

## The Development of High Field Magnets Utilizing Bi-2212 Wind & React Insert Coils

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**Abstract** - Wind & react Bi-2212 inserts have been manufactured and tested inside a wide-bore NbTi-Nb<sub>3</sub>Sn magnet providing a background field up to 20 T at 4.2 K. A pair of six-layer concentric coils both achieved critical currents of 350 A ( $J_E = 200 \text{ A/mm}^2$ ) in a 20 T background field. A thicker 14-layer insert made from 119 m of round wire had a critical quench current  $I_Q$  of 287 A ( $J_E = 162 \text{ A/mm}^2$ ) at the same field and contributed to a combined central field of 22.5 T. This is a record for a fully superconducting magnet at 4.2 K. The 14-layer coil, equipped with an external protective shunt, was used for an extensive series of quench measurements and endured > 150 quenches without damage. Minimum quench energies were found to be in the range of 200-500 mJ in background fields of 15-20 T when the coil carried 70-95% of its critical quench current.

**Index Terms** - Bi-2212, High Temperature Superconductor, High Field Magnet, Quench.

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