



**Testing of magnets and components at
cryogenic temperatures, report from
TNA WP9**

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For the ARIES ANNUAL MEETING APRIL 2020

WP9.1 – The *MagNet TNA*

MagNet (@CERN) is operational,
but very busy with CERN projects (mainly with HL-LHC magnet testing)



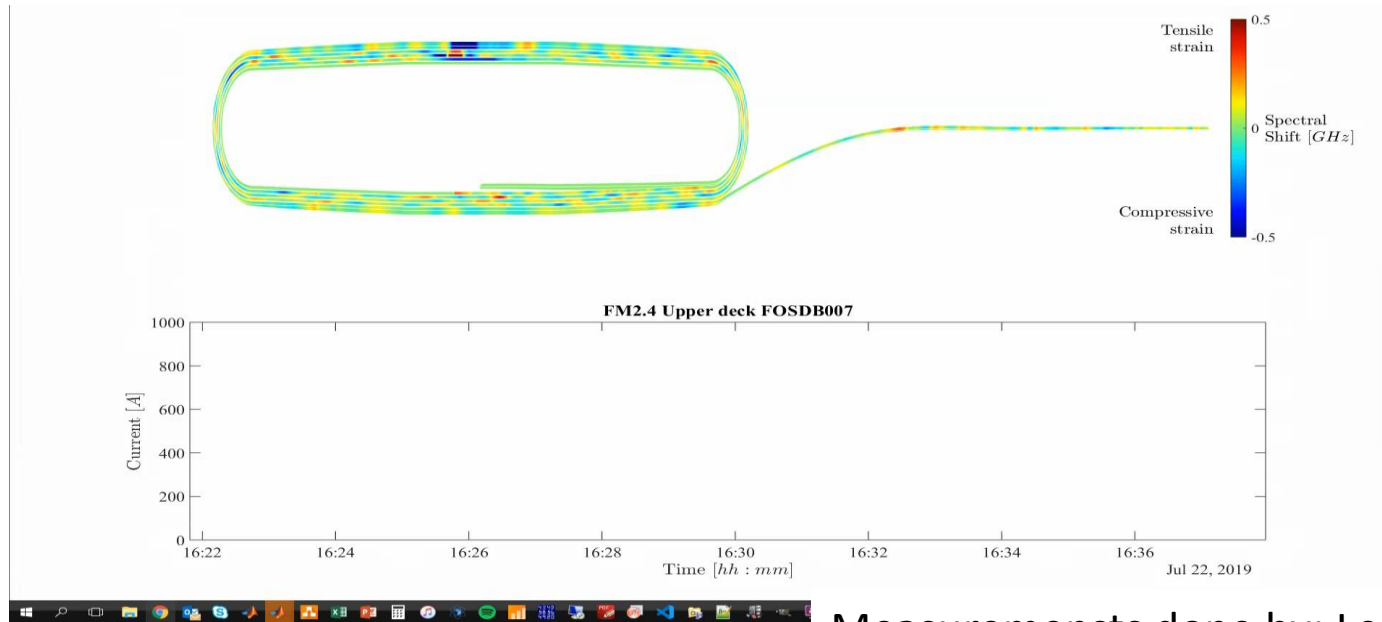
5 projects were submitted for approval
4 approved and 1 in evaluation process
4 of them has been already performed tests

Facility	No. of projects Y1	Total no. of projects Annex 1	No. of users Y1	Total no. of users Annex 1	No. of access units Y1	Total no. of access units Annex 1
MagNet	4	8	27	40	944	1,920
Gersemi	0	8	0	56	0	2,880

Monitoring by distributed optical fibre sensors

To demonstrate the feasibility of the quench monitoring in a SC link and and HTS magnet.

FeatherM2.3-4: powering



Dr. Palmieri is willing to take up the challenge in integrating a continues fiber into a coil after a successful test in a transmission line.

Measurements done by: Leonardo Marcon

In this video the shift induced on the fiber during the powering of the coil is shown. Since the temperature was sufficiently stable during the measurement, the shift can be considered generated exclusively by strain. As can be seen, as the current flowing in the coil increases, the sides of the coil experience a small tensile strain and the ends of the coil experience a small compressive strain. This strain disappears as soon as the current is stopped

Users event @ GERSEMI



3rd International Workshop of the Superconducting Magnets Test Stands

11-12 June 2019
Ångström laboratory
Europe/Stockholm timezone

With 45 participants and 35 talks

Industrial Exhibition
Timetable
Contribution List

Overview



Ångström Laboratory,
Lägerhyddsvägen 1,
Uppsala



WP9.2 The *Gersemi* TNA

- **Commissioning with simulator-cryostat**

- delivery on 2018-March & May
 - delayed due to technical manufacturing difficulties
- test runs 2018-June, Sept., Dec., 2019-Feb/Mar
 - cold leak(s) in valve box → several opening/repairs
 - damaged warm 2K pumping valve

- **Commissioning with full cryostat**

- commissioning runs 2019-June, Oct., Dec.
- cold leaks in valve box & vertical cryostat; MLI damage → several opening/repairs
- **Remaining worries during 2K operation**
 - thermo-acoustic vibrations (Taconis) with liquid insert
 - large heat load on 2K return line → JT valve not at optimal temperature

- **Ongoing work**

- fixing some remaining hardware/software issues
- preparing for first test with a superconducting cavity (not part of WP9.2)



Potential new project at CERN

as in December 2019

[...] magnet is part of a large ultra-cold neutron source called SuperSUN, which will first be used to search for the electric dipole moment of the neutron and later to measure the lifetime of free neutrons. This magnet is going to be built by Elytt Energy (Spain) for the ILL (France). ILL is part of EIROforum with CERN.

The goal is to test and train the magnet in a test cryostat before installing them inside the final cryostat.

The magnet consists of a solenoid surrounded by 8 coils inside a yoke. The field will act as a magnetic trap of ultra-cold neutrons (2.1 T max on the perimeter and a few mT on the axis). The 8 NbTi coils will be energised with 432 A and a switch heater will allow us to work in persistent mode. The solenoid, which prevents the loss of neutrons through depolarisation, will be energised with a lower current. We shall test the persistent switches and joints at our facility before testing the coils.

The whole length of the 4 K magnet is a bit more than 3 m and the diameter is ≈ 220 mm. As we shall need space to attach the persistent joints and switches, the instrumentation and the LN2 precool loop, we estimate that we shall need a $\approx \text{Ø}350 \times 4000$ mm³ 4K cylinder.

As for the schedule, Elytt should complete the construction of the magnet in January 2021. The drawings are completed and they are preparing the mockup coil.

No news from them



Potential new project at CERN additional request in 2020

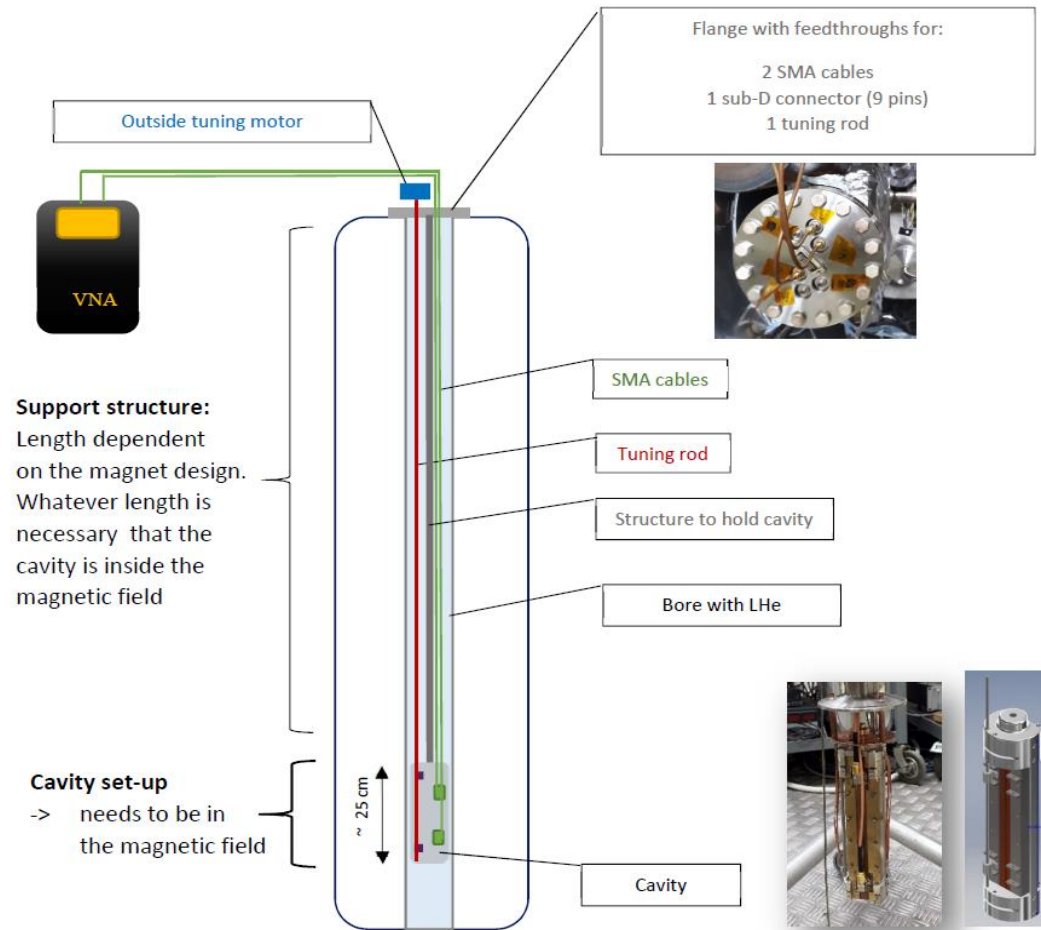
RADES

(Relic Axion Detector Exploratory Setup)

is a project with the goal of directly searching for axion dark matter employing custom-made microwave filters in magnetic dipole fields.

tentative schedule for TNA MagNet facility

- 20.01. - 22.01.2021 Installation of the set-up
- 25.01. - 29.01.2021 Characterization of the set-up
- 30.01. - 07.03.2021 Data taking



+ 11 users and prox + 500 access



Potential new projects at GERSEMI

Test of the Metrosil varistor at cold

Test of the Scanditronix 50 cm short model CCT magnet

TEST of MCBXF-A/B magnetS

What are my expectations from now on at MagNet

MagNet : It is quite difficult with the CERN projects in these days to offer accesses. HL LHC magnets are occupying our test benches with much more time than originally expected. Still with these two extra projects we may with an extra 12 months be in line with our initial proposal.

GERSEMI : We expect this summer to start operation and with some extension to make give the offered accesses.

Facility	Institute	COMMITTMENT (Annex1)			ACHIEVED at M18 (10/2018)			ACHIEVED at M36 (04/2020)			EXPECTED to M48 (05/2020-04/2021)			EXPECTED to M60 (05/2021-04/2022)		
		Projects	Users	Access Units	Projects	Users	Access Units	Projects	Users	Access Units	Projects	Users	Access Units	Projects	Users	Access Units
MagNet	CERN	8	40	1920	4	22	944	4	22	944	5	30	1300	6	35	1800
Gersemi	U. Uppsala	8	56	2880	0	0	0	0	0	0	2	8	720	8	32	2880

WE WILL FOLLOW THE RECCOMENDATIONS AND PROPOSAL OF THE
PROJECT LEADER M. VRETENAR IN THE REDISTRIBUTION OF
BUDGET AND ACCESSES

