

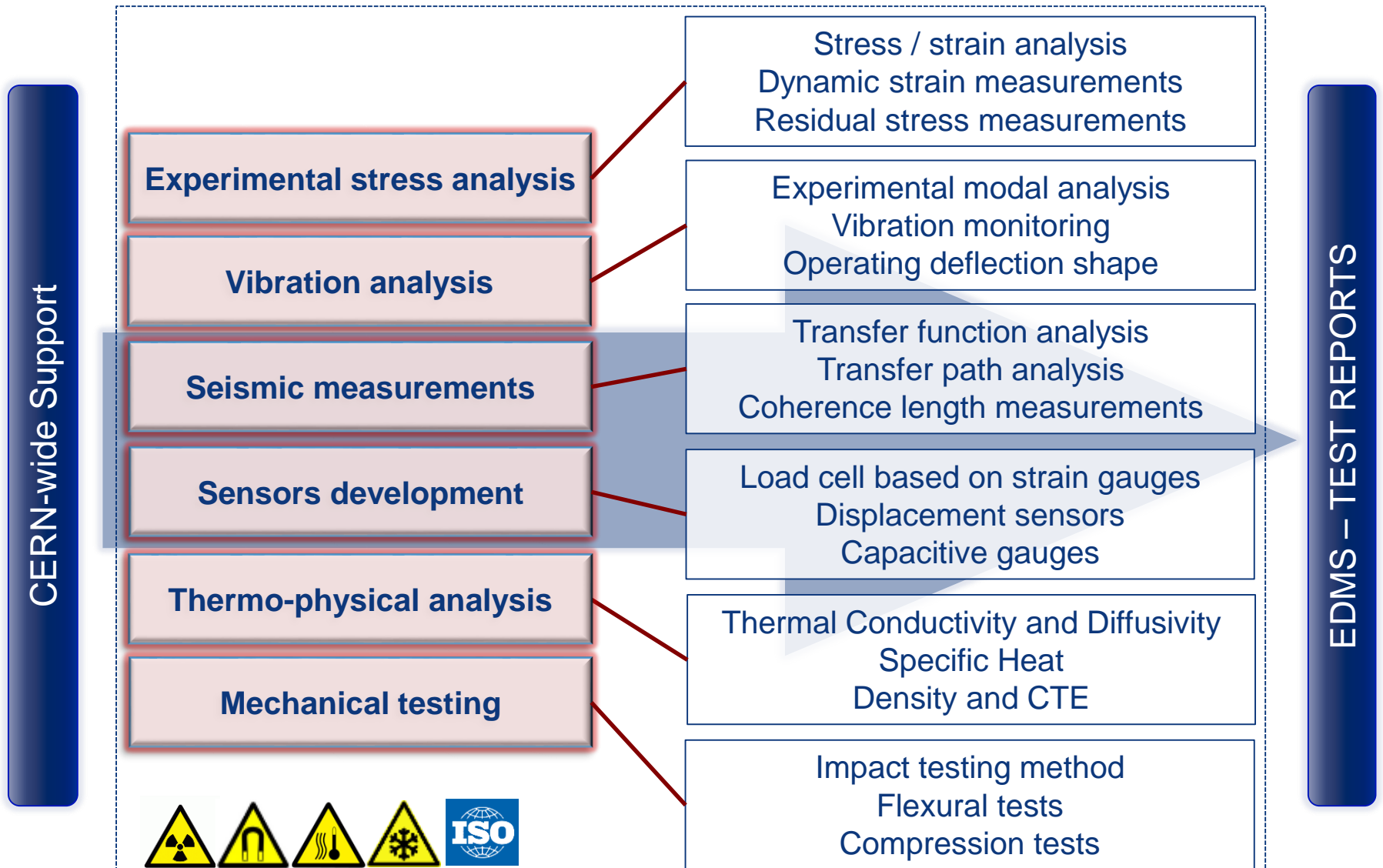
# D2 Short Model : Mechanical Measurements Proposal

M. Guinchard



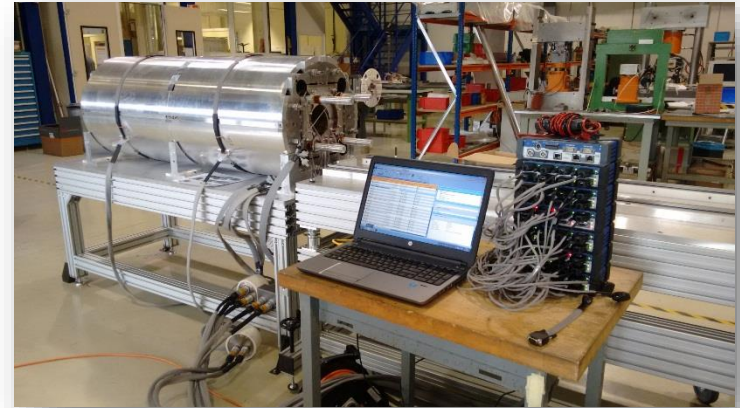
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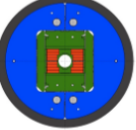
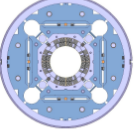
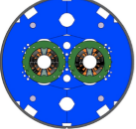
# Lab Competencies

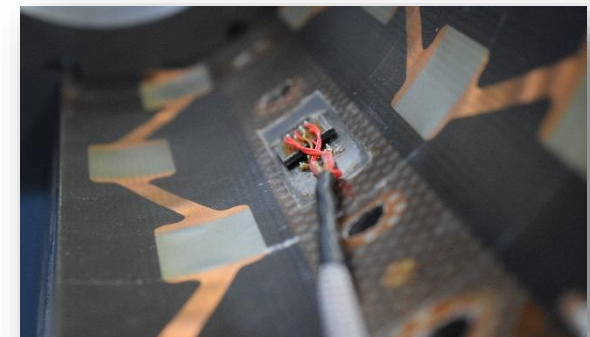
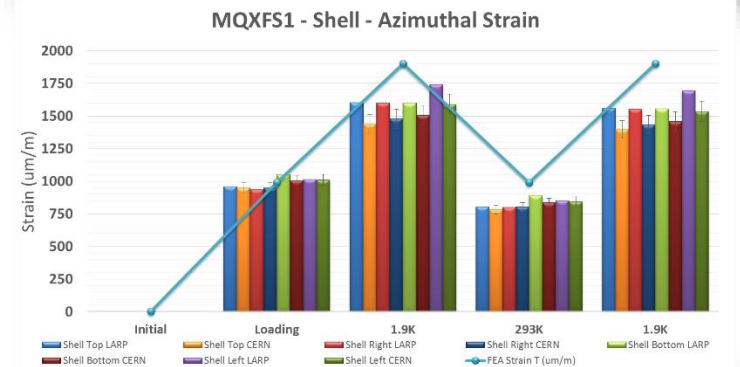


# Standard activities with magnets

Mechanical strain measurement is a key element in the development of superconducting magnets, in order to validate the Finite Element Analysis (FEA) and control the integrity of the whole structure during assembly phases, thermal cycles down to 1.9K and powering tests.

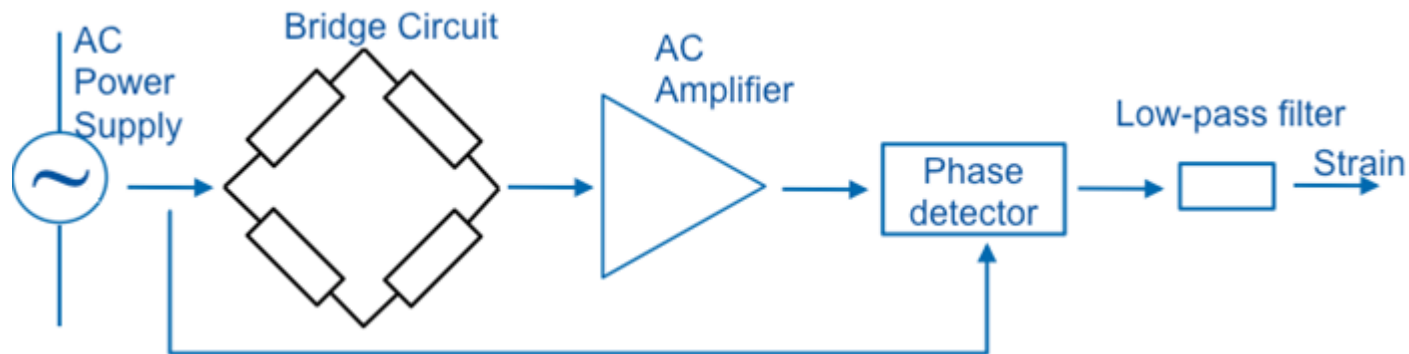


Name	Cross Section	Diameter	Magnetic Field	Nb of Strain gauges	Nb of wires
SMC		540 mm	12.5 T peak field	48	156
RMC		570 mm	16 T peak field	48	148
FReSCa2		1030 mm	13 T bore field	40	116
MQXFS		615 mm	12.1 T bore field	64	104
DS 11T Dipole		580 mm	11.21 T bore field	180	416

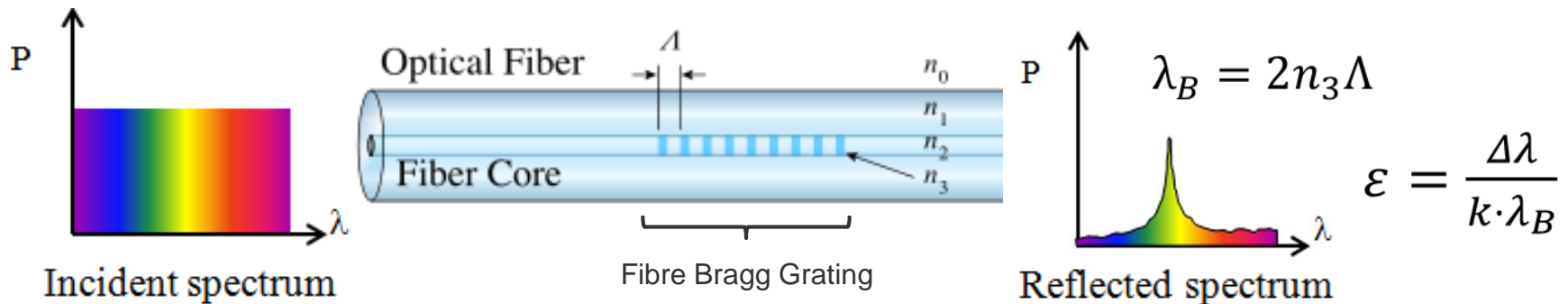


# Mechanical strain measurements

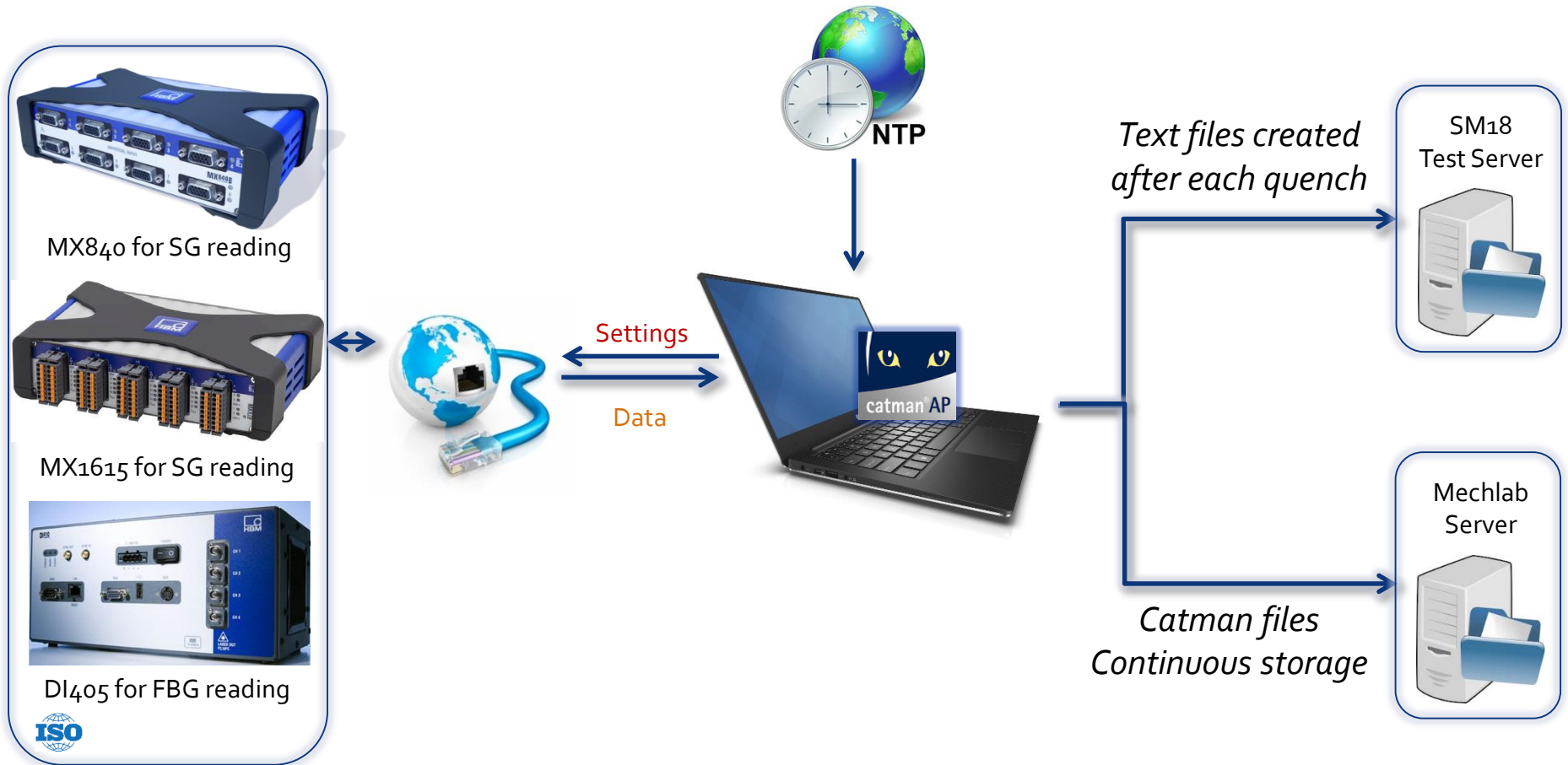
- Electrical circuit principle for SG :



- Principle for FBG :



# Instrumentation overview : DAQ System

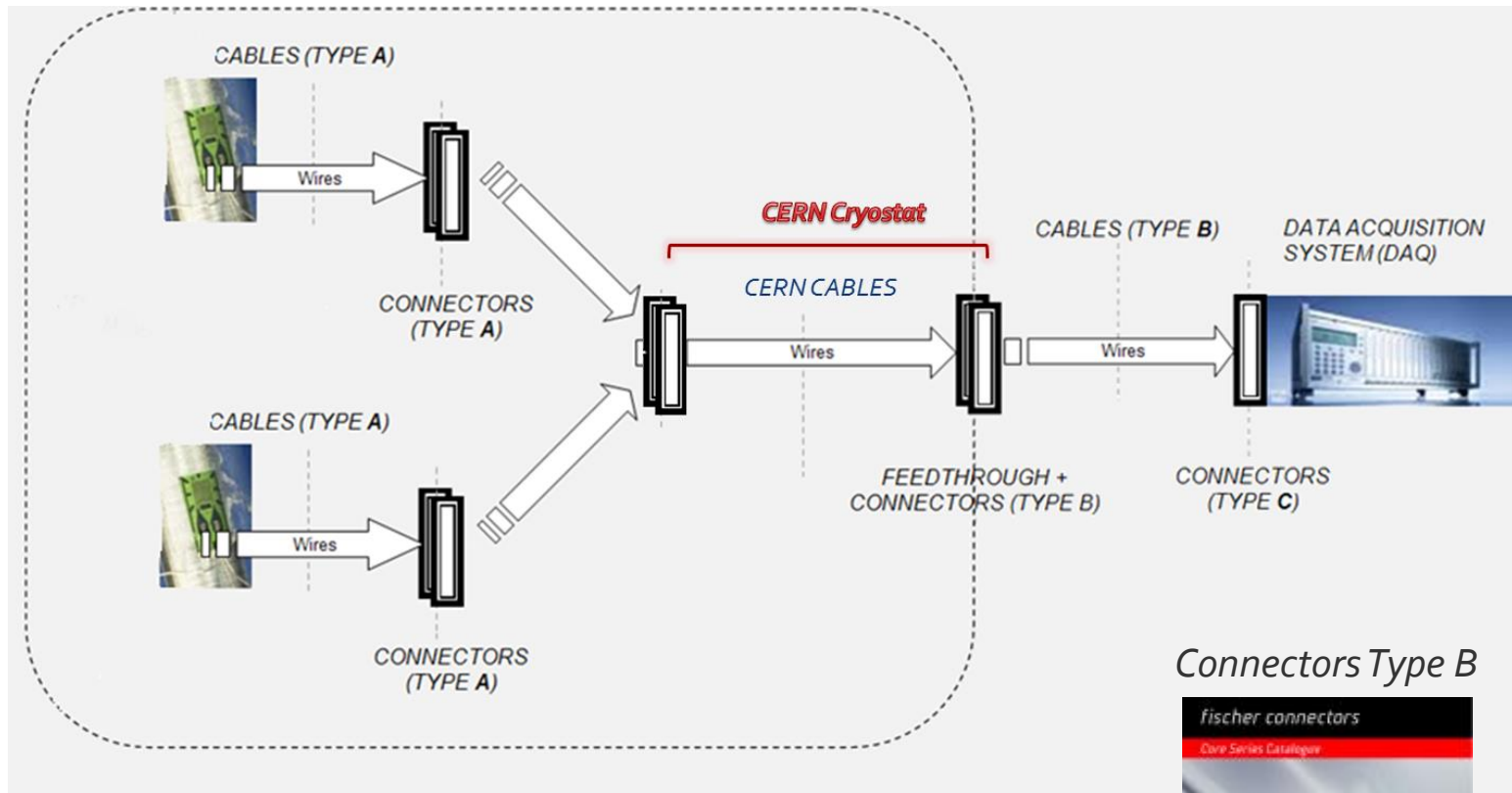


# Possible collaboration for D2 short model

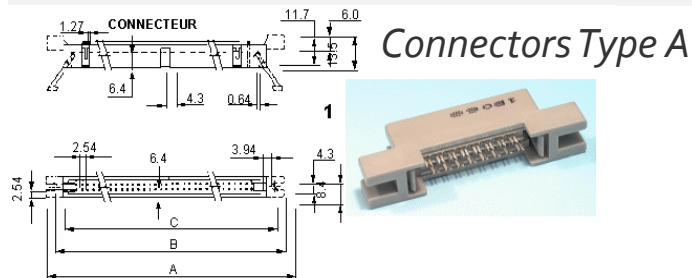
Ideally, CERN (EN-MME) team would like to take in charge the mechanical instrumentation of the structure with the following steps :

- Design of the instrumentation in collaboration with INFN, based on relevant Finite Element Analysis (INFN); Optical or electrical strain gauges, load cells, etc...
- Installation of the instrumentation by CERN experts on site (INFN ?), including strain gauges and wiring compatible with CERN test benches;
- Strain monitoring during magnet assembly will be done with CERN data acquisition systems and CERN experts on site;
- Preparation / interfacing for SM18 test benches, measurements during powering tests, data will be accessible on SM18 servers;
- Data sharing, Analysis and Reporting.

# Mechanical strain measurements : Interface



Connectors Type B



**Thank you !**



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