



# Quench Analysis of REBCO-based High Temperature Superconducting Magnets

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The MagLab's 32T all-superconducting magnet will set a new standard for superconducting user magnets, a standard that relies on the magnet's inner coils, which were built using Rare Earth-Barium-Copper-Oxide (REBCO) high-temperature superconductor (HTS) tape.

With this magnet, we are facing completely new challenges in quench analysis compared to superconducting magnets made only with low temperature superconductors (LTS). New HTS physical phenomena have to be included in the computer simulations of magnet quenches to design the magnet. HTS input parameters are frequently not precisely known, forcing us to deal with rather wide ranges ("clouds") instead of single values for critical parameters. Since this magnet is the first of its kind, there are no other codes available to benchmark against, so we have used sensitivity analyses and statistics - and also performed deliberate high-field quench tests in prototype coils - to calibrate and tune the numerical code.

The work has advanced to the point that, for the first time, quenches in both the HTS and LTS coils can be simulated. This provides a level of confidence in the final choices made in the construction of the magnet as we lead up to the commissioning of the full 32T HTS/LTS magnet.

**Facilities:** Magnet Science & Technology.

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