

Abstract Submitted
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Large MgB₂ Superconducting Coils for the Ignitor Experiment¹

A. TUMINO, G. GRASSO, Columbus Superconductors, Genoa, Italy, B. COPPI, M.I.T. — Intermediate temperature, superconducting cables have been adopted for the fabrication of the largest poloidal field coils of the Ignitor experiment. This is an important step to achieve better duty cycles in Ignitor-like machines with innovative magnet technologies compared to traditional superconductors. The commercially available MgB₂ strands manufactured by Columbus Superconductors meets the target specifications for the considered coils, about 5 meters of outer diameter and maximum field on the conductor below 5 T, and they are also compatible with the Ignitor cryogenic system, which is designed to cool the machine at 30 K, although MgB₂ may use colder gas at 10 K. The technical feasibility of these coils, as well as their stability and protection in the unlikely case of its quench, has been studied. The final design includes about 300 MgB₂ multifilamentary strands of 1 mm in diameter and a copper pipe for the He-gas flow in the center. A mock-up cable has been manufactured. Measurements of the critical current J_c as a function of magnetic field and temperature have been done for the cable bent to a curvature radius of 20 cm and compared to the results of a straight sample. The feasibility of the manufacturing and jacketing processes has thus been demonstrated.

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