

A New Hybrid Protection System for High-Field Superconducting Magnets

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Abstract - The new generation of high-field superconducting accelerator magnets poses a challenge concerning the protection of the magnet coil in the case of a quench. The very high stored energy per unit volume requires a fast and efficient quench heating system in order to avoid damage due to overheating. A new protection system for superconducting magnets is presented, comprising a combination of a novel Coupling-Loss Induced Quench (CLIQ) system and conventional quench heaters. CLIQ can provoke a very fast transition to the normal state in coil windings by introducing coupling loss and thus heat in the coil's conductor. The advantage of the hybrid protection system is a global transition, resulting in a much faster current decay, a significantly lower hot-spot temperature, and a more homogeneous temperature distribution in the magnet's coil.

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