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## Wed-Af-Or2-05: SMART Coil-to-Coil Insulation for Online Temperature Mapping of Non-Insulated (RE)Ba<sub>2</sub>Cu<sub>3</sub>O<sub>7-x</sub> Pancake Coils

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No-insulation (NI) high-temperature superconducting (HTS) coils have been shown to have improved thermal stability properties and an improved winding pack density over traditionally wound HTS coils. These improved properties have led to new design proposals for a wide range of applications, include some of the magnets of a fusion magnet system. However, further research still needs to be conducted into the feasibility of NI coils for various applications, and the inherent design of NI coils means that sensor systems that would otherwise be easily embedded into traditional coils cannot be used. Thus, although NI coils can be more stable in certain operating conditions, they would be harder to monitor, which is a limitation to their overall suitability to applications.

Here we demonstrate a proof-of-concept for a sensing system that can be embedded into the coil-to-coil insulation of a pancake coil stack. This system is based on embedding optical fibers in a thin coil-to-coil insulation layer and can be used to map the temperature of the coils with millimeter level spatial resolution on the 2D coil surface. Unlike prior sensor integration approaches, this system is equally adaptable to both NI and insulated REBCO coils, offering a valuable tool for future development and application of NI coils into magnet systems.

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