



# MQXF Quench Heaters plans and decision tree

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# Outline

- Planned activities in the coming months
- Decision tree

# Planned activities

- Some key dates
  - 11/19
    - instrumentation pre-impregnation of MQXFBP2 coil 110
      - first coil of second MQXFB prototype
  - 03/20
    - instrumentation pre-impregnation of MQXFA08 coil
      - first coil of 3<sup>rd</sup> series cold mass MQXFA
  - 06/20
    - instrumentation pre-impregnation of MQXFB01 coil 115
      - first coil of first MQXFB series magnet (or first “spare”)

# Planned activities

- Two options are being investigated with practice and real coils
  - “Swap” and external QH
- Practice coils
  - CERN
    - MQXFB 204: External QH → impregnated by end of 10/19
    - MQXFB 003: External QH → impregnated by mid of 11/19
    - MQXFB 205: swap → impregnated by end of 11/19
  - AUP
    - Short coil practice coil S4: swap → impregnated mid 08/19
- Coils MQXFB 204 and MQXFB 003 will be used to define the procedure for external quench heaters and tested in dummy assemblies in the MQXFB structure
- Coils MQXFB 205 and AUP S4 will be used to define the procedure for the swap and evaluate results

# Planned activities

- Two options are being investigated with practice and real coils
  - “Swap” and external QH
- “Real coils”
  - AUP short coil **S10** with **swap** → to be tested by the end **01/20** in a mirror
  - CERN short coil **113** and **114** with **external QH**
    - Winding to start in **11/19** after cabling/insulation
    - To be tested in MQXFS7 with two “old” coils by **06/20**

# Outline

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# Decision “tree”

- If
  - Successful test of MQXFS4 (09-11/2019)
    - Several thermal cycles, with all standard electrical tests passed and with intermediate HV test (80-120 K, He gas, 850 V, 1 bar) passed
  - Successful test of MQXFA03 (10-11/2019)
    - One thermal cycles with all standard electrical tests passed and with intermediate HV test (80-120 K, He gas, 850 V, 1 bar) passed
  - ...and giving the results of MQXFS1 and MQXFS3
  - Experimental observation and computational analysis which explains the failure scenario and the degradation of the insulation
- Then
  - MQXF BP2 coils fabricated starting on 11/2019 with the swap
- The proposal accounts for the change in electrical requirements
  - Intermediate electrical test after powering test
    - 850 V, 100 K, 1 bar, He gas

# Decision “tree”

- In the meantime, before 3<sup>rd</sup> series AUP coil (03/20) or before the 1<sup>st</sup> series CERN coils (06/20)
  - MQXFB mech. Assembly with 1-2 coils with external QH by 01/20
  - AUP short coil S10: swap → to be tested in 01/20 in a mirror
  - One 11T short model with external QH → to be tested in 01/20
  - MQXFA04 with impregnated QH → to be tested by 04/20
  - Two 11T series magnets with external QH → to be tested by 04/20
  - MQXFS7 with 2 coils with external QH → to be tested in 06/20
- These results will be used to re-assess QH performance and finalize plan for 3<sup>rd</sup> series cold-mass AUP coil and 1<sup>st</sup> series CERN coils



# Decision “tree”

- Else (so if not successful with S4 and A03...)
  - Two options can be considered for MQXF BP2 coils fabricated starting on **11/2019**
    - If experimental observation and computational analysis are convincing that the increase of insulation thickness with the swap significantly improves the insulation
      - With **Swap**
    - Otherwise
      - With **external QH**

# Decision “tree”

- In the meantime, before 3<sup>rd</sup> series AUP coil (03/20) or before the 1<sup>st</sup> series CERN coils (06/20)
  - MQXFB mech. Assembly with 1-2 coils with external QH by 01/20
  - AUP short coil S10: swap → to be tested in 01/20 in a mirror
  - One 11T short model with external QH → to be tested in 01/20
  - MQXFA04 with impregnated QH → to be tested by 04/20
  - Two 11T series magnets with external QH → to be tested by 04/20
  - MQXFS7 with 2 coils with external QH → to be tested in 06/20
- These results will be used to re-assess QH performance and finalize plan for 3<sup>rd</sup> series cold-mass AUP coil and 1<sup>st</sup> series CERN coils