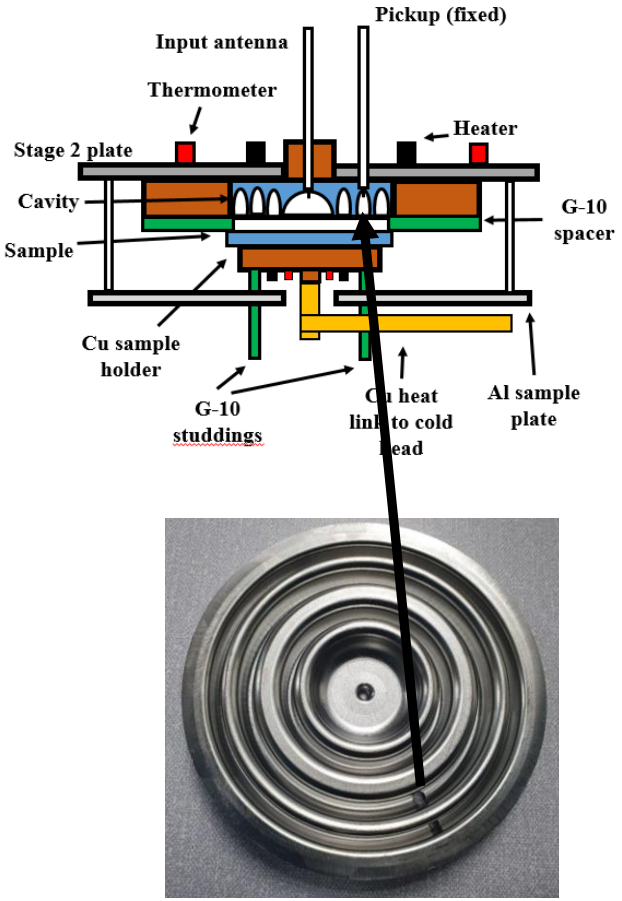
Progress with RF Characterisation facility at STFC

4th IFAST WP9 Meeting
17th February 2022

Daniel Seal
Lancaster University/Cockcroft Institute
daniel.seal@cockcroft.ac.uk

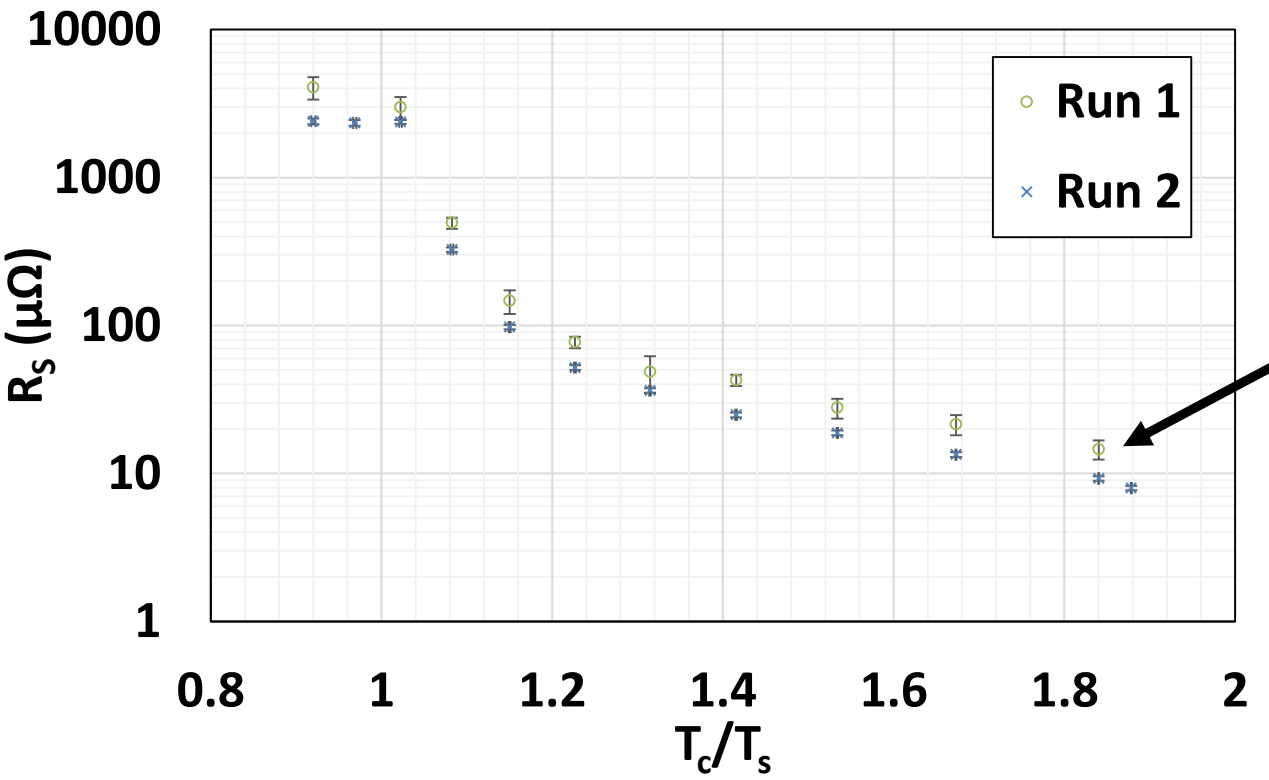
Current Status

- Some modifications to single coupler RF system to reduce errors in stored energy measurements
- Facility currently being upgraded for pickup coupler – further improve accuracy of stored energy measurements
- 3 choke bulk Nb cavity, bulk Nb sample and 2 choke bulk Cu cavities have been chemically polished at INFN
- Bulk Nb sample has been metallographically polished at IJCLab
- A phase-locked loop control system is being developed to mitigate the effects of microphonics



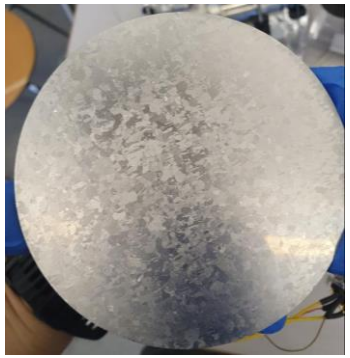
3 choke Nb cavity

Nb on Cu Sample



Nb on Cu Sample
- High temperature deposition
- Cu mechanically polished with diamond abrasive
- Surface analysis yet to be made

Before: R_s = (14.57 ± 2.14) μΩ
After: R_s = (9.25 ± 0.33) μΩ



- Results shown before and after RF modifications
- Aim to get lower temperature measurements and test with pickup and PLL

Future Plans

- Facility in final commissioning stages as we move to using 2 couplers (aim to complete by end of March):
  - Install polished 3 choke cavity
  - Measure R_S of bulk Nb samples:
    - Baseline measurement for future sample tests
    - Comparison of metallographic polishing and chemical polishing
  - Develop and test the phase-locked loop system

- Start testing 2 samples per week by end of March:
  - Sample discs 90-110 mm diameter
  - With PLL, will be able to make measurements at up to 10 mT (currently only reaching maximum of 1 mT)

Thank you for listening

Daniel Seal
Lancaster University/Cockcroft Institute
daniel.seal@cockcroft.ac.uk