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Fri-Mo-Po.03-08: [Invited] Cool-down and Ramp Test of a Low-Cryogen, Lightweight, Head-Only 7T MRI Magnet

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A low-cryogen compact 7T MRI system(C7T) dedicated for brain imaging has been developed at the GE HealthCare Technology and Innovation Center. The C7T magnet utilizes a fully sealed helium cooling system. Only 12 liters of liquid helium are condensed at 4.2 K from high pressure gaseous helium charged at room temperature. The C7T magnet is designed for a B₀-field homogeneity <1.0 ppm in a 26-cm field-of-view. Both active superconducting shim coils and passive shimming are applied for shimming the C7T magnet. This C7T MRI system has a similar footprint and weight of a clinical whole-body 3T MRI scanner. C7T will greatly improve the access of ultra-high-field MRI brain imaging for a more diverse group of patients.

A Cryomech MPC600 helium circulation system is applied to firstly pre-cool the C7T magnet down to about 50 K, then three SHI RDE-412 cryocoolers cool the cold mass down to 3.4-3.5 K to its equilibrium state. The C7T magnet cool-down, energization and quench protection performance will be reported in this paper.

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