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Estimation of the Critical RF Fields on a SRF Cavity Flange Transition

To optimize the length of the drift tube of a superconducting radio frequency (SRF) cavity, it is required to know the critical value of the RF fields. This prevents a potential early quench at the flange contact area (transition) in case of a drift tube length reduction.

To avoid changes on the SRF cavity used for the tests, all RF cryogenic experiments will be carried out by using a cylinder in the center of a 1-cell cavity drift tube to increase the field density at the flange contact. This cylinder was designed and optimized by CST Microwave Studio simulations for the use of a test cavity with a comparatively low gradient to avoid field restrictions by the cavity.

The ongoing work investigates the field limitations of 1.3 GHz TESLA-Shape SRF cavity flanges, originally designed for low field areas. Due to the high losses at the normal conducting seal, a relatively low value can be expected to be critical. For this reason approaches to increase the critical RF fields will be investigated during the further process.

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