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Design for an Upgrade of the NHMFL 32-mm Bore Resistive Magnet

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The National High Magnetic Field Laboratory (NHMFL) has developed the design of its next generation 32mm bore Resistive Magnet. This magnet upgrade includes enlarging the size of the most outer coil from a 610mm to a 1000mm outer diameter and from a 430mm to a 730mm maximum height. First, a general design optimization was performed to decide on the number, the geometries and the materials of the nested resistive coils. As a result of that analysis, the new magnet will consist of six coils (upgraded from 4 coils) with the innermost two coils electrically connected in parallel and the remaining coils connected in series. Next a series of systematic detailed analysis of the winding pack was iterated coil by coil as well as section by section along each coil axis employing current density grading all aiming to achieve a new world record field near or above 40 Tesla.

Submitters Country

USA

Author: Dr TOTH, Jack (NHMFL)

Co-author: Mr BOLE, Scott (NHMFL)

Presenter: Dr TOTH, Jack (NHMFL)

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