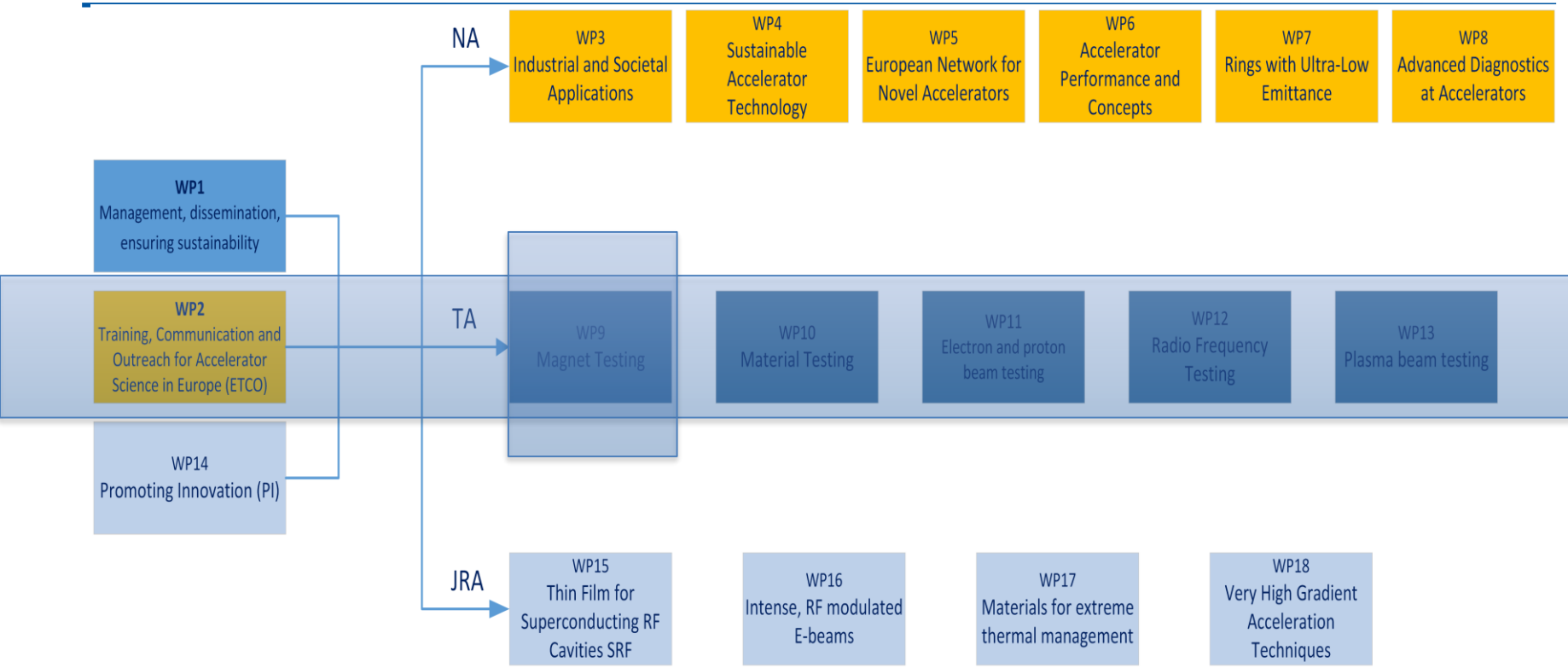
This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No 730871.

ACCESS to magnet testing facilities

ARIES KICK OFF/GENEVA/ May 2017

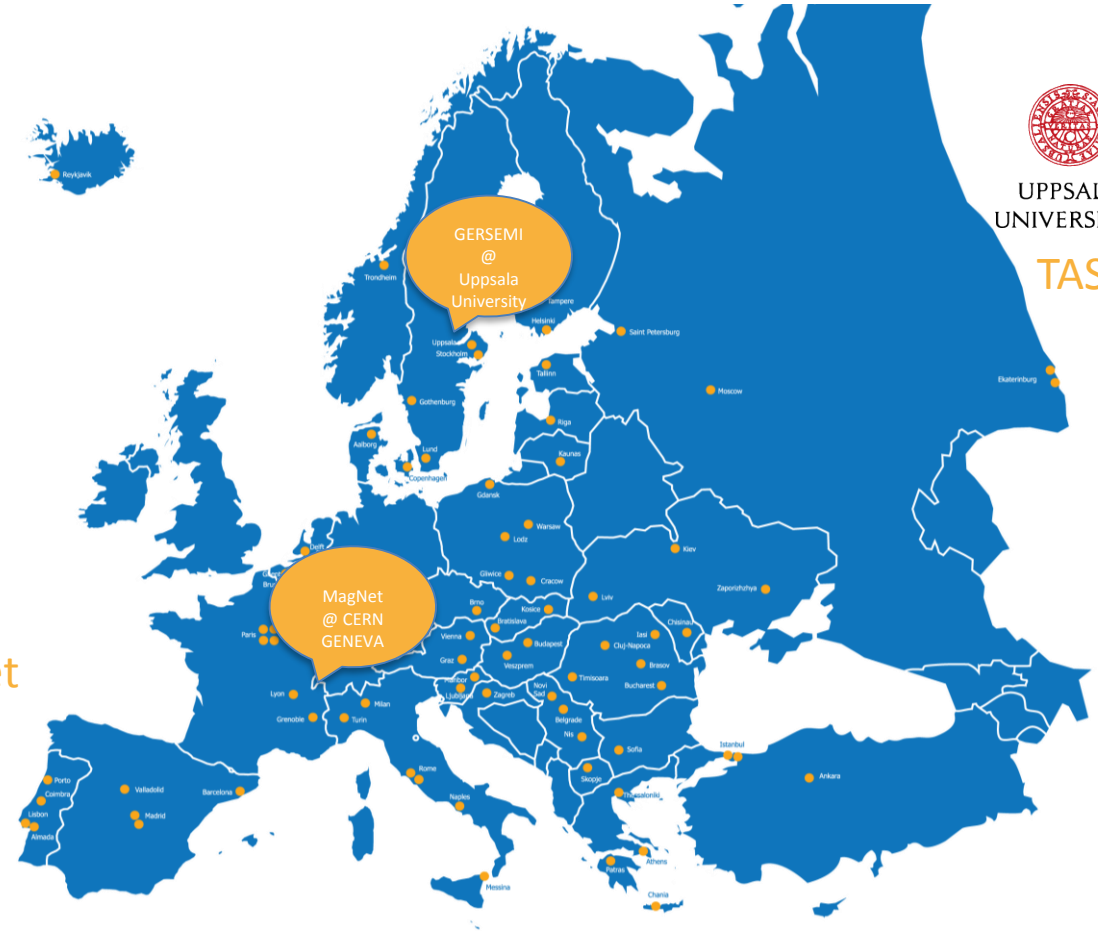
Marta Bajko CERN

Trans National Accesses in ARIES



Each of the five **Transnational Access** work packages groups complementary test facilities addressing the same community. Inside each work package, the access facilities offer a complementary set of services to the user community.

MAGNET TESTING FACILITIES in WP9



UPPSALA UNIVERSITET

FREIA

TASK 9.2 GERSEMI

CERN

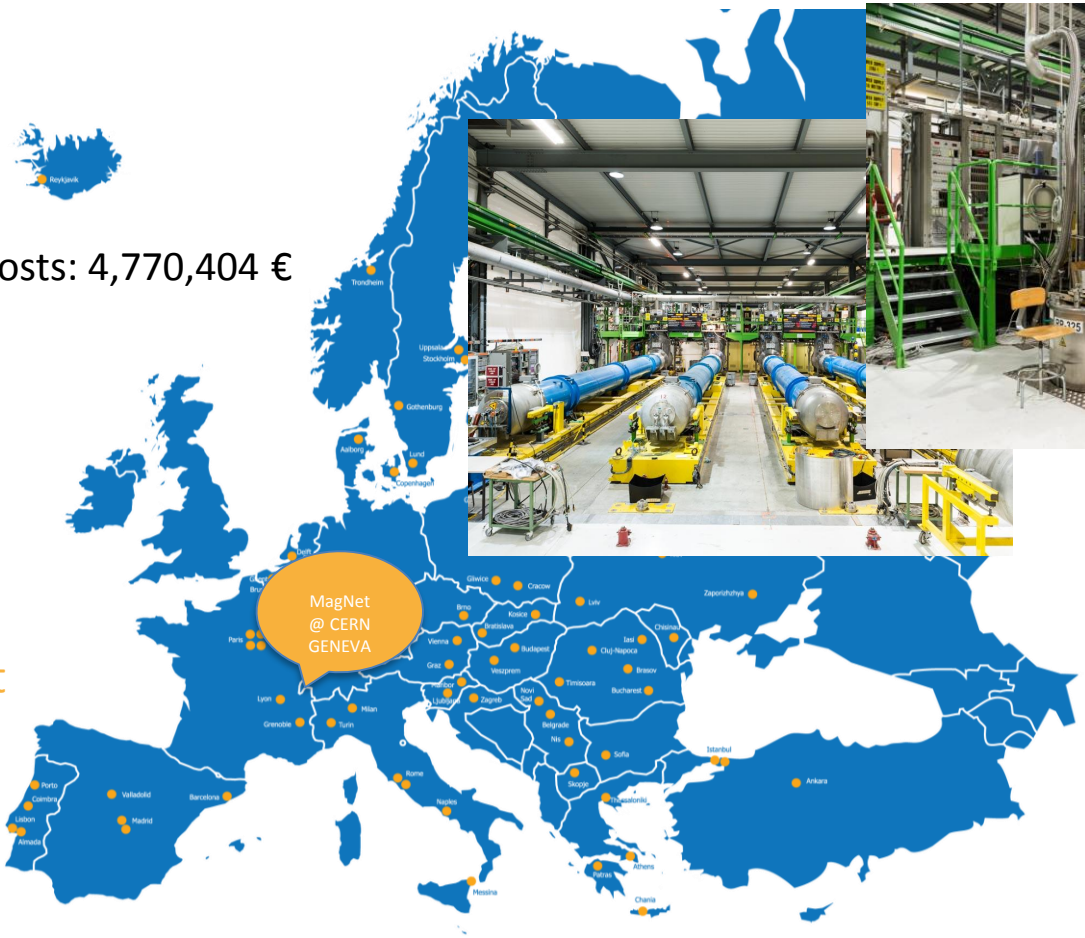
TASK 9.1 MagNet

The TNA within WP9 groups **TWO** facilities devoted to testing of superconducting magnets and of instrumentation operating at cryogenic temperature.

ARIES

MAGNET TESTING FACILITIES in WP9.1

Annual operating costs: 4,770,404 €



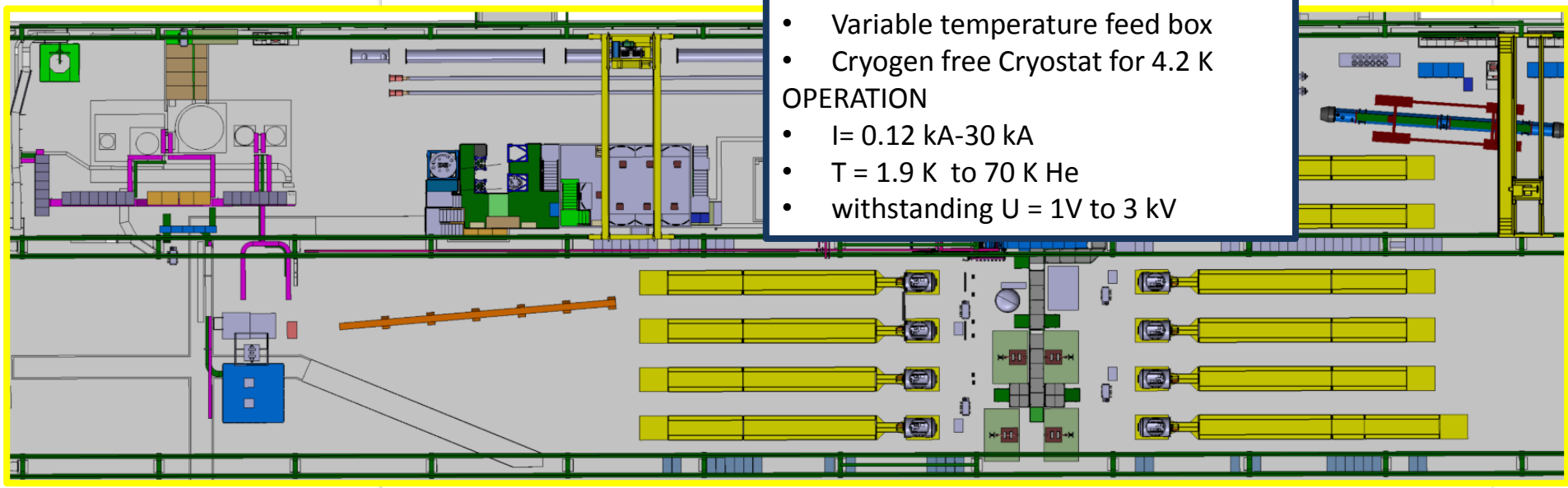
TASK 9.1 MagNet

The **MagNet** based at CERN in Geneva, (CH) offers testing on superconducting magnets and devices refrigerated at low temperatures and **high** currents.

MAGNET TEST STANDS LAYOUT @ CERN

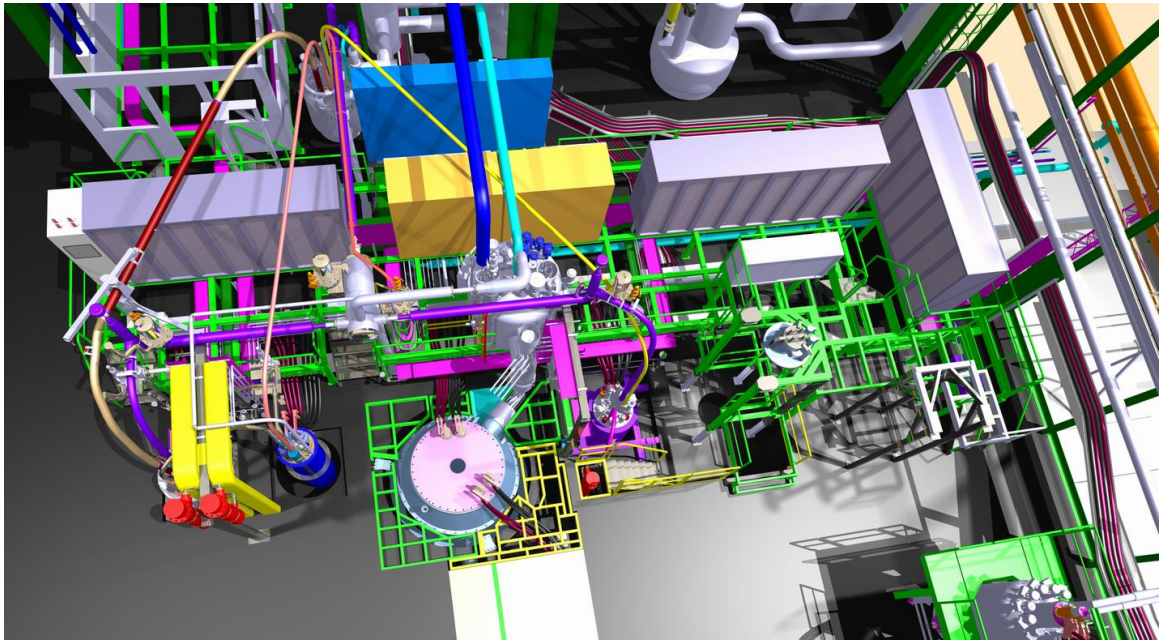
INSTALLATIONS
- 5 vertical cryostats ,
- 1 feed box for supercritical He,
- 1 cryostat for LN_2,
- 8 horizontal benches
- Variable temperature feed box
- Cryogen free Cryostat for 4.2 K

OPERATION
- I= 0.12 kA-30 kA
- T = 1.9 K to 70 K He
- withstanding U = 1V to 3 kV



VERTICAL TEST FACILITY at CERN

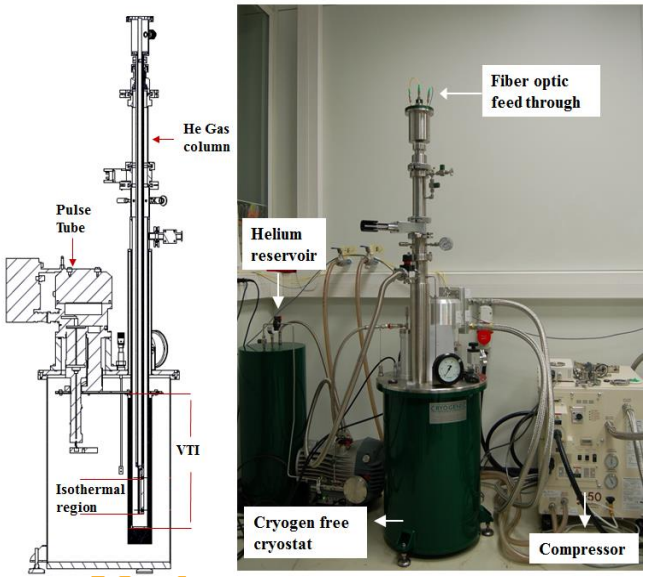
The VERTICAL test facility is an area regrouping FIVE cryostats with a capacity of up to 30 kA at 1.9 K; this area is typically used for research and development projects.



CRYOSTAT PARAMETERS (Cluster G/D)	
Max internal pressure :	5 bara
Magnet temperature :	1.9 K
Useful diameter :	1500/ 800 mm
Useful length in 1.9 K bath :	2.5/5.2 m
Max. thermal gradient :	50 K
Magnetic measurements:	yes
Estimated lifetime :	20 years
Number of thermal cycles :	< 1000
Number of Quenches :	< 10000

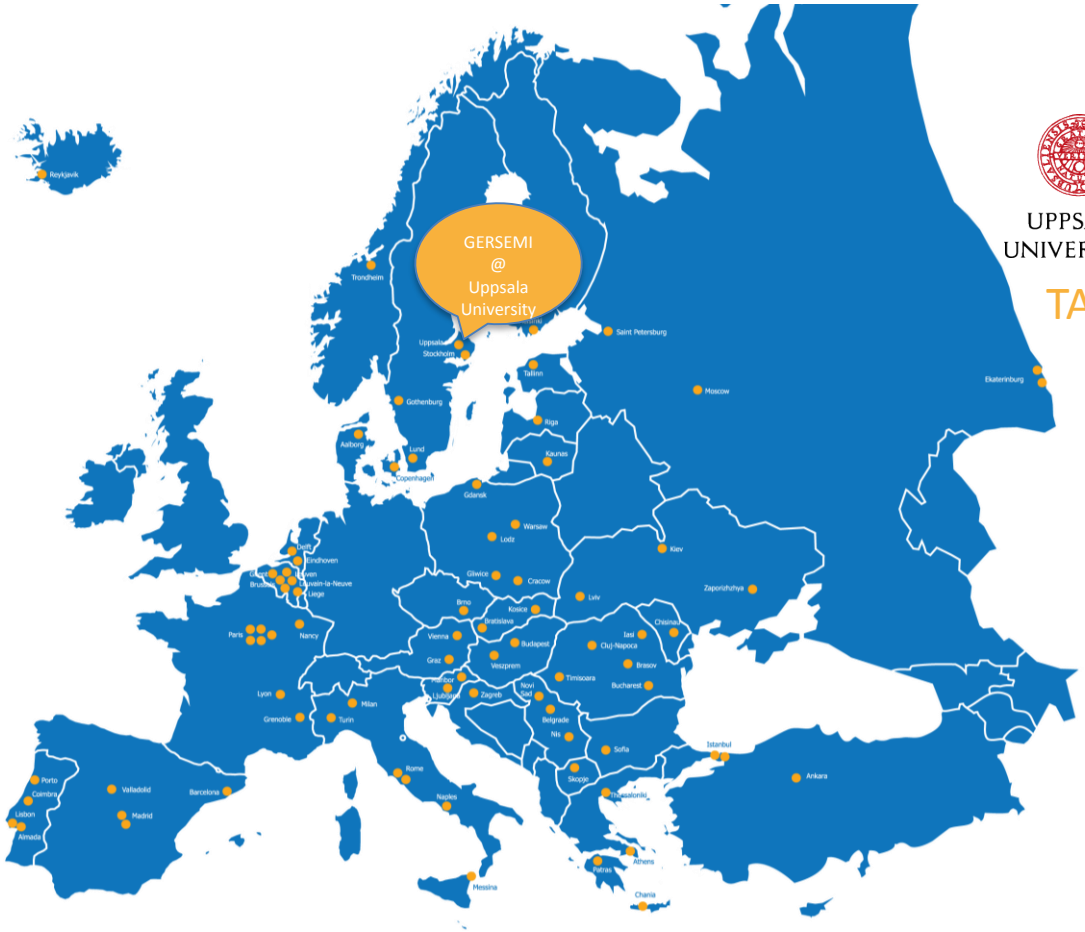
HORIZONTAL TEST FACILITY at CERN

The HORIZONTAL test facility is an area regrouping EIGHT operational cryostats with a capacity of up to 20 kA at 1.9 K; this area is typically used for LHC type magnets



Cryogen free cryostat for instrumentation down to 4.2 K

MAGNET TESTING FACILITIES in WP9. 2



UPPSALA UNIVERSITET

FREIA

TASK 9.2 GERSEMI

The **GERSEMI** based at University of Uppsala (S) offers testing on superconducting magnets refrigerated at low temperatures and **medium** currents.

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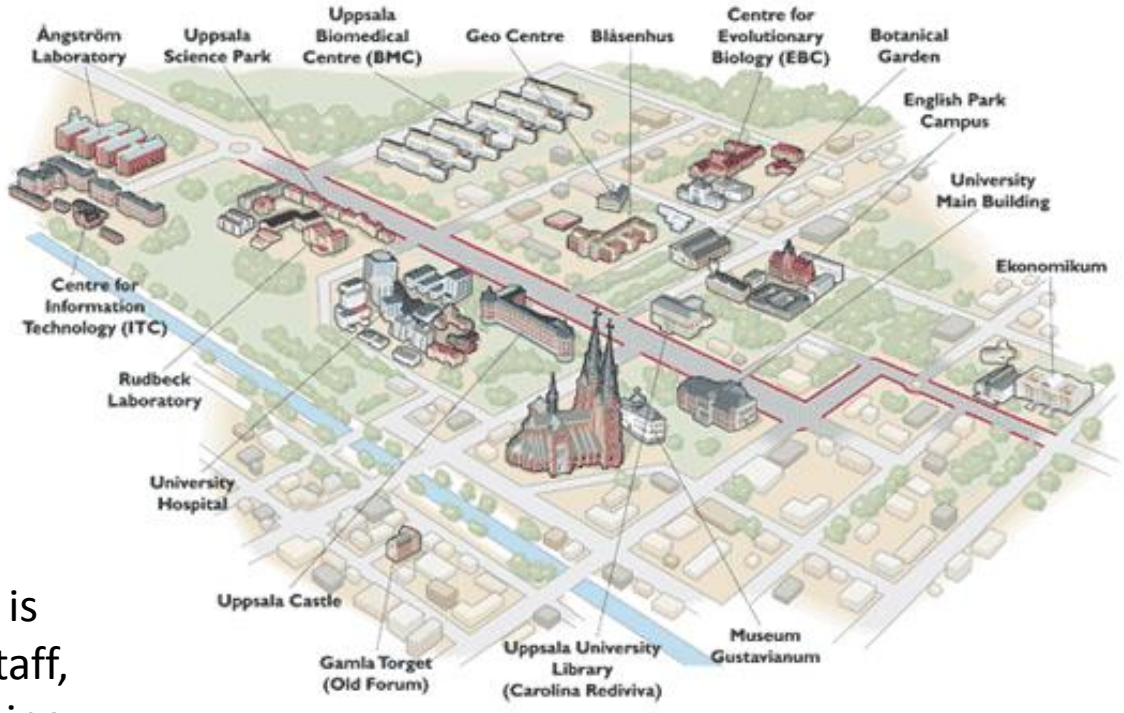
ARIES

MAGNET TEST STANDS LAYOUT @ GERSEMI

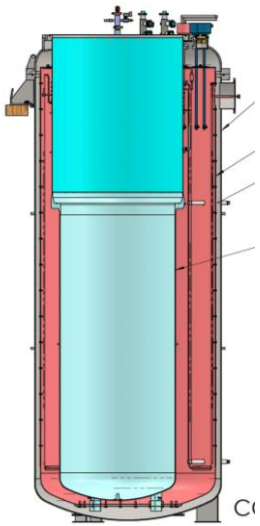


UNIVERSITY OF UPPSALA

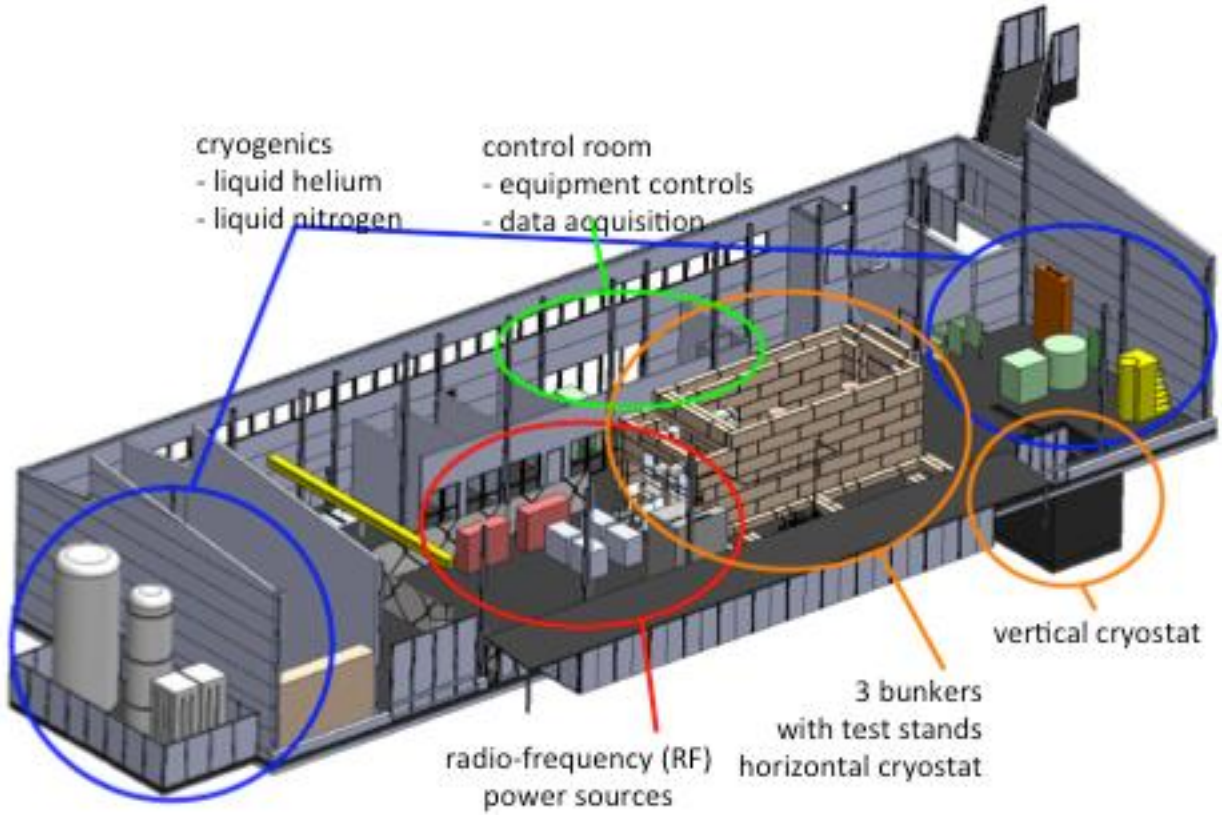
the oldest university in Sweden is having : 25'000 students, 9'000 staff, 7 faculties of theology, law, medicine, pharmacy,
arts, social sciences, languages, educational sciences, science and technology

MAGNET TEST STANDS LAYOUT @ GERSEMI

A building of **1100 m²** hosts a vertical cryostat for 1.8 K and 4.2 K operation with currents up to 2 kA.



useful diameter = 1.0 m
useful length in 1.9 K bath = 2.1 m



SELECTION PANNEL and MODUS OPERANDI

The TWO test facilities are sharing a COMMON User Selection Panel.

TNA User Selection Panel

is established to select users, based on the **SCIENTIFIC QUALITY** and **FEASIBILITY** of their proposals. The panel is composed of representatives of the facilites

M. BAJKO @ CERN AND R. RUBER @ GERSEMI

and also international experts in the field of magnets and instrumentation.

Dr. TATSUSHI NAKAMOTO
KEK - JAPAN

Dr. GIANLUCA SABBI
LBNL - USA

OUR ENGAGEMENT FOR EU

The expected minimum availability for the 4 years covered by the project is 1920 units @ MagNet and 2880 in GERSEMI.

A unit of access is 1 h of use of an installation in operation or in preparation..

THE SUMMARY OF TNA IN EUCARD2

- **2340** (over 1920) accesses given
- 9 (over 8) projects
- 15 universities and institutes
- 6 countries (IT, SP, HU, USA, FI, Ru)
- 38 (over 60) users
- > 54 travels to CERN

MY PAST EXPERIENCE with TNA

1st access granted 20th of November 2013

Fiber Optic Sensors FOR CRYogenic ApplicatiOns and Superconducting Magnets

- University of Sannio (IT)
- University of Napoli, Federico II (IT)
- University of Padova (IT)
- University of Debrecen (HU)
- Institute of Polymers, Composites and Biomedical materials (IT)

Sensors and Actuators A 189 (2013) 195–203

Contents lists available at SciVerse ScienceDirect

Sensors and Actuators A: Physical

journal homepage: www.elsevier.com/locate/sna

Fiber Bragg Grating sensors to measure the coefficient of thermal expansion polymers at cryogenic temperatures

Marco Esposito[a,b], Salvatore Buontempo[a,f], Angelo Petriccione[b], Mauro Zarrelli[b], Giovanni Bre
Andrea Saccomanno[c], Zoltan Szillasi[d,f], Alajos Makovec[e,f], Andrea Cusano[g,f], Antonella Chiuch
Marta Bajko[h,f], Michele Giordano[b,f,*]

[a] INFN – National Institute of Nuclear Physics, Sez.NA, Italy
[b] CNR-IMCB – Institute for Composites and Biomedical Materials, National Research Council, Italy
[c] DIBET – University of Napoli Federico II, Italy
[d] ATOMKI – Institute of Nuclear Research of the Hungarian Academy of Science, Hungary
[e] University of Debrecen, Hungary
[f] CERN – European Organization for N
[g] Engineering Department – Universit
[h] DSF – Physical Sciences Department

IEEE Photonics Journal
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4424 Vol. 40, No. 19 / October 1 2015 / Optics Letters Letter

Optics Letters

Cryogenic-temperature profiling of high-power superconducting lines using local and distributed optical-fiber sensors

Antonella Chiuchiolo,[1,2] Luca Palmieri,[3] Marco Consales,[1] Michele Giordano,[4] Anna Borriello,[4] Hugues Bajas,[2] Andrea Galtarossa,[3] Marta Bajko,[2] and Andrea Cusano[1,*]

[1]Optoelectronic Division, Department of Engineering, University of Sannio, 82100 Benevento, Italy
[2]CERN-European Organization for Nuclear Research, CH-1211 Geneva, Switzerland
[3]Department of Information Engineering, University of Padova, 35131 Padova, Italy
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*Corresponding author: acusano@unisannio.it

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Structural Health Monitoring of Superconducting Magnets at CERN Using Fiber Bragg Grating Sensors

Antonella Chiuchiolo, Marta Bajko, Juan Carlos Perez, Hugues Bajas, Michael Guinchard, Michele Giordano, Giovanni Breglio, Marco Consales, Andres Cusano

Fiber Bragg Grating Cryosensors Superconducting Accelerator Mag

Volume 6, Number 6, December 2014

A. Chiuchiolo
M. Bajko
J. C. Perez
H. Bajas
M. Consales
M. Giordano
G. Breglio
A. Cusano

Fiber Optic Cryogenic Sensors for Superconducting Magnets and Superconducting Power Transmission lines at CERN

A. Chiuchiolo[a,b], M. Bajko[b], J. C. Perez[b], H. Bajas[b], M. Consales[a], M. Giordano[c], G. Breglio[d], L. Palmieri[c], A. Cusano[a*]

[a]Optoelectronic Division ,Department of Engineering, University of Sannio, Corso Garibaldi, 82100 Benevento
[b]European Organization for Nuclear Research, CERN, CH-1211 Geneva 23
[c]Institute for Composite and Biomedical Materials, CNR, 80055 Portici
[d]Electrical Engineering and Information Technologies Department, University of Naples Federico II, Corso Umberto I, 80138 Napoli
[e]Department of Information Engineering, University of Padova, Via Gradenigo, 35131 Padova

Fiber Bragg Grating Sensor as Valuable Technological Platform for New Generation of Superconducting Magnets

A. Chiuchiolo[a,b], M. Bajko[b], J. C. Perez[b], H. Bajas[b], P. Viret[b], M. Consales[a], M. Giordano[c], G. Breglio[d], A. Cusano[a*]

[a]Optoelectronic Division, Department of Engineering, University of Sannio, Benevento, Italy; [b]European Organization for Nuclear Research, CERN, Genève, Switzerland; [c]Institute for Composite and Biomedical Materials, CNR, Portici, Italy; [d]Electrical Engineering and Information Technologies Department, University of Naples Federico II, Napoli, Italy

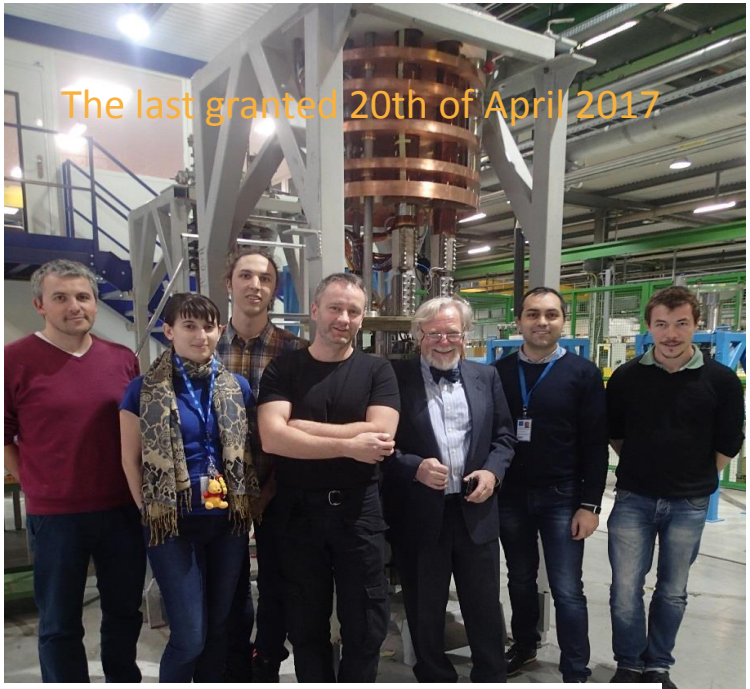
IEEE TRANSACTIONS ON APPLIED SUPERCONDUCTIVITY, VOL. 26, NO. 4, JUNE 2016 9000705

Advances in Fiber Optic Sensors Technology Development for Temperature and Strain Measurements in Superconducting Magnets and Devices

A. Chiuchiolo, H. Bajas, M. Bajko, L. Bottura, M. Consales, A. Cusano, M. Giordano, and J. C. Perez

ARIES

MY PAST EXPERIENCE with TNA



8. SUSHI Septum (Superconducting **Shi**eld for Septum **)**

Project leader: Dr. Daniel Barna
WIGNER RESEARCH CENTRE FOR PHYSICS, BUDAPEST, HUNGARY
5 members (**HU+ RU + IT**)

WITH THE MAGNET TEAM MEMBRES WE HAD:
5 NATIONALITIES
2 GENDERS, ALL AGES, INTITUTES , UNIVERSITIES AND INDUSTRY!!!

PHYSICAL REVIEW ACCELERATORS AND BEAMS **20,** 041002 (2017)

High field septum magnet using a superconducting shield for the Future Circular Collider

Dániel Barna*
Wigner Research Centre for Physics, Budapest H-1121, Hungary
(Received 15 July 2016; revised manuscript received 16 February 2017; published 21 April 2017)

A zero-field cooled superconducting shield is proposed to realize a high-field (3–4 T) septum magnet for the Future Circular Collider hadron-hadron (FCC-hh) ring. Three planned prototypes using different materials and technical solutions are presented, which will be used to evaluate the feasibility of this idea as a part of the FCC study. The numerical simulation methods are described to calculate the field patterns around such a shield. A specific excitation current configuration is presented that maintains a fairly homogeneous field outside of a rectangular shield in a wide range of field levels from 0 to 3 Tesla. It is shown that a massless septum configuration (with an opening in the shield) is also possible and gives satisfactory field quality with realistic superconducting material properties

.. And many smiling faces!!!

THANKS FOR YOUR ATTENTION