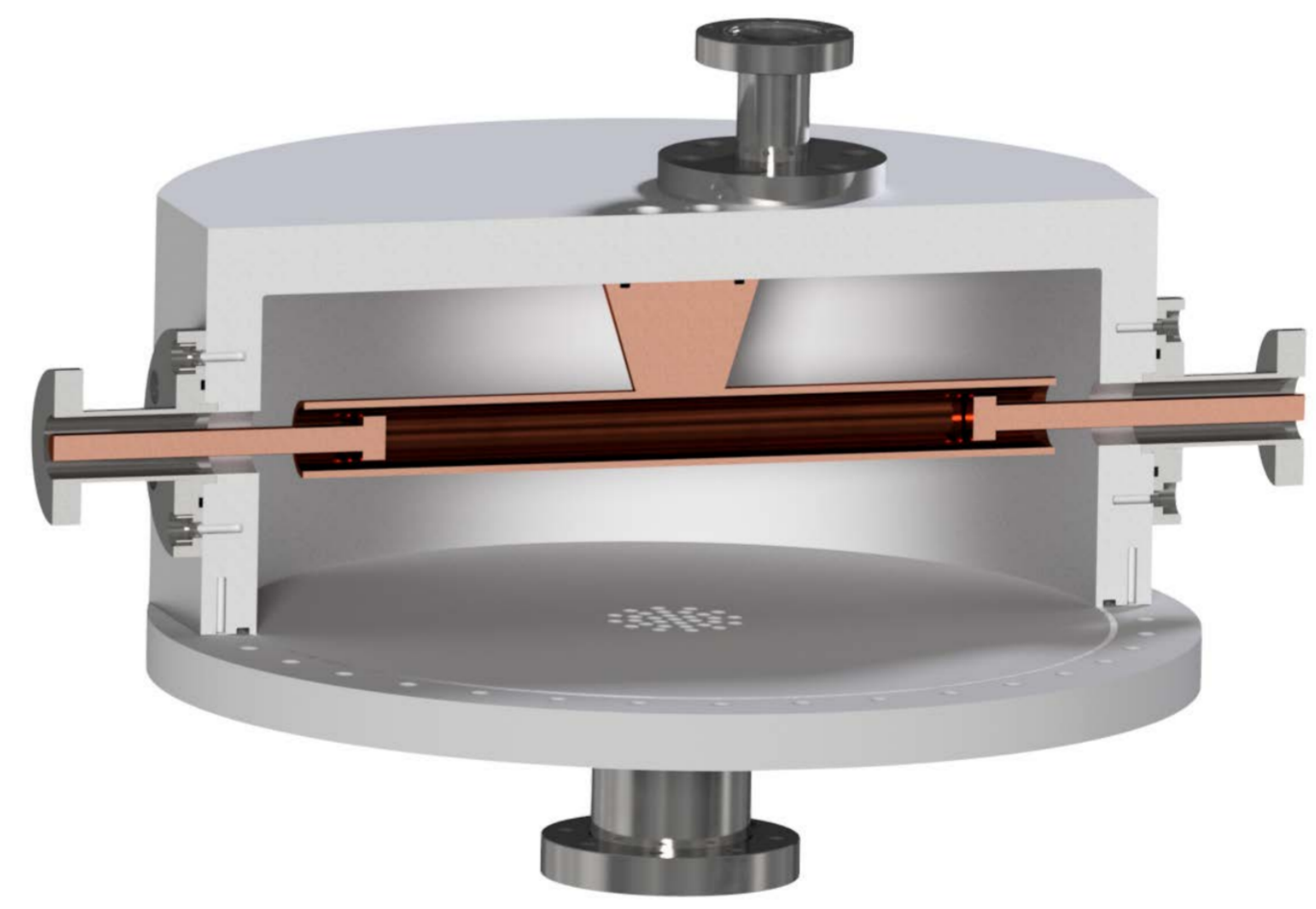


The 217 MHz Power Coupler



Design of the 217 MHz FPC and assembly with the corresponding CH-Cavity. Changed window positions and a transition to smaller transversal dimensions required simulations in order to reduce reflected power.

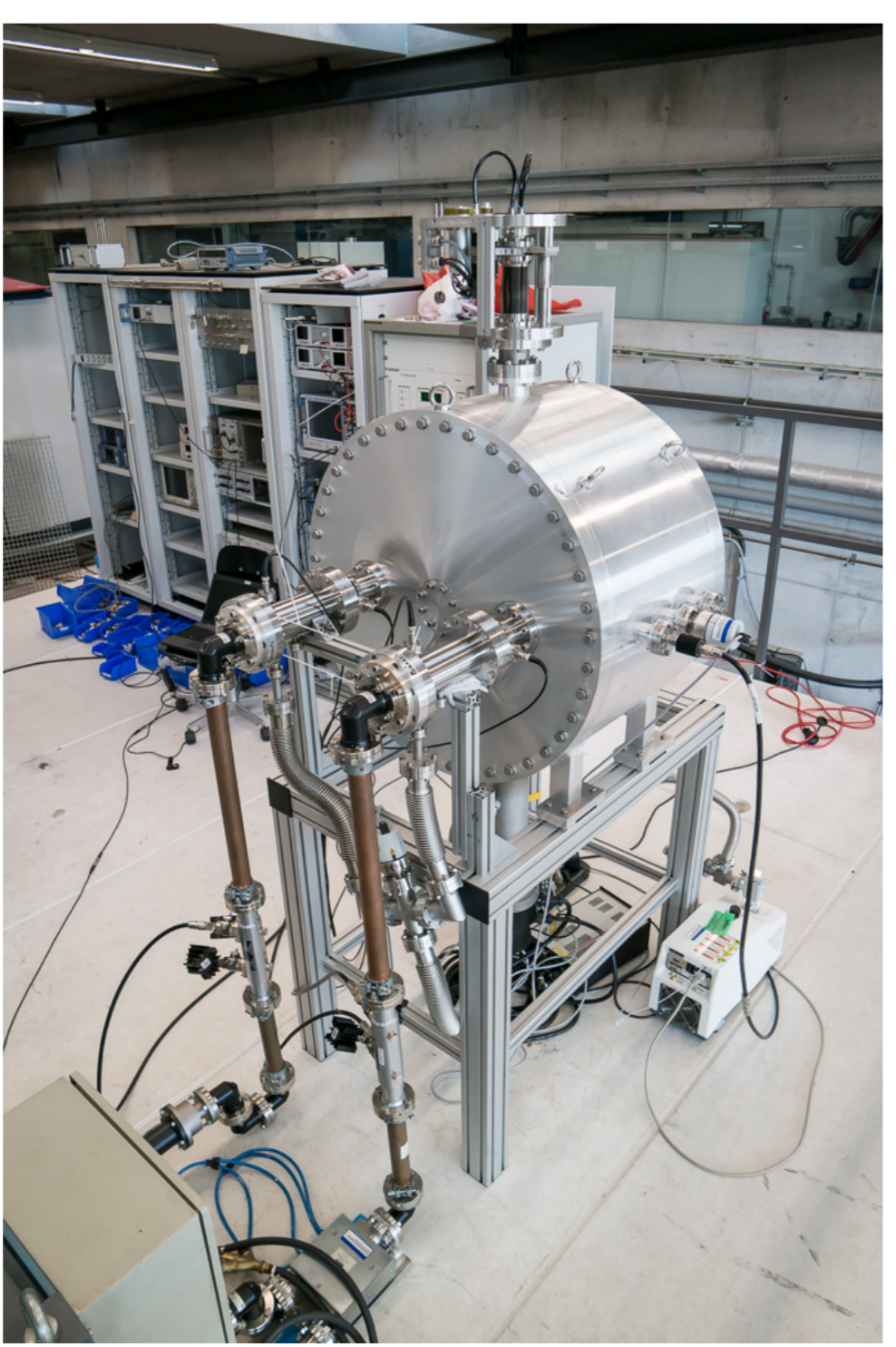
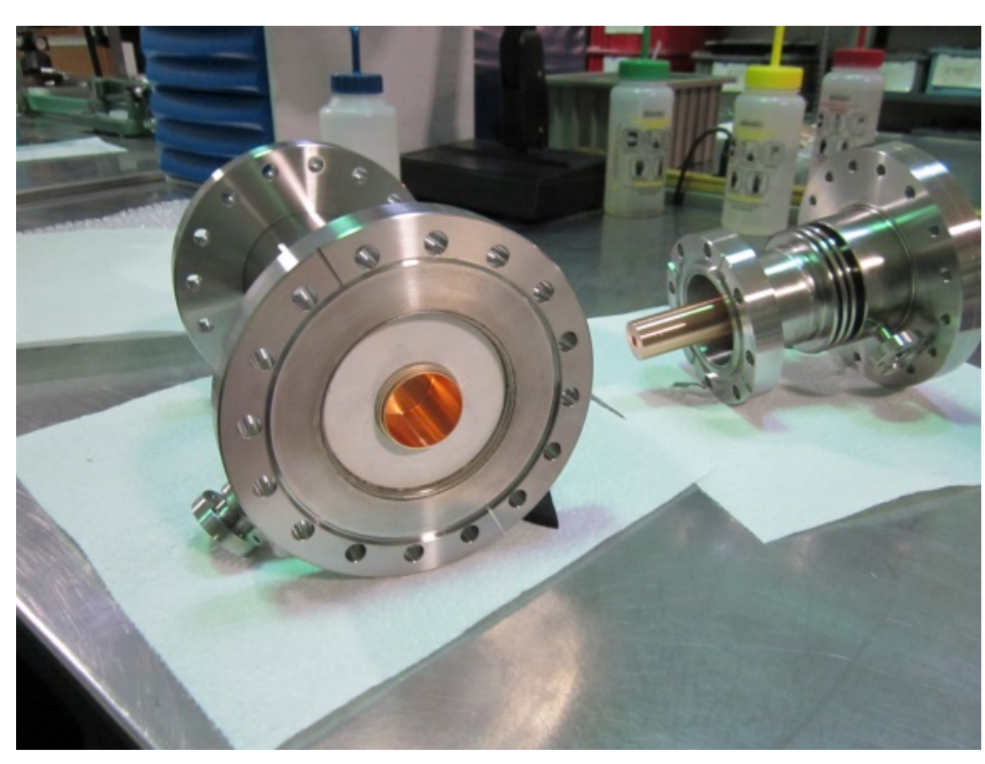
217 MHz Power Coupler Test Setup



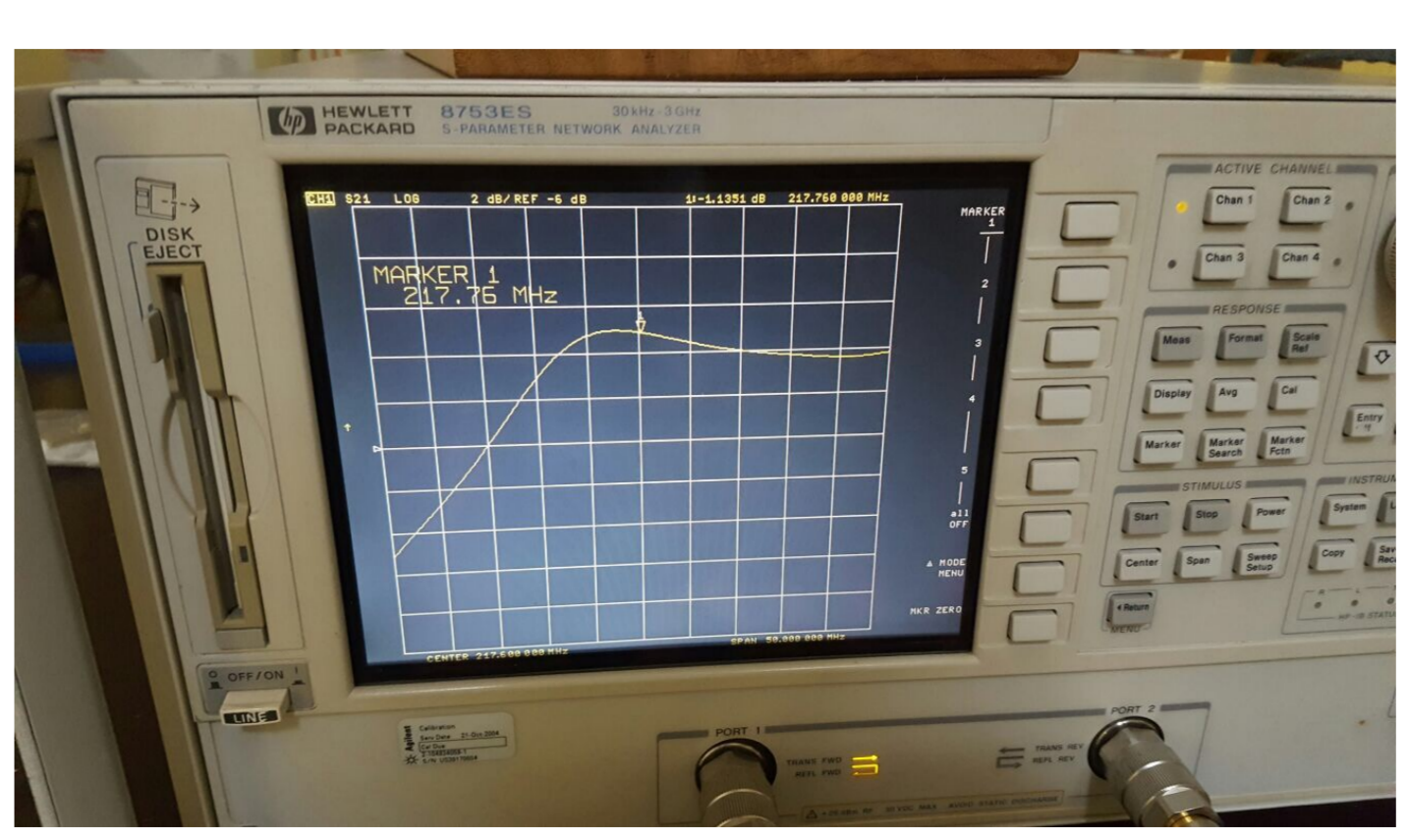
The setup for the 217 MHz FPC's demanded a different approach for the conditioning of the couplers. A quarter-wave type waveguide was simulated in order to achieve a compact design and concurrently to gain a broadband transmission behavior.

325 MHz Power Coupler Test Layout

For the tests of the 325 MHz power couplers a dedicated test stand has been arranged at IAP, Frankfurt. This setup enabled two power couplers, linked by a pill-box cavity, to be conditioned up to 40 kW of pulsed power. Besides the power measurement the current of the Langmuir probes, mounted in the vicinity of the ceramic windows, as well as the pressure between the windows has been recorded to detect Multipacting events. These events could be surmounted by a bias voltage of 60 V.



Assembly of the power coupler test stand.



The test box made of aluminum and with an inner geometry made of bulk copper was constructed and assembled at GSI, Darmstadt. Conditioning of two FPC's could successfully be performed up to 2.5 kW cw power only being limited by increasing temperature at the windows due to the non-cooled couplers.