

# Task 5.6 Devise quench protection concept – Re-defined

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## Old definition

Task 5.5: Devise quench protection concept (TUT, INFN)

- ▶ Review and assess quench detection and protection methods
- ▶ Analyse quench initiation, detection and protection magnet model design
- ▶ Extrapolate findings to the string of the collider main bending magnets

Protection of a long 16 T accelerator dipole may turn out to be a limiting factor to magnet performance. It is important to review and assess detection and protection methods and to propose a robust magnet protection concept. This work will be performed jointly by TUT and INFN. Both partners will simulate various quench initiation and propagation cases, to be defined based on the selected magnet design. TUT will cover the extrapolation to a string of magnets. This task requires close interaction with electromagnetic design (task 5.3) and mechanical design (task 5.4).

## New definition

Task 5.5: Devise quench protection concept (TUT, INFN)

- ▶ Review and assess quench detection and protection methods and simulation tools **including** a benchmark
- ▶ **Perform conceptual protection analysis for a 14 m long 16 T Nb<sub>3</sub>Sn dipole as part of a string of magnets and develop a baseline for detailed protection studies**
- ▶ Analyse quench protection in magnet model design
- ▶ Extrapolate findings to the string of the collider main bending magnets

# Distribution of work

## First 10 months

- ▶ Review of methods: TUT
- ▶ Review of simulation tools (and benchmark): TUT + INFN (incl. TUT visit to CIEMAT, booked)
- ▶ Conceptual protection analysis: TUT
- ▶ Development of baseline for protection: TUT (responsible proposes, but should be decided together)

## Then:

- ▶ Analyse quench protection in magnet model designs according to the selected baseline: TUT + INFN

## Later:

- ▶ Protection design for the magnet strings including detailed analysis of final magnet design (short model and 14 m long): TUT

## Relation to milestones and deliverables

- ▶ **M-5.2:** Baseline for protection: single magnet and string
- ▶ **M-5.3:** Amount of copper needed, for different grading levels
- ▶ **M-5.4:** Protection design report for full length coil and string of coils
  
- ▶ **D-5.1:** Provide magnet protection options, and select baseline
- ▶ **D-5.4:** Manufacturing folder for the protection of a short model