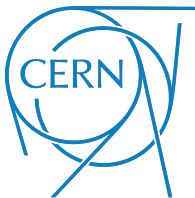


# Thermal analysis of He II cooled Nb<sub>3</sub>Sn superconducting coil samples

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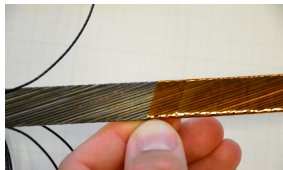
# Overview

## High Luminosity upgrade of LHC (HL-LHC)

- Higher Beam luminosity : Intensive heat loads
- $\text{Nb}_3\text{Sn}$  magnet tech. : Heat transfer mechanisms
- Safe operating margins : Quench limits?

## Test Program at Cryolab, CERN

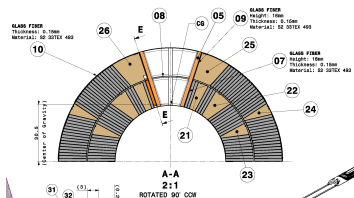
- 1 Experiments with prototype magnet coil samples
- 2 Developing a numerical toolkit



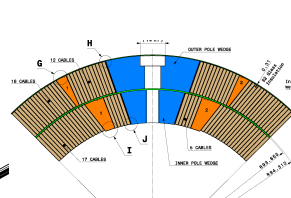
NbTi - polyimide



$\text{Nb}_3\text{Sn}$  - Epoxy glass fiber



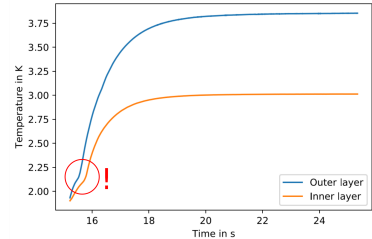
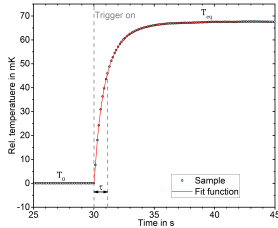
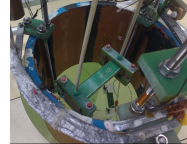
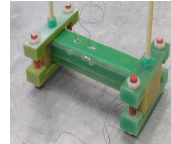
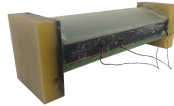
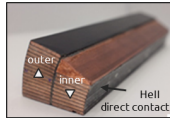
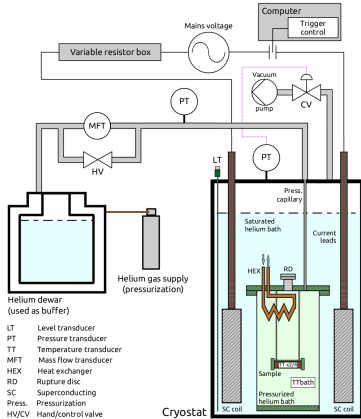
D11T



MQXF

# Experiments

## Unexpected observations



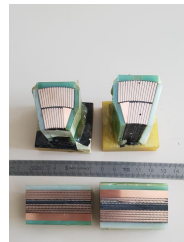
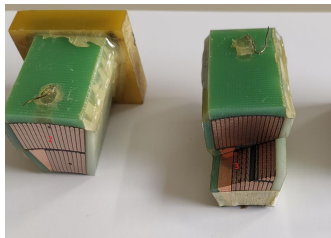
# Hypothesis

Validation with numerical analysis and sample inspection

**Coil samples are porous to helium.**

How can this porosity be efficiently investigated, quantified and modeled?

- Phenomenological model : proof of hypothesis.
- Complex conjugate heat transfer model ultimately needed (being validated).



Cut D11T sample

**Look out for my poster to see how and what we found out!**