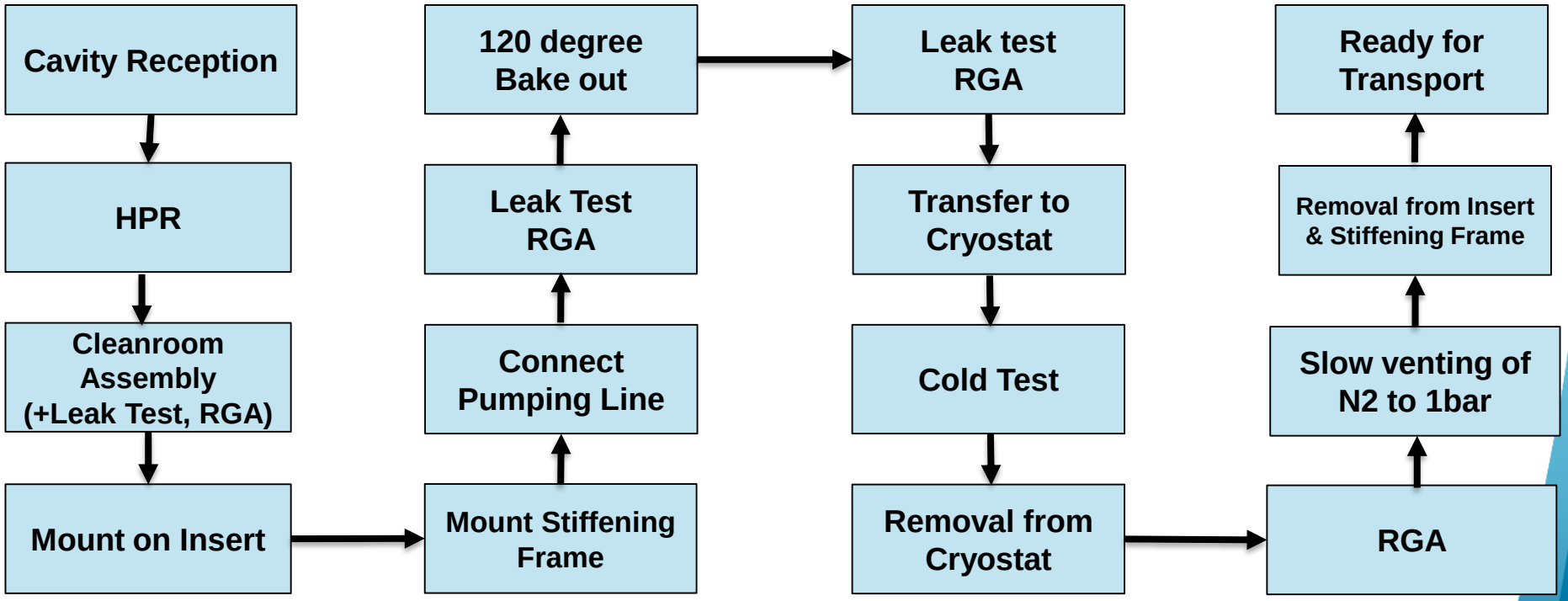
# RF dipole Cold test results

Katarzyna Turaj on behalf of SRF testing team

AUP-Canada-CERN-UK meeting, CERN, 25 September 2020

# RF testing of bare RFD1 and RFD2 cavities

- RF tests performed in July/August in V4 cryostat
- The same preparation and testing process was used for both cavities (slight differences on the next slide)

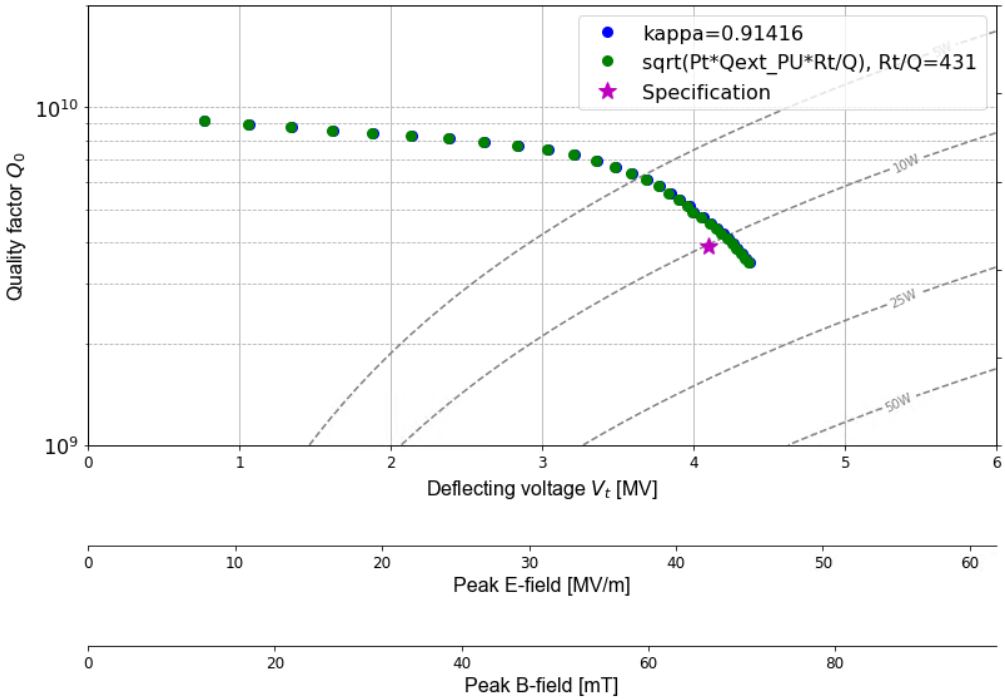


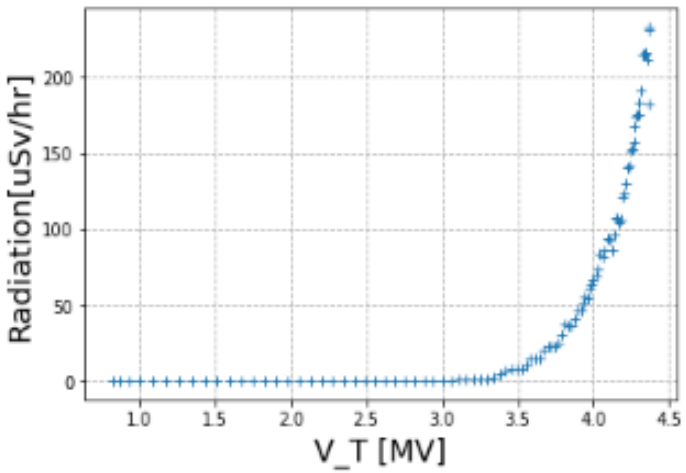
# Differences in the preparation and testing process

- Cool down (see spare slides)
  - RFD1: slow cooldown until 130K with ΔT<10K, fast cool-down below 130K (~5K/min),
  - RFD2: slow cooldown until 250K, fast cool-down below 250K (~1.2K/min) ΔT>>50K
- Magnetic field compensation
  - RFD1: ~1μT
  - RFD2: 0.5μT

# Results of the RF cold test of RFD1 (04.08.20 - 07.08.20)

- Multipacting much more difficult to be process appeared at the same Vt as for RFD2→ RF conditioning using pulse and AM* method
- Surface resistance ~12nΩ
- only CW measurement →to prepare the cavity for light BCP as soon as possible
- No field emission was observed below ~3.5MV; at 4.1MV: ~85 μSv/h

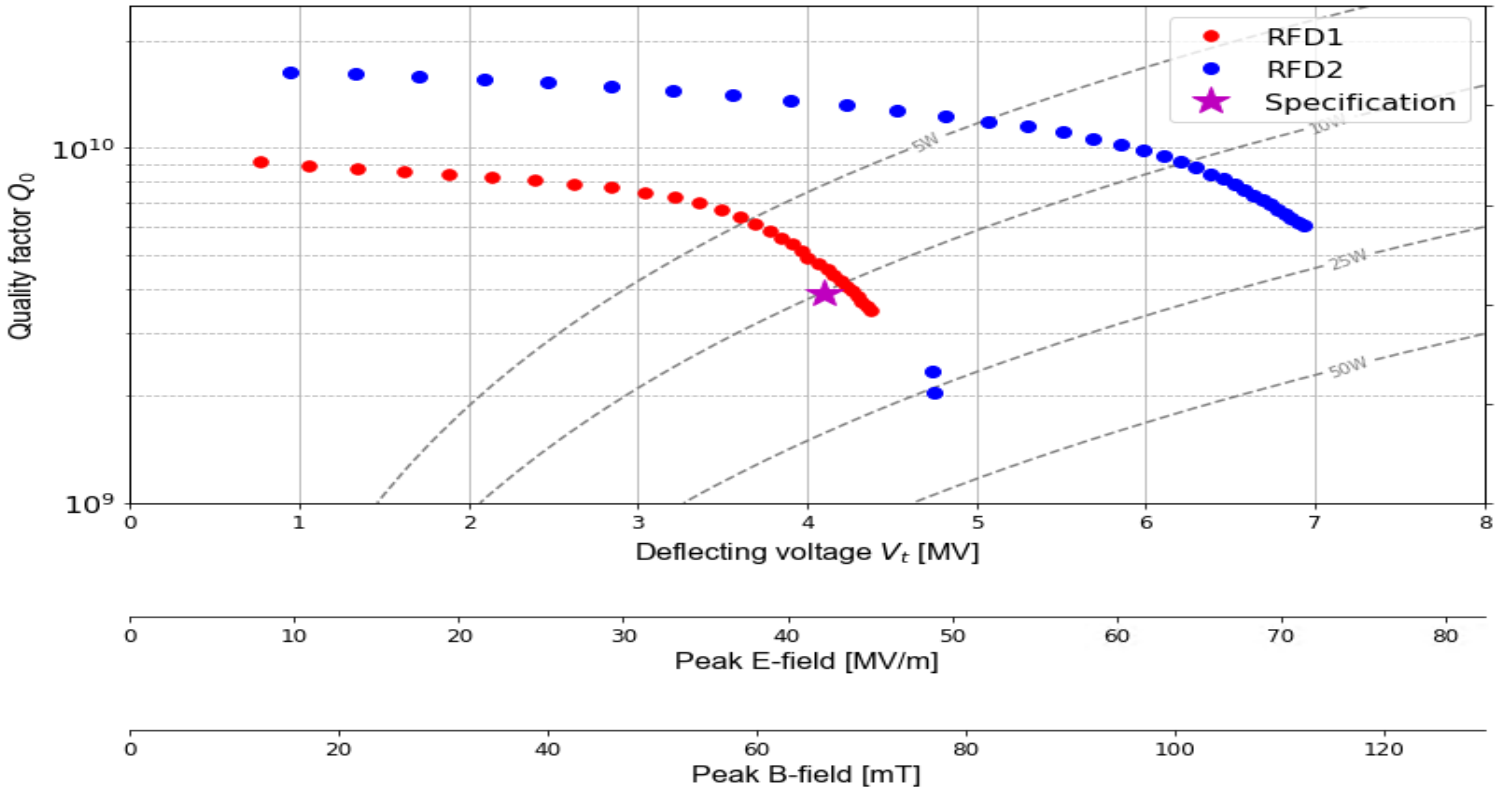



* step function

# Results of the RF cold tests (at 2K, CW)

| | RFD1 | RFD2 |
|---|---|---|
| Frequency [MHz] | 400.949 | 401.167 |
| Max $V_t$ [MV] | 4.36 MV | 6.91 MV |
| $Q_0$ at max $V_t$ | $3.5\times10^9$ | $6\times10^9$ |
| $E_p$ [MV/m] | 44.9 | 71 |
| $B_p$ [mT] | 70.7 | 112 |



# Results of the RF cold tests (at 2K, CW)

| | Spec. (**) | RFD1 | RFD2 |
|---|---|---|---|
| Resonant frequency [MHz] (at 4.5K) | 400.79±0.15 | 400.949 (400.764) | 401.167 (401.041) |
| Max $V_t$ [MV] | ≥4.1 | 4.36 MV | 6.91 MV |
| $Q_0$ at 4.1 MV | $\geq 3.9\times10^{9}$ | $4.6\times10^{9}$ | $1.3\times10^{10}$ |
| Lorentz Force Detuning Coefficient [Hz/MV^2] | ≤865 | 719.53 ± 3.48 | 734.74 ± 8.83 |
| Sensitivity to LHe pressure fluctuation dF/dp [Hz/mbar] | ≤300 | No data | 105.23 ± 0.21 |
| $P_{diss}$ at 4.1 MV [W] | ≤10 | 8.6 | 2.1 |

** EDMS1389669

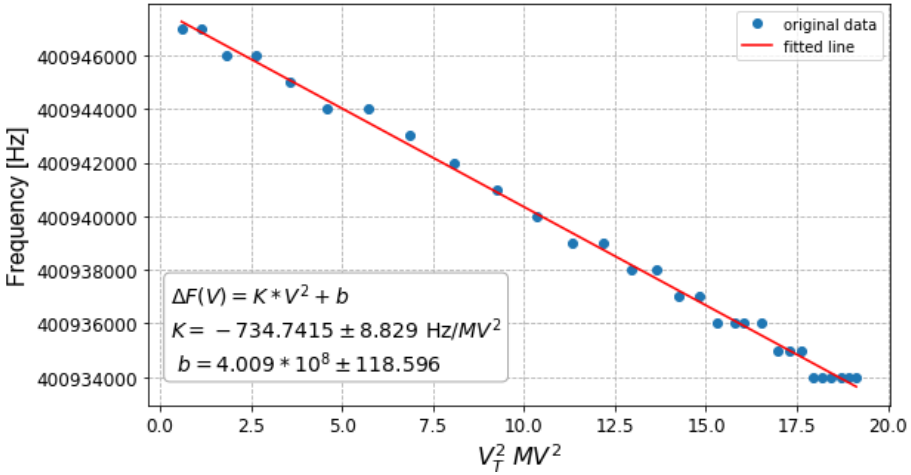
# Conclusion

- Both cavities met the specification** (excellent results of RFD2)
- Cavities successfully prepared and tested within 6 week (cold test 1week).
- Due to a broken detector, radiation measurements were not possible (some data available for RFD1) →new device ordered
- Reports available here: RFD1 & RFD2

***Thank you very much!***

# Lorentz Force detuning

## RFD1




## RFD2