Cold Power Tests of the sc 325 MHz CH-Cavity*

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Abstract:
At the Institute for Applied Physics, Frankfurt University, a superconducting 325 MHz CH-Cavity has been designed, built and first tests have successfully been performed. The cavity is determined for a 11.4 AMeV, 10 mA ion beam at the GSI UNILAC. Consisting of 7 gaps this resonator is envisaged to deliver a gradient of 5 MV/m. Novel features of this structure are a compact design, low peak fields, improved surface processing and power coupling. Furthermore a tuner system based on bellow tuners attached inside the resonator and driven by a stepping motor and a piezo actuator will control the frequency. In this contribution measurements executed at 4 K and 2 K at the cryo lab in Frankfurt will be presented.

Setup and Main Parameters
In the cryo-lab of IAP a measurement setup comprising a vertical cryostat has been installed for various test purposes allowing power measurements at 4 K and 2 K, respectively. The vaporized Helium can be extracted via a port to a recovery system or pumped out by a roots pump to achieve 2 K. The forward power is delivered by a 500 W broadband amplifier. Further equipment like the control system, scopes, power meter and rf generator is arranged in three racks.

LFD Measurements
The CH-cavity has been provided with four low-temperature probes and forty Thermo-Luminescence-Dosimeter to record field emission events. The analysis of the TLDs yielded a small potential field emitting site located at the bottom of the cavity. Furthermore a long term VCO measurement has been performed to study cavity operability with background noise from pumps, power supplies and helium bubbles.

Cold Measurements
After HPR preparation and fast cool-down the performance improved significantly to gradients up to 8.5 MV/m at 4.2 K. Lowering the temperature to 2.1 K yields a gradient of 14 MV/m with very few multipacting at low fields. Even higher field levels are limited by a supposed thermal defect leading to quench event.