Progress in the Construction of the 43 T Hybrid Magnet at LNCMI-Grenoble

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***Abstract*— By combining resistive polyhelix and Bitter insert coils with a large bore superconducting outsert one, the new hybrid magnet in construction at LNCMI-Grenoble will produce in a first step, an overall continuous magnetic field of 43 T in a 34 mm warm bore aperture. After a brief reminder of the specificity of hybrid magnets, namely the strong electromagnetic and mechanical coupling between resistive and superconducting coils, the main specificities of the proposed design are presented. The superconducting coil of 1.1 m cold bore diameter will provide a nominal magnetic field of at least 8.5 T. It relies on the specific development of the Nb-Ti/Cu Rutherford cable on conduit conductor (RCOCC) cooled down to 1.8 K by a bath of superfluid helium at atmospheric pressure. The novelty of the RCOCC concerns the in-laboratory assembly with induction soft-soldering of the Rutherford cable on a Cu-Ag hollow stabilizer allowing a strict control of the quantity of the solder alloy used and therefore of the interstrand contact resistance. A stainless steel reinforced copper shield inserted between the superconducting and resistive coils will allow reducing the coupling currents induced within the RCOCC as well as the mechanical force exerted on the superconducting coil. After successful thorough reviews of the Grenoble hybrid magnet design anticipating possible upgrades of the maximum magnetic field produced, this project is now well engaged in its construction phase. The status of this project is presented in details together with the next milestones.**

***Keywords (Index Terms)*— Hybrid magnet, large bore superconducting magnet, resistive magnet, superfluid helium, very high field magnet.**

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