



WP9 TNA MagNet

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Within EUCARD² TransNational Access CERN extended access to SM18 infrastructures to test superconducting magnets and/or specific low temperature instrumentation .

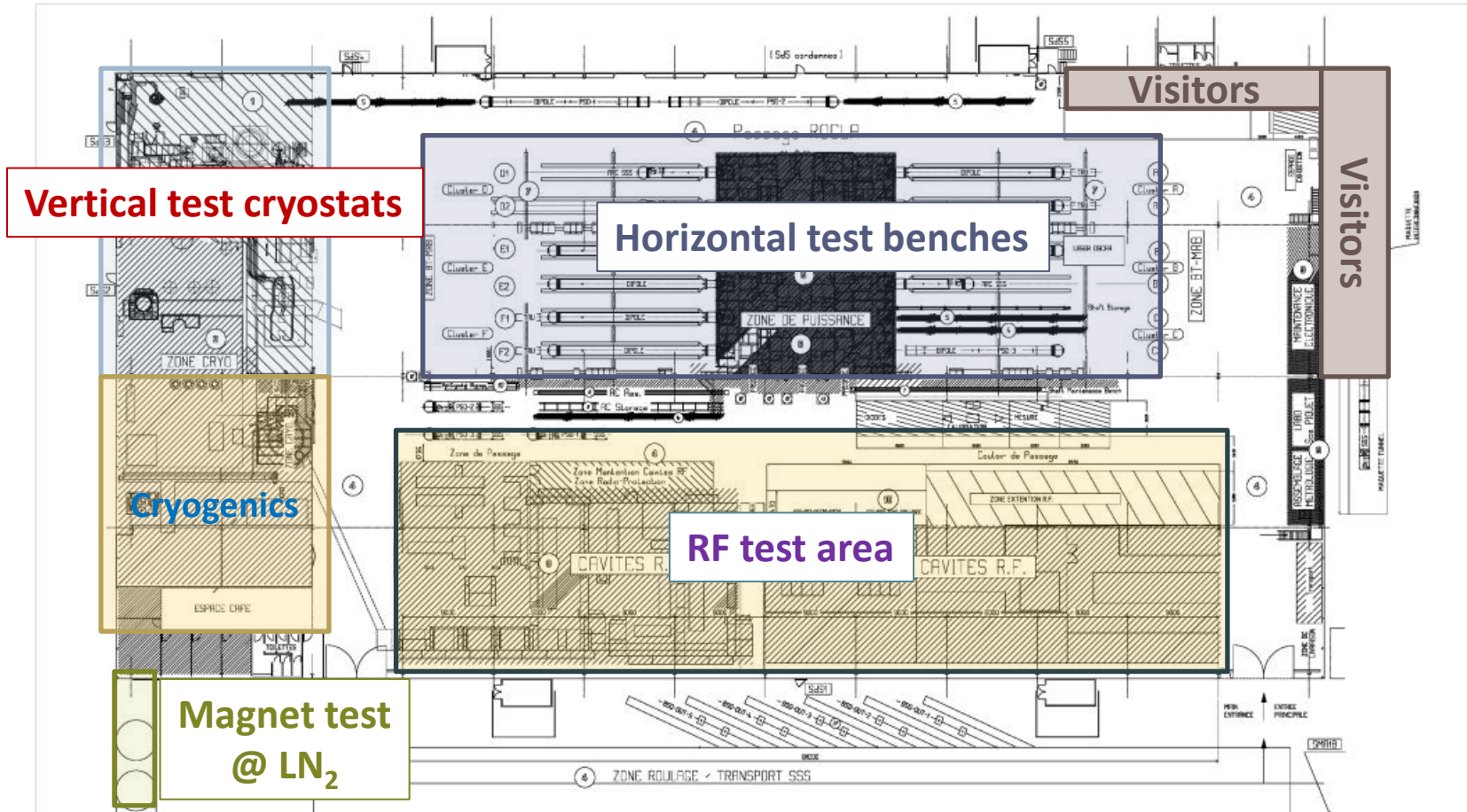
CERN offers infrastructure and/or equipment and expert support

The budget from FP7 is used to installations, dismantling, transport of heavy equipment for test and for travel expenses of users

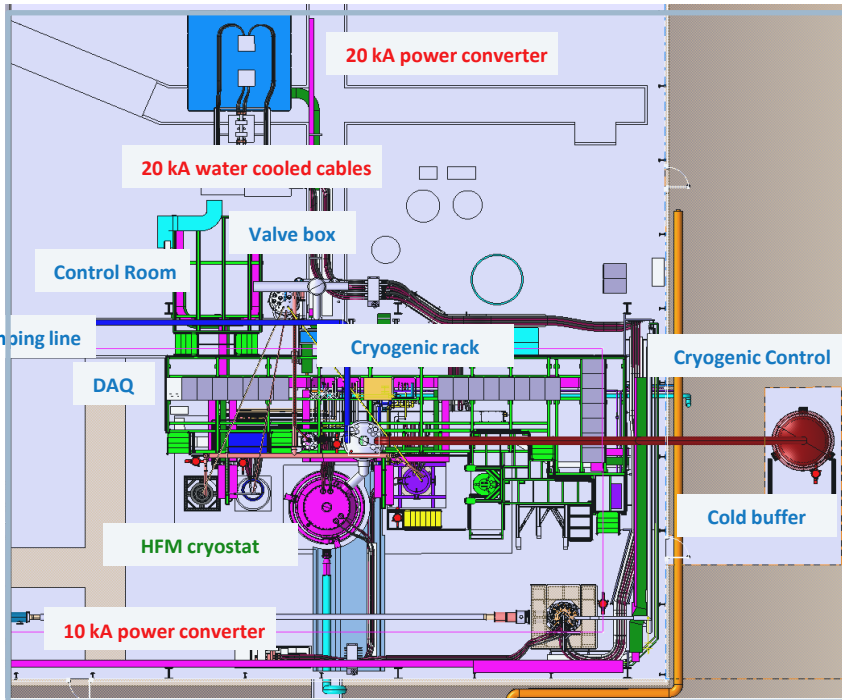
Users may profit from a stimulating environment @ CERN often hosting conferences and workshops in a specific subjects and offering free access to participation to them



EuCARD² MagNet @ SM18.LAYOUT.



Vertical test cryostats



2 operational vertical cryostats @ 20 kA @ 1.9 K
 6 kW power plant shared by RF and Magnets
 25 000 l buffer of LHe

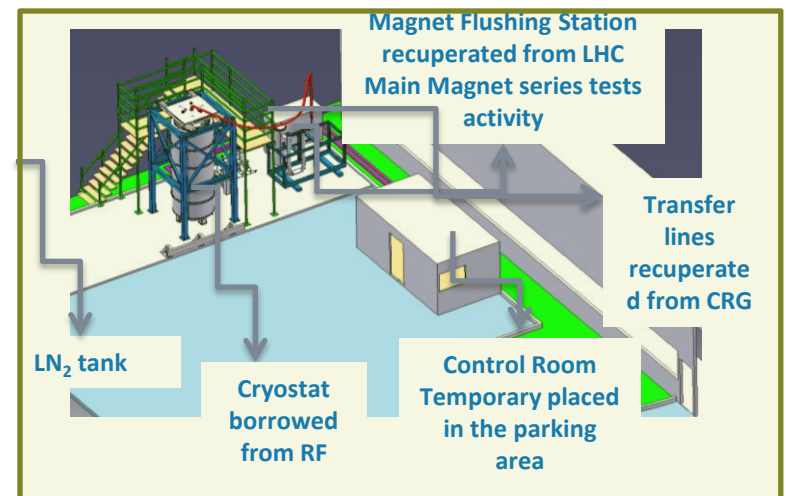
X EUCARD 2 Annual Meeting

Horizontal test benches



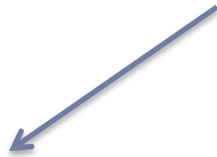
10 operational horizontal benches @ 14 kA @ 1.9 K

Magnet test @ LN₂

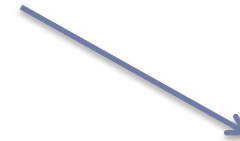


TNA User Selection Panel

was established to select users based on the scientific quality and feasibility of their proposals. The panel is composed of representatives of the facility, of the EuCARD-2 project (M. Bajko) and also international experts in the field of magnets and instrumentation



Dr. Luis Garcia Tabares (SP)



Dr. Vinod Chohan (CH)

1 committee meeting held @ CERN SM18
in October 2013 adjudicating 3 projects

FOSxCRYO (Fiber Optic Sensors FOR CRYogenic ApplicatiOns and Superconducting Magnets)

Project leader: Dr. Andrea Cusano UNiversity of Sanio (IT)

7 members (It + Hu)

> 400 access requested

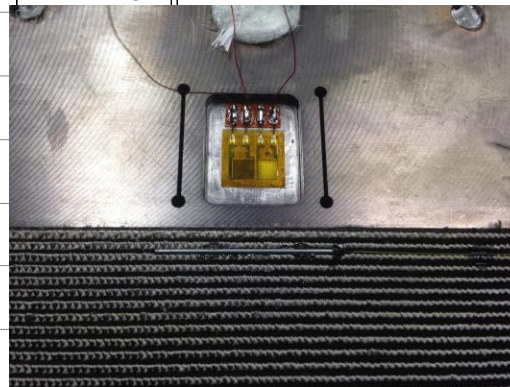
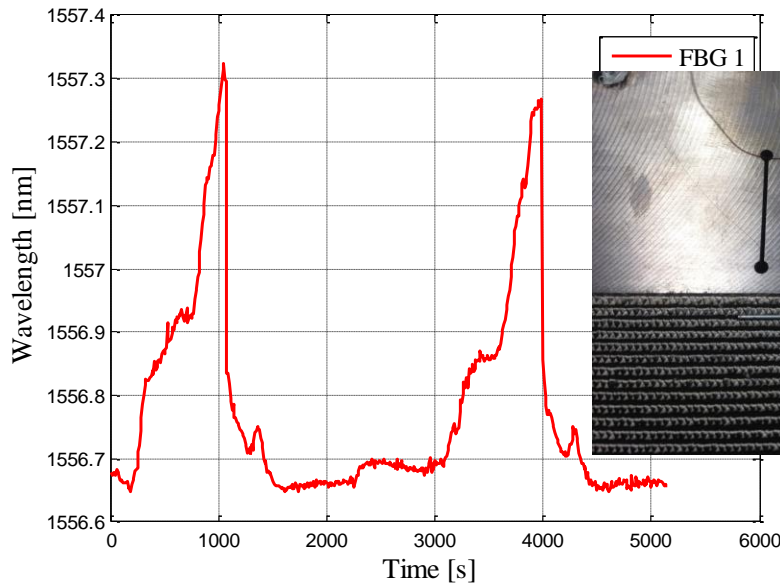
Optical fiber sensors, thanks to their immunity to electromagnetic disturbances, light weight, small size, radiation hardness capability, multiplexing capability and low power consumption, are ideal candidates for the development of sensing systems to be operated in cryogenic environments .

The main drawback of these sensors is their low intrinsic thermal sensitivity at low temperatures due to very low thermal expansion coefficient of the optical fiber constitutive material – silica.



Results

Strain recorded on the outer Al shell of a Nb₃Sn based during a quench.
 A fiber integration into the coil is ongoing. Tests at nominal operating conditions are planned for September 2014.



FBGs recoated with epoxy and PMMA have been selected and arranged in 4 arrays of 20 meters length in order to monitor the homogeneity of the Helium gas temperature in the first prototype of SC – Link.

ThMo_Nb₃Sn ()

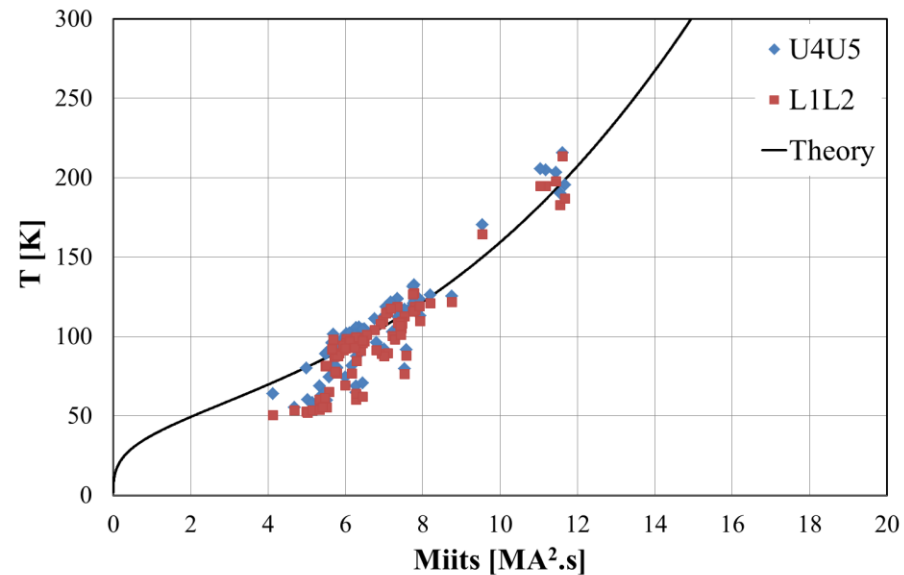
Project leader: Dr. Fabrizio Bellin UNiversity of Udine (IT)

5 members (IT+ USA)

> 400 access requested

The proposed activity consists of the development, validation and use of new computer tool to model the electromagnetic and thermal behavior of Rutherford cable magnets for accelerators.

With this new tool, we propose to model simple geometries representative of existing or new prototype Nb₃Sn magnets (e.g., Short Model Coil) and to compare the results with the measured values.



EuCARD² AMIT_Mag HeBP@ MagNet

AMIT_Mag HeBP (AMIT Magnet Helium Bath Performance)

Project leader: Dr. Fernando Toral CIEMAT (SP)

5 members (all SP)

200 access requested

The AMIT project aims to develop a compact superconducting cyclotron for radioisotope production with medical purposes. It uses a NbTi Superconducting Magnet. Once the full system is finished, it will operate in a stand-alone mode in a closed cycle, but prior to this phase, it must be checked that the magnet is working properly. The goal of these measurements is to carry on the training test of the magnet, recording as much information as possible to determine quench origins and overall performance.



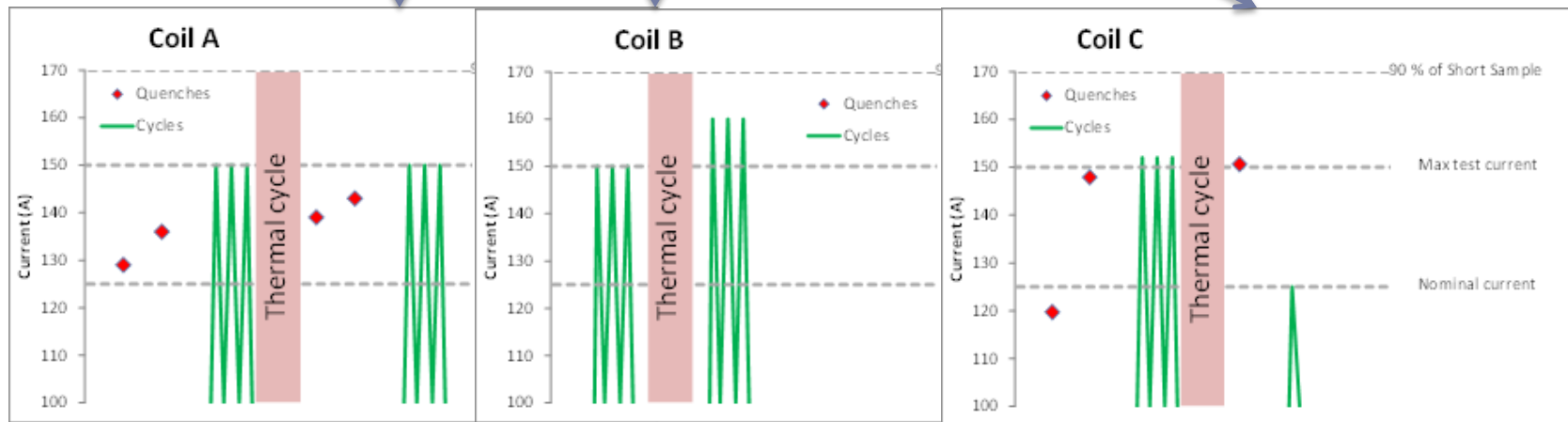


EuCARD² AMIT_Mag HeBP @ MagNet

Results

Thanks to the efforts of all teams involved we succeeded in performing **2 test runs**: first with coil A in March and then with coil B and C in April. In both cases a thermal cycle was performed.

The magnets all reached 150 A with a maximum of 2 training quenches per thermal cycle. The self-protected magnets performed good and the memory of the magnets is overall very good too.



What else we offer?

- Possibility of young people from external projects to exchange their working progress with CERN teams with the unique goal of building up a **network** for them

Extract from the Minuets of the Round Table Discussions

... Round discussion about **quench modelling for Nb₃Sn** magnets. Giulio and Fabrizio gave an overview of **their code**. The main **different** with respect to what is being by Susana using thea-heater is that they discretize the conductor in strands and study the current-heat distribution within the strands. Preliminary results for the adiabatic case without insulation are available. Giulio will present them in the next meeting

- Possibility of young people from external projects to exchange **visit** **CERN** Facilities

Status of the WP 9 MagNet in numbers

> 25 % of the planned accesses has been given

- 680 h accesses given the 1st year (*counting the CERN efforts: 1456 h accesses*)
- 3 projects
- 6 universities and institutes
- 4 countries (IT, SP, HU, USA)
- 12 participants
- 15 travels to CERN



- Administration is representing more work load than expected.
- Access to CERN is more complicated than expected : status for the project members

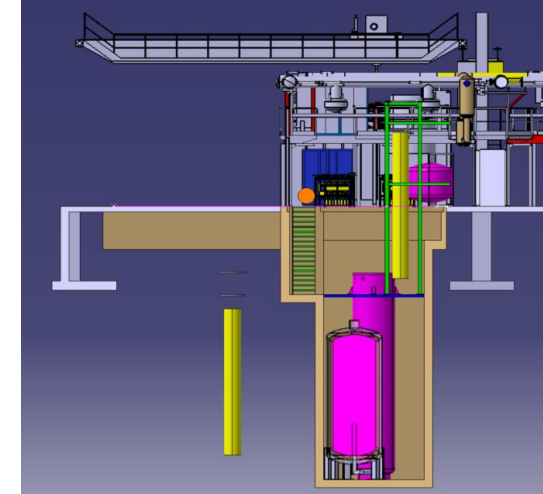
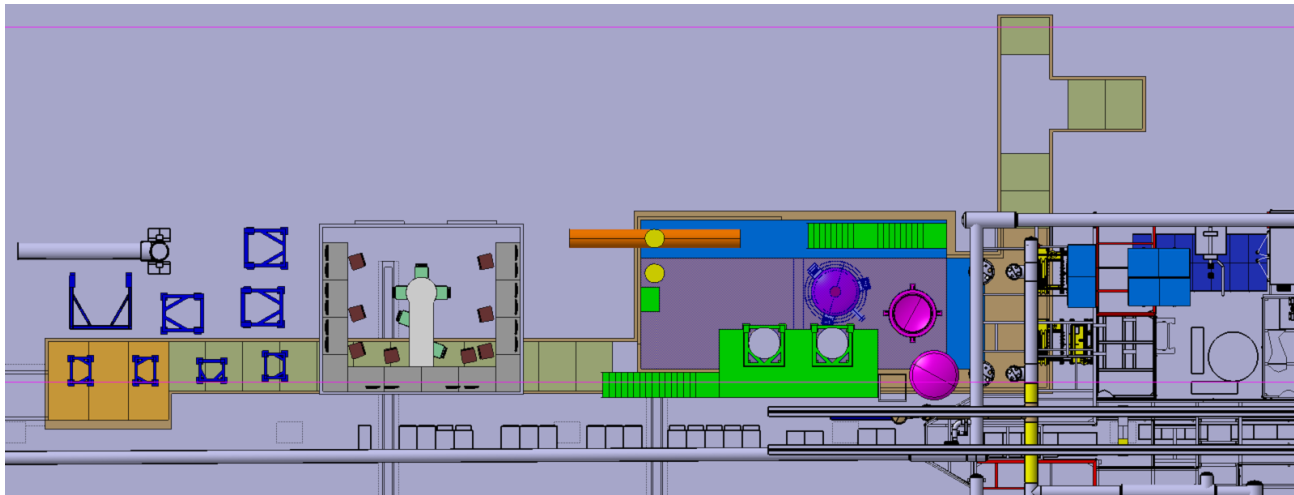
HOR2020

1. *Fiber Bragg Grating Sensor as Valuable Technological Platform for New Generation of Superconducting Magnets, A. Chiuchiolo et al x Mediterranean Photonics Conference (Trani – Italy)*
2. *Structural Health Monitoring of Superconducting Magnets at CERN using Fiber Bragg Grating Sensors, A. Chiuchiolo et al x Fotonica 2014 (Napoli - Italy)*
3. *Cold Test Results of the LARP HQ02-b magnet at 1.9 KH. Bajas et al forAsC 2014*
4. *Fiber Optic Cryogenic Sensors for Superconducting Magnets and Superconducting Power Transmission lines at CERN, A. Chiuchiolo et al xII International Conference on Applications of Optics and Photonics (Averio - Portugal)*
5. *Quench analysis of high current density Nb₃Sn conductors in a racetrack coil configuration H. Bajas et al for ASC 2014*
6. *Fiber Bragg Grating Sensors Based Monitoring System for Superconducting Accelerator Magnets, A. Chiuchiolo et al xEuropean Workshop on Structural Health Monitoring (Nantes - France)*



The outlook for next year

2/3 present projects will continue next year but due to work load from CERN projects the next year will be more difficult than the 1st year. Moreover we continue the extension and upgrade of the test facility to cope with next generation SC magnet test for HL LHC and FCC .





Thanks for your attention