

## Acoustic Diagnostics for Superconducting Accelerator Magnets

Over the past few decades, acoustic measurement technology has emerged as a versatile & non-invasive tool for structural analysis, failure detection, and process control. We present acoustic emission sensing and data analysis techniques developed by the Superconducting Magnet group for monitoring mechanical disturbances in high-field superconducting accelerator magnets. Localized movements and micro-structural failures can cause magnets to suddenly transition (quench) into a normal state; a proper diagnostics of such events is essential for understanding limitations of magnet performance. We also discuss our development of an active quench detection method using ultrasonic beams to localize hot spots in coil windings. This active method can be essential for adequate quench protection of future magnet systems based on high-temperature superconductors.

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