A COLD BEAD-PULL TEST-STAND FOR SRF CAVITIES

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Cold Test-Stand

Figure 1: 9-cell Tesla cavity mounted on the test-stand before the installation of the pillbox (a). Pill-box cavity mounted with the wire system inside the HobiCat cryomodule (Niobium 9-cell cavity hidden behind) (b).

Bead Calibration

Figure 2: Layout of the 9-cell Tesla cavity mounted within HoBiCaT test cryomodule [1,2].

\[ f = \pi r^2 \varepsilon_0 \left( \frac{\varepsilon_r - 1}{\varepsilon_r + 1} \right) \]

\[ s = \frac{R/Q_{\text{meas}}}{R/Q_{\text{sim}}} \]

\[ f_c = f \cdot s \cdot s^* \]

\[ \Delta_{\text{nohole/hole}} = -103 \text{ Hz} \]

Phase corr. factor = -0.012°

\[ f_c = 5.083 \times 10^{-21} \]


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**References**


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Monopole Band 1, published in [1]

**TT**

- Saturation in the band measurement due to:
  - Metal bead
  - Big size

**HOMs**

- Due to a LHe environment, the lossless surface material characteristics allow for the characterisation of many high order modes (HOMs)
- Extreme field sensitivity to bead perturbation
- Proper bead calibration is required.
Monopole Band 1

\[ \pi \]
\[ 3/9\pi \]
\[ 6/9\pi \]

\[ R/Q_{\text{Wanz}} = 1022 \]
\[ R/Q_{\text{meas}} = 1099 \]
\[ Q_i = 1\times10^5 \]

\[ R/Q_{\text{Wanz}} = 0.0013 \]
\[ R/Q_{\text{meas}} = 0.032 \]
\[ Q_i = 1.95\times10^5 \]

\[ R/Q_{\text{Wanz}} = 0.0019 \]
\[ R/Q_{\text{meas}} = 0.12 \]
\[ Q_i = 6.9\times10^4 \]

Monopole Band 2 (HOMs)

\[ 8/9\pi \]

\[ R/Q_{\text{Wanz}} = 77.6 \]
\[ R/Q_{\text{meas}} = 89 \]
\[ Q_i = 4320 \]

- Average deviation in the field flatness of 1.98%
- Small repetition error 0.31% (average)
CONCLUSIONS:

- 1st Cold bead-pull test stand commisioned and in operation
- Form factor of the bead extracted by means of a copper pillbox at 1.8 K
- Experimental study of the effects created by cooldown process and tuner actuation on field profile
- Sucessfully commisioned a 1.3GHz 9-cell Tesla cavity for the fundamental passband. Characteristic parameters such as R/Q can be experimentally determined.
- Study of the field profile and R/Q for different HOM modes

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