

**Title:** Project 4 of the JRC Fusion “High Tc superconductors for magnetic confinement fusion: development of materials and production processes” within the Joint Research Agreement CNR – Eni

**Source of funding:** CNR - Eni

**Scientific funding program:** Joint Research Agreement

**Project coordinator:** Maurizio Lontano

**SPIN coordinator:** Valeria Braccini

**Other partners:** CNR-IMM

**Project objectives.** In spring 2019, a Joint Research Agreement (JRA) between CNR and Eni has been signed for the establishment of four joint research centers set up at existing operational or research centers to work together in four fundamental areas driven by circular economy and carbon neutrality.

In particular, four Centers have been created:

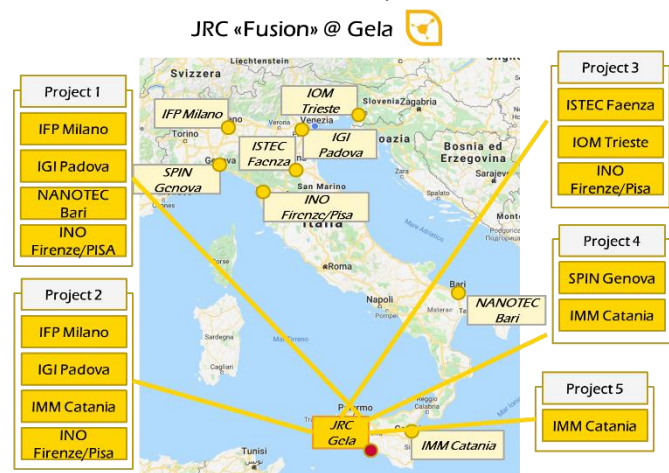
- Center “Arctic” in Lecce, for the study and feedback evaluation on climate and environment deriving from temperature rise in the Arctic cryosphere
- **Center “Fusion” in Gela**, for the development of skills and technological know-how for magnetic fusion.
- Center “Water” in Metaponto, for the sustainable and innovative management of the water cycle
- Center “Agriculture” in Portici, for the incentive and development of sustainable and low CO<sub>2</sub> agriculture

The Eni – CNR center in Gela on fusion, named 'Ettore Majorana', in particular, is oriented towards cutting-edge research on the characteristics of plasmas, superconducting magnets, and on the characteristics of power plants that can exploit the properties of the materials and the advantages of the casting process.

The center also aims at developing skills in the transportation and storage of electrical power.

The Center is organized in five Projects, involving several CNR Institutes all over Italy:

1. Application and development of advanced models for magnetic confinement fusion
2. Control and diagnostic systems for magnetic confinement fusion
3. Study of materials for magnetic confinement fusion
4. High Tc superconductors for magnetic confinement fusion: development of materials and production processes
5. High efficiency power electronics for magnetic confinement fusion based on SiC.



CNR-SPIN is involved, together with CNR-IMM Catania, in Project 4. The main goal of the Project is the development of HTS superconductors suitable for applications in high magnetic field – particularly referring to the fusion. We will focus in particular on the fabrication and development of Fe-based superconductors and on the study of the effects of irradiation on such materials, coordinated with a deep investigation of the nanostructure developed after irradiation through TEM at IMM. Between the outcomes of this Project, ENI-funded PhD will be activated both at University of Genova and University of Catania for the fabrication, irradiation and characterization of Fe-based superconductors.