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## Operation Results of a 23.5-T REBCO Magnet Prototype Towards a Tabletop Liquid-Helium-Free 1-GHz Microcoil NMR

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We present the operation result of a liquid-helium-free 23.5-T/ $\phi$ 12.5-mm-cold-bore magnet prototype composed of a stack of 10 no-insulation (NI) REBCO double-pancake (DP) coils: eight middle coils of 6-mm wide and two end coils of 8-mm wide tape. All the tapes have only 1- $\mu$ m-thick copper layer on each side to overcome the conductor thickness uniformity issue and enhance the mechanical strength within the winding. With this small-scale prototype towards a tabletop liquid-helium-free 1-GHz microcoil NMR magnet, we validate our coil design issues that include conductor performance, screening-current-induced field and stresses, and conduction-cooling cryogenics. We have applied additional electrical shunting by thin layers of solder on the top and bottom surfaces of the 10 NI DP coils for effective cooling and quench protection. Included in the paper are: 1) summary of construction and conduction-cooling; 2) charging and operating test results in the temperature range 10–30 K; 3) examination of screening-current effects by experimental and analytical methods; and 4) quench-protection heater performance. The paper concludes with a summary of enabling features to be used for subsequent development of the 23.5-T/ $\phi$ 25-mm-RT-bore microcoil NMR magnet.

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