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- Techniques for electrical characterization of superconducting cables up to currents of 100 kA
- Characterization of superconducting materials
- Design of superconducting magnets
- Developments of materials for devices

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Techniques for electrical characterization of superconducting cables up to currents of 100 kA

- The main tool related to this activity is the facility Ma.Ri.S.A. allowing measurement in the field range 0-8 T and temperature 1 to 300 K in a large bore (400 mm). The current is fed to samples through a flux transformer. In the last 15 years several multi-strand conductors of HERA and LHC superconducting dipoles, as well as the conductors of FINUDA, BABAR and CMS superconducting coils have been tested. The same apparatus is used for performing measurements of Minimum Quench Energy

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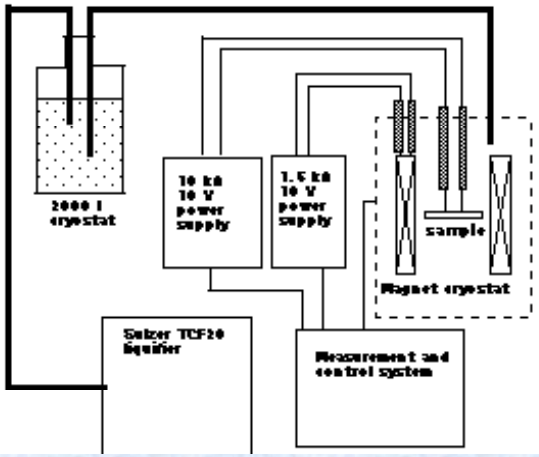

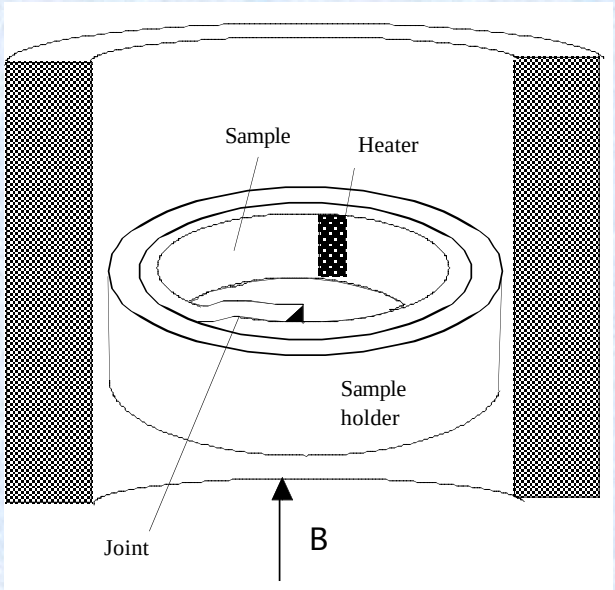

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Characterization of superconducting materials

The characterization of materials (in form of wire, tapes or films) is made via electrical and magnetic measurements: electrical resistivity vs temperature, critical current, ac susceptibility, ac magnetization. Temperature range 1 to 300 K in 50 mm bore; Magnetic field range 0 to 16 T.

1. 8-10 T solenoidal magnet equipped with VTI 50 mm bore
2. 14-16 T solenoidal magnet equipped with VTI 50 mm bore
3. 5 T split coil with VTI 60 mm bore

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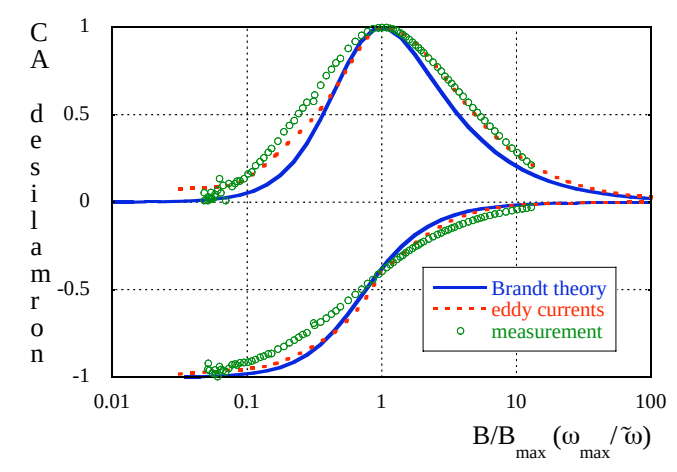
AC susceptibility set-up

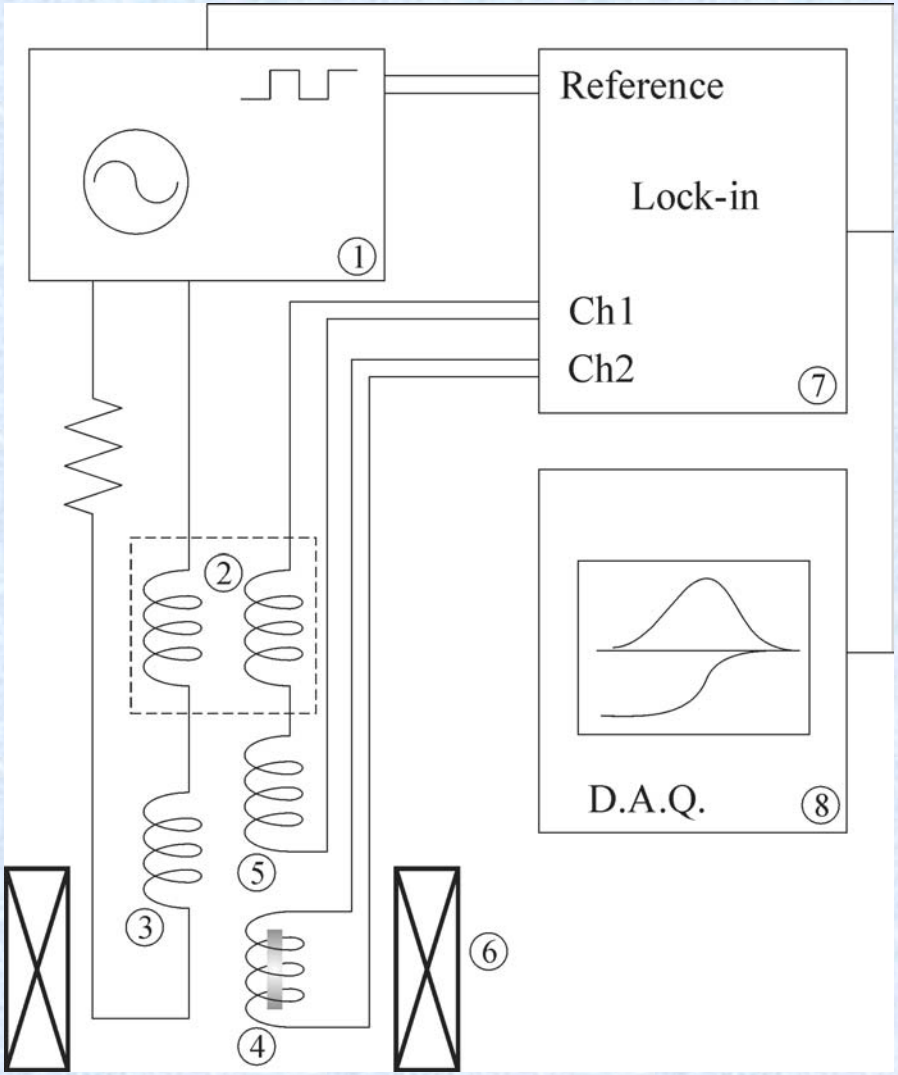
AC field up to 2000 G

Frequency range [0.5 -100 Hz]

Several sample holders:

Pick-up coils from 1 mm to 20 mm





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Resistivity vs B and T

Two dedicated sample holders.

Straight samples in perpendicular field (l =50 mm)

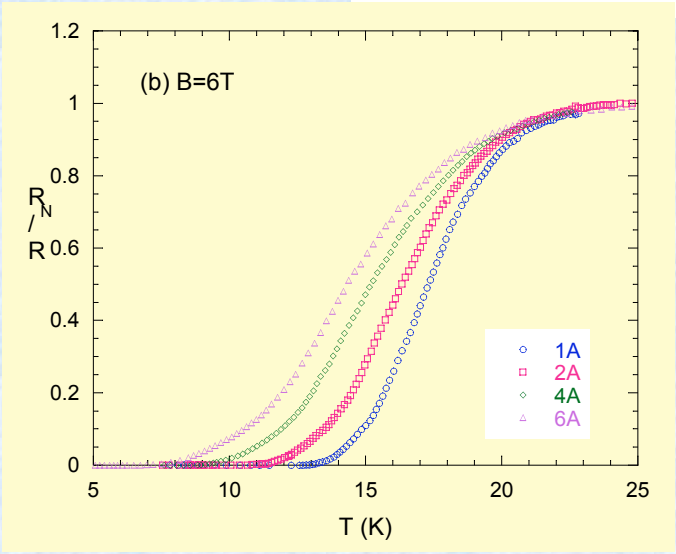
Ic vs B and T

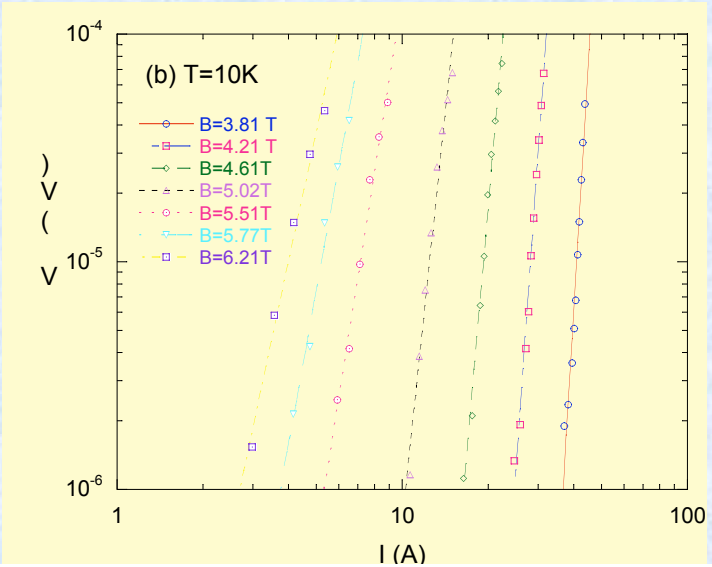
Two sample holders for current up to200 A (hair-pin sample)

1000 A in 5 T split coil (Straight sample)

Ic vs B at 4.2 K

70 mm single turn I_{max} 1000 A





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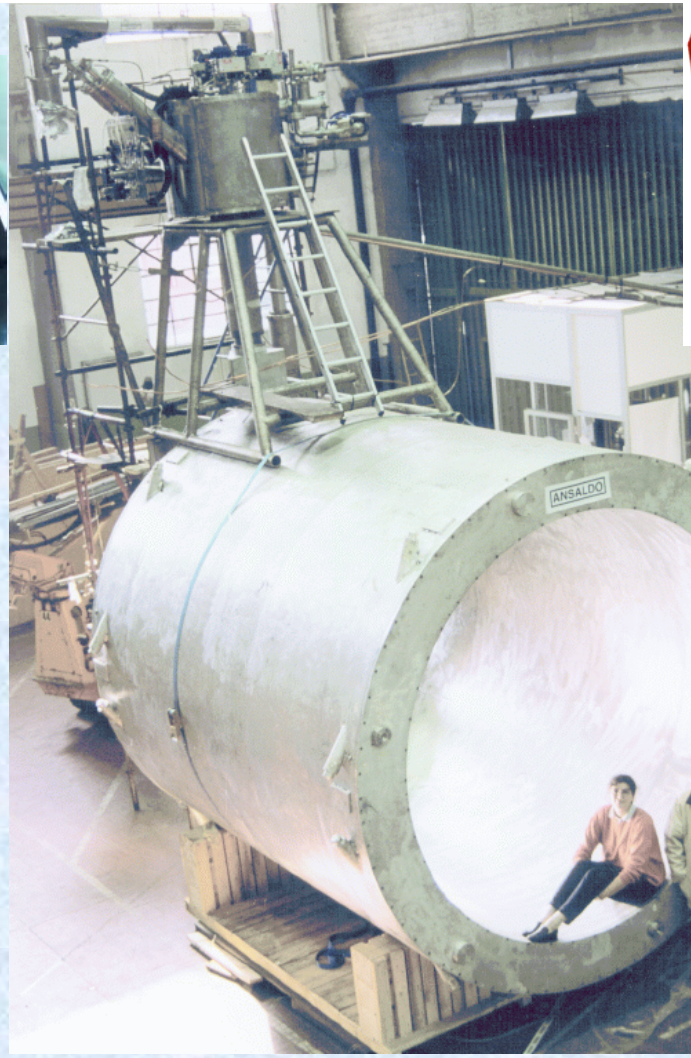
Superconducting Magnets Design and industrial follow-up



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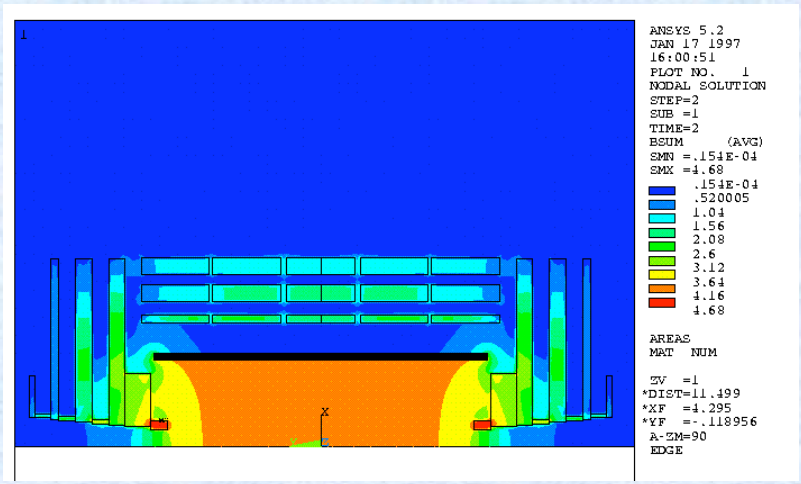
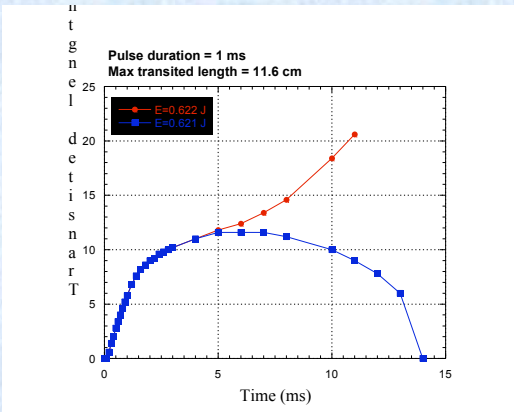
Design tools:

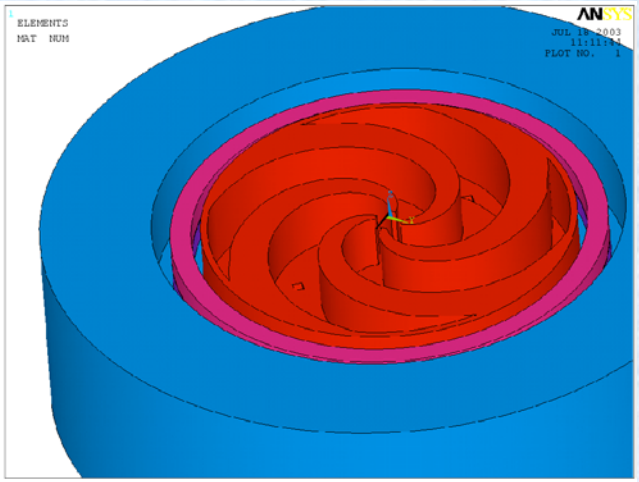
Opera for 2 D and 3D Magnetic analysis

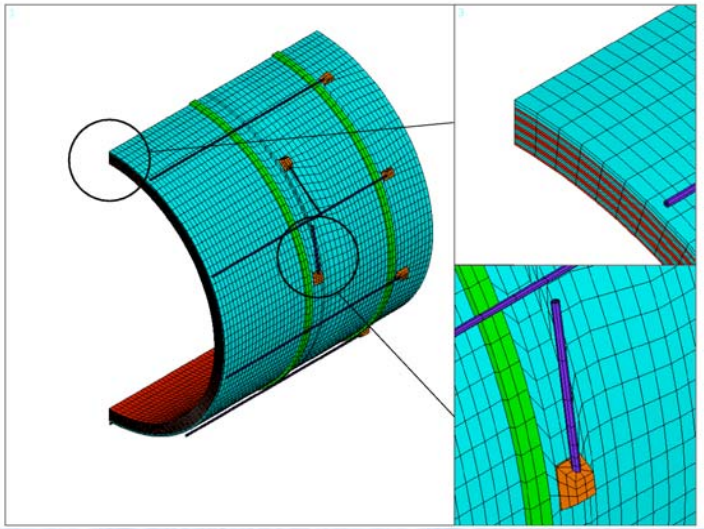
ANSYS for 2D&3D Magnetic, Mechanical and Thermal analysis

Simple codes for quench and stability









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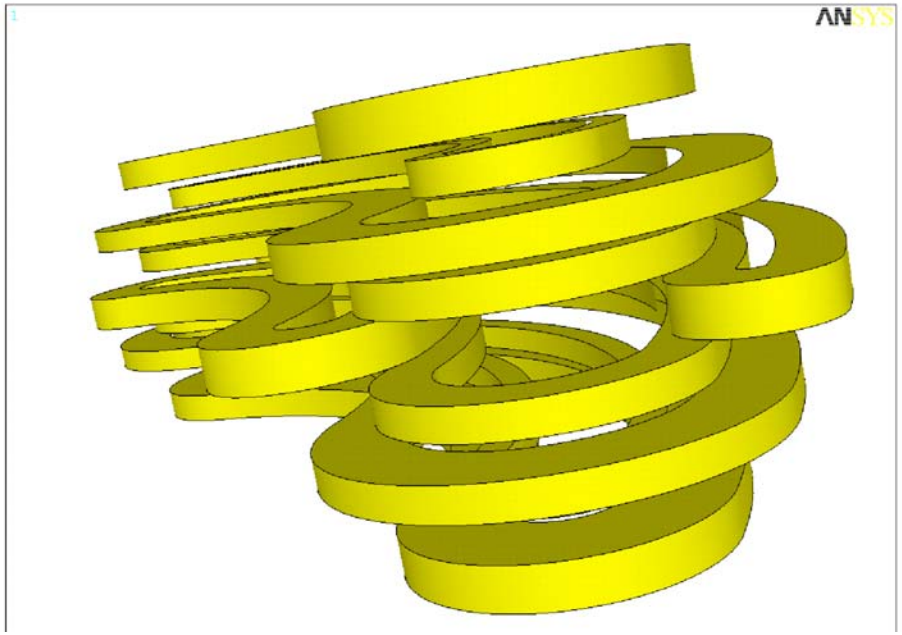

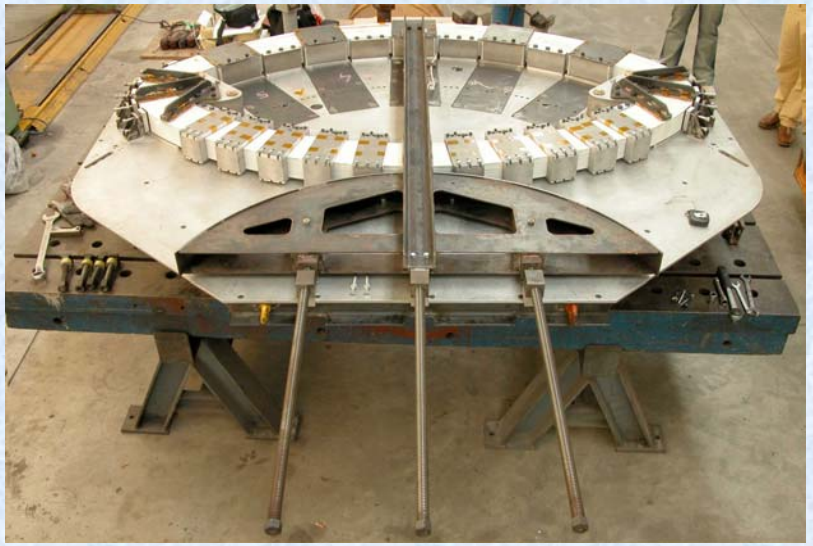

Curved dipole for hadron-theraphy

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Composition of the INFN Genova Group

P.Fabbricatore	Coil design, industrial follow-up
S.Farinon	Finite element analyses
M.Greco	Measurements, Data acquisition
R.Musenich	Material development

+ 2 technicians + INFN mechanical workshop