Perspectives for the High Field Approach in Fusion Research and Advances within the Ignitor Program

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The main objective of the Ignitor Program is to explore the ignition conditions of magnetically confined D-T plasmas while producing significant amounts of fusion power (up to about 100 MW). For this, a (necessarily) compact, high field device has been designed that advances the line of high field experiments which began with the Alcator program at MIT and was later also developed in Italy with the FT program.

A detailed design of all the main machine components has been carried out and its results and drawings are now ready to be transferred to the industrial groups that have been identified as capable of constructing all the components of the machine core.
The Ignitor facility is expected to be operated at the Troitsk site of Rosatom and managed by the IGNIR collaboration between Italy and Russia. At this time the Ignitor Program is the only one that has retained the objective of investigating the approach and the access to ignition conditions thanks to the regular updates of the machine design that have followed relevant advances in physics, technology and materials.

Starting from the experience gained in designing intermediate temperature superconducting cables to be adopted for the largest poloidal field coils of Ignitor, we have undertaken the analysis of high field superconducting experiments based on the fact that "hybrid" high fields magnets can be fabricated using two superconducting components: MgB_2 for the "low" field ($\lesssim$ 10 T), outer part and a high temperature superconductor for the high field, inner part.