MMP6:An Object Oriented Toolkit to manage the Magnetic Measurements for the LHC Magnets

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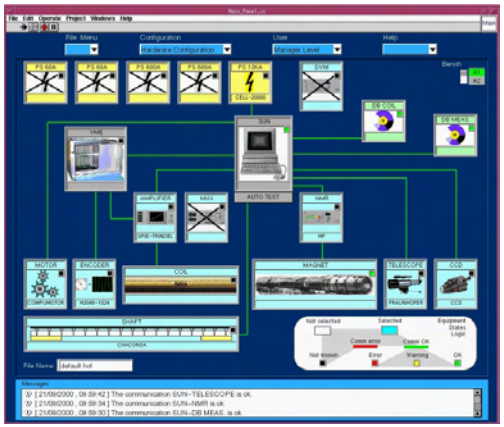


Introduction

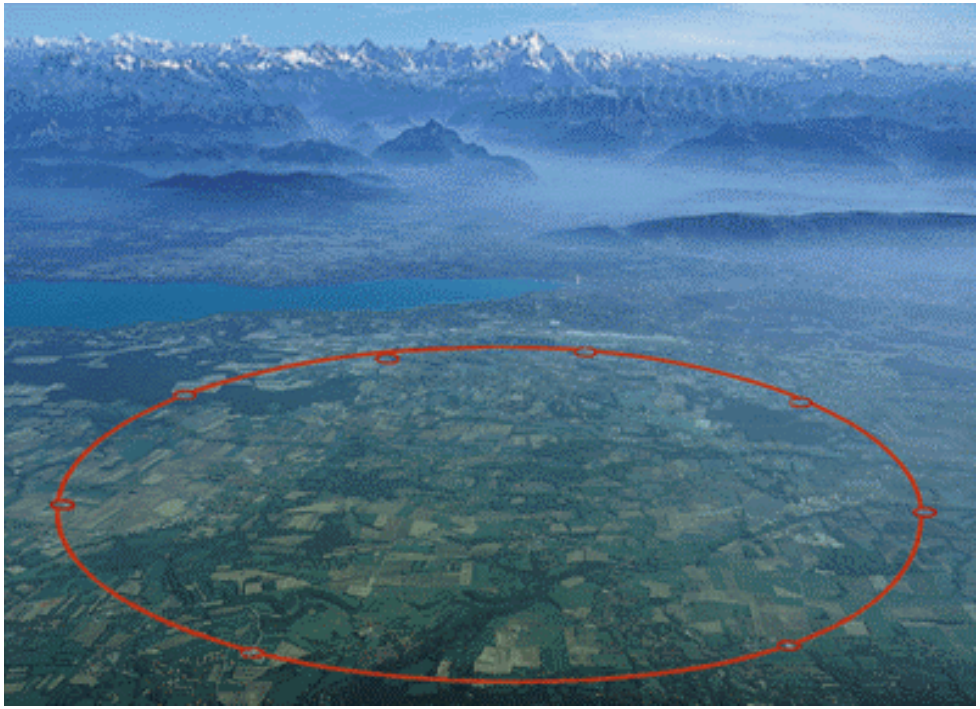
CERN LHC magnet test facilities

The magnetic measurement system

Project status

Summary

The LHC MB & MQ test program



- 4 years to test all magnets
  - 1232 dipoles
  - 400 quadrupoles
  - 100 spec. quad.
- ~1 week test time per magnet

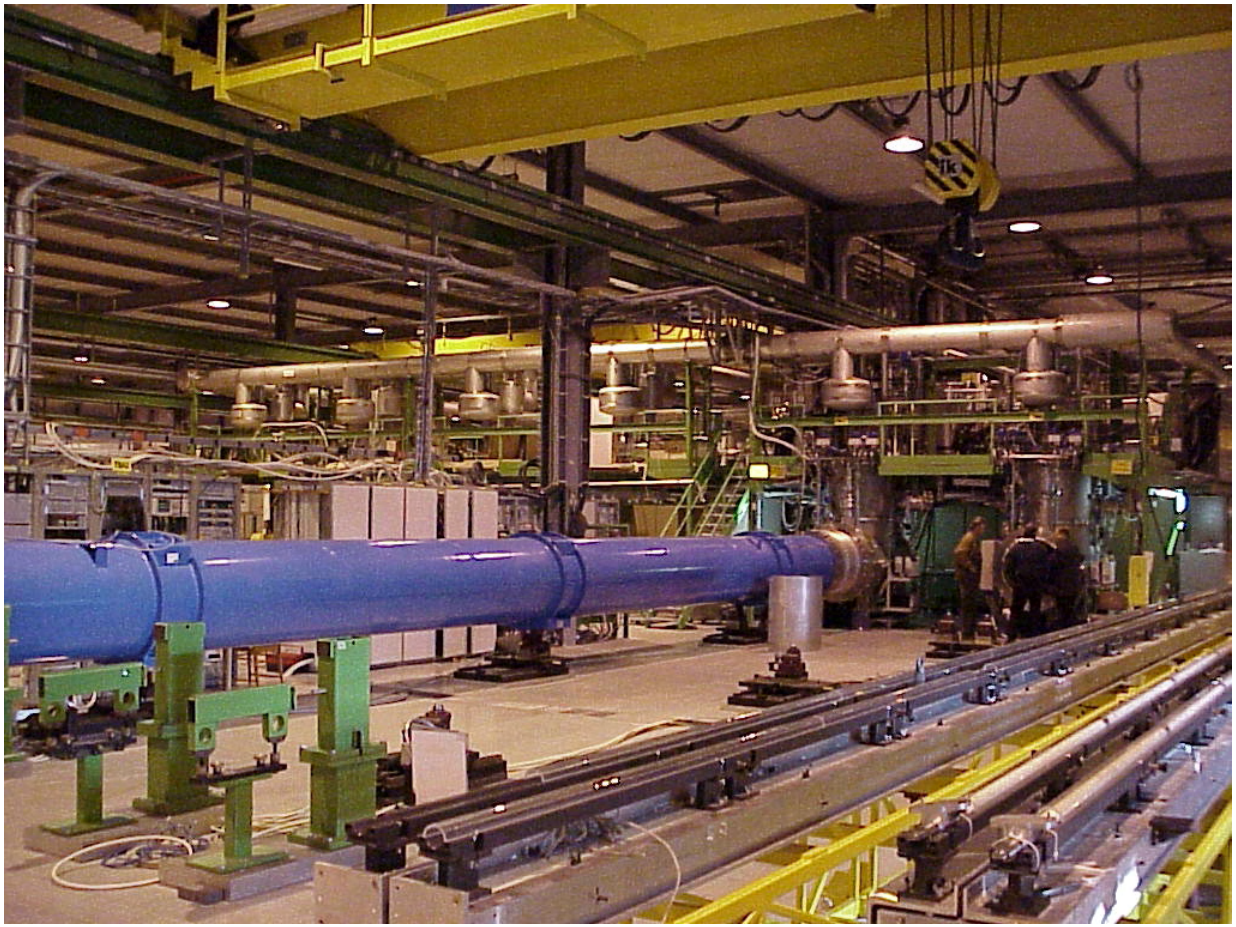
Cold measurement test facilities

- **6 clusters planned to be installed**
- **2 magnet test benches per cluster:**
  - **1 under test**
  - **1 on mounting or cool down status**

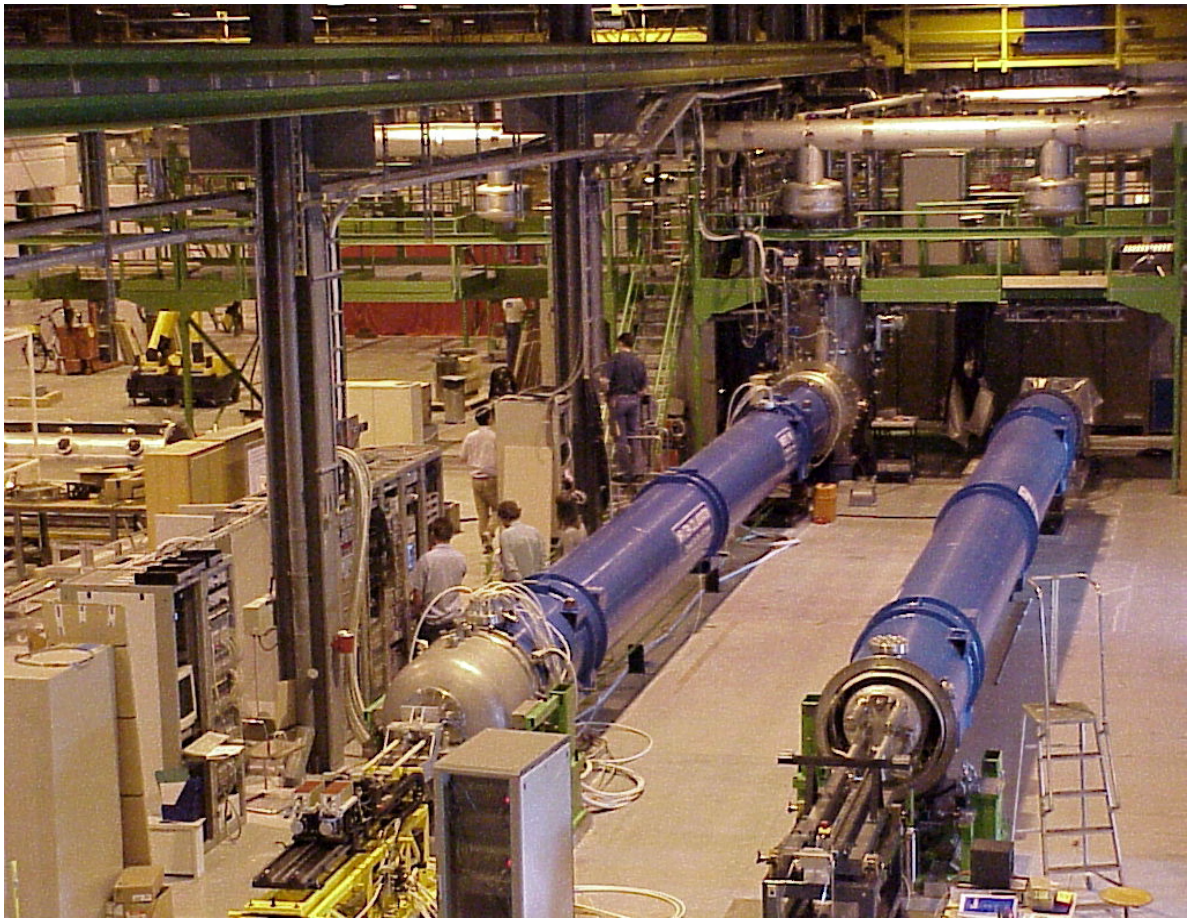
Cold measurement test facilities

- **A cluster is fitted with:**
  - **power supplies (13KA, 600A,…)**
  - **1 Twin Rotating Unit**
  - **1 long coil pair**
  - **1 MM acquisition system**
  - **1 precision current readout**

Cold measurement test facilities



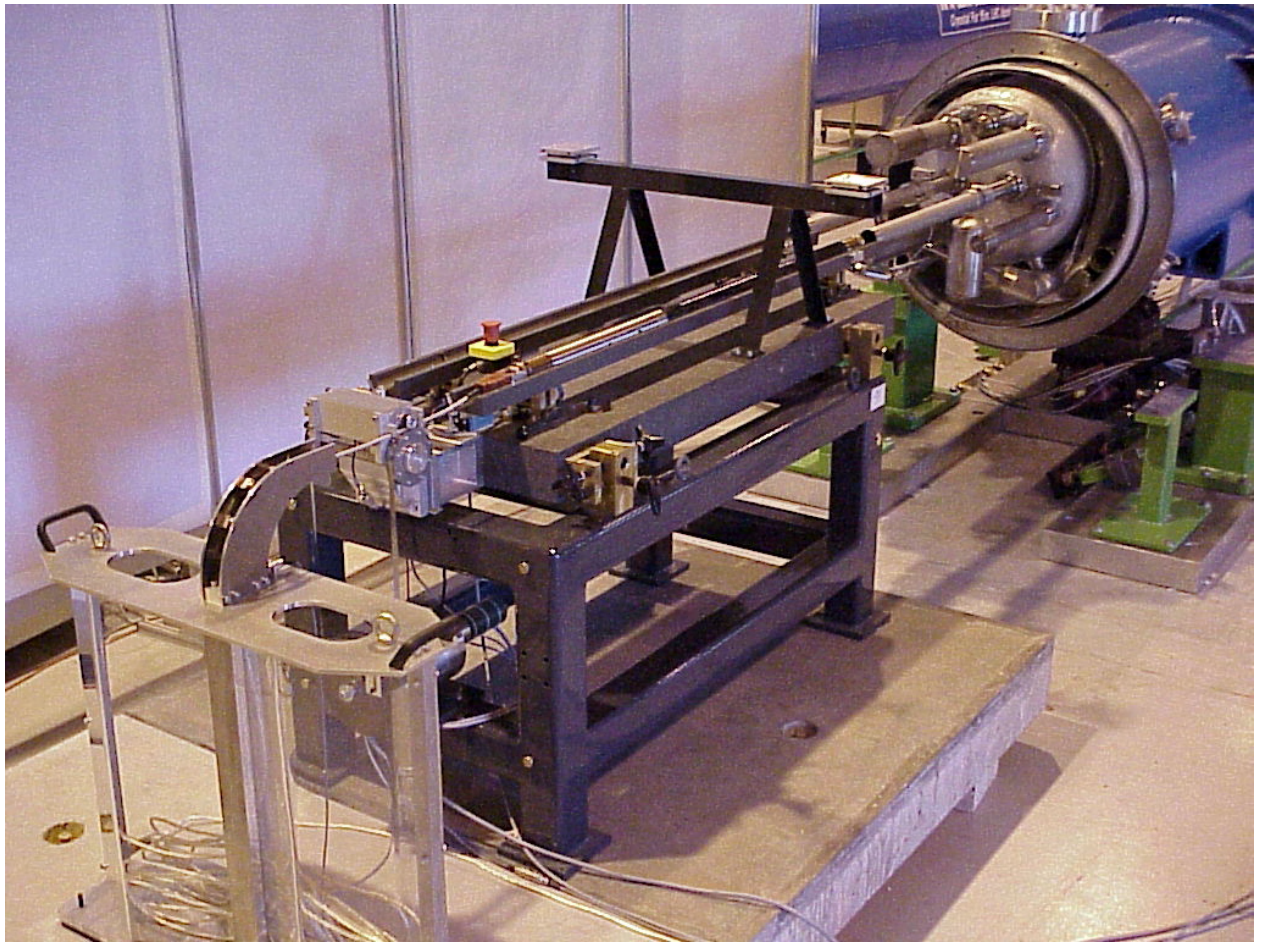
Cold measurement test facilities



Warm measurement test facilities

- **2 “MOLE” benches will be used**
- **1 under use and fitted with:**
  - **- 55A power supply**
  - **- 1 mole rotating unit**
  - **- 1 coil**
  - **- 1 MM acquisition system**
  - **- 1 axial move unit**
  - **- 1 coil center tracker**

Warm measurement test facilities



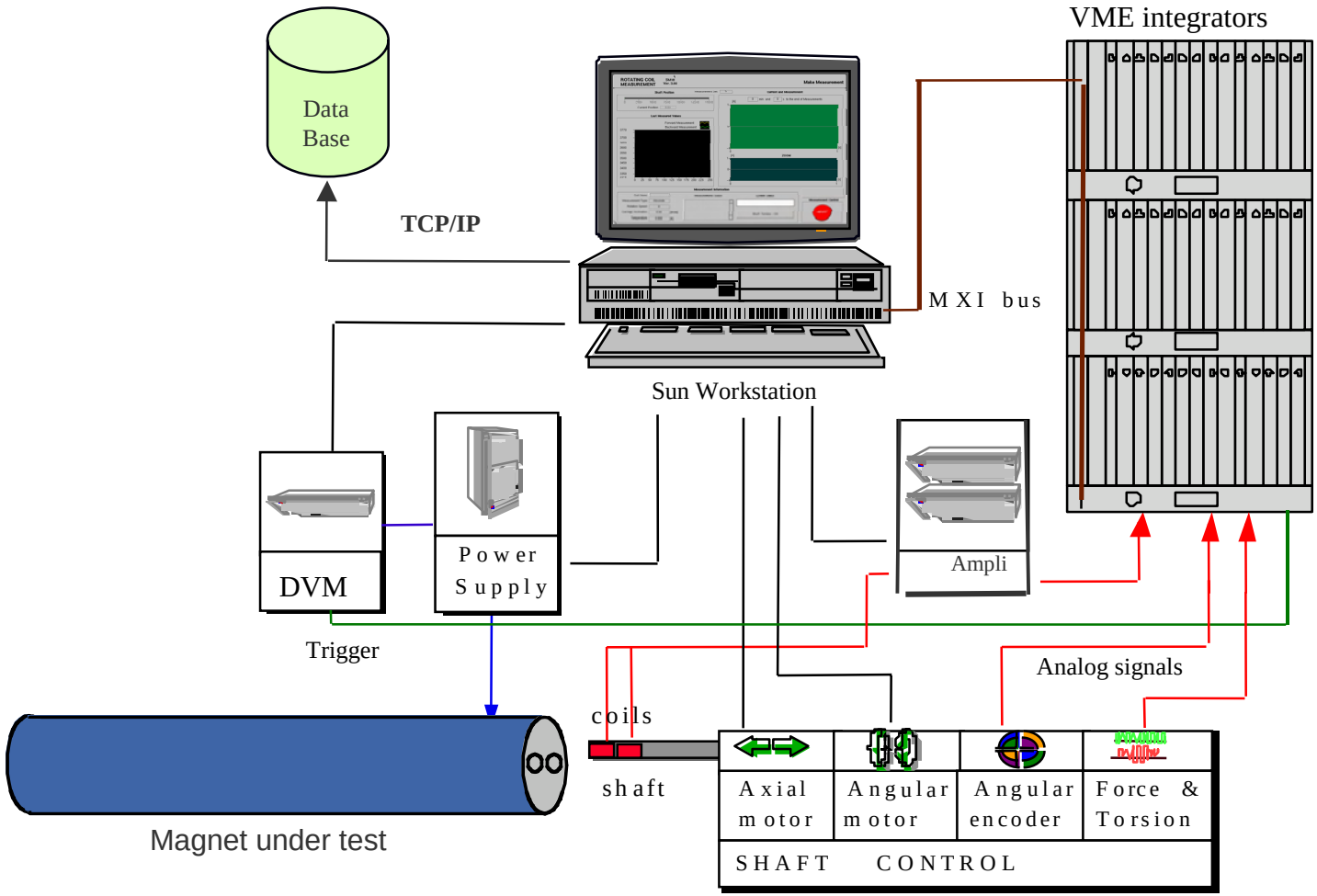
Coil calibration bench

- **1 bench used to calibrate the 15m long coil, fitted with:**
  - **55A power supply**
  - **1 Twin Rotating Unit**
  - **1 long coil under test**
  - **1 MM acquisition system**
  - **1 axial move unit**
  - **1 NMR (main field readout)**

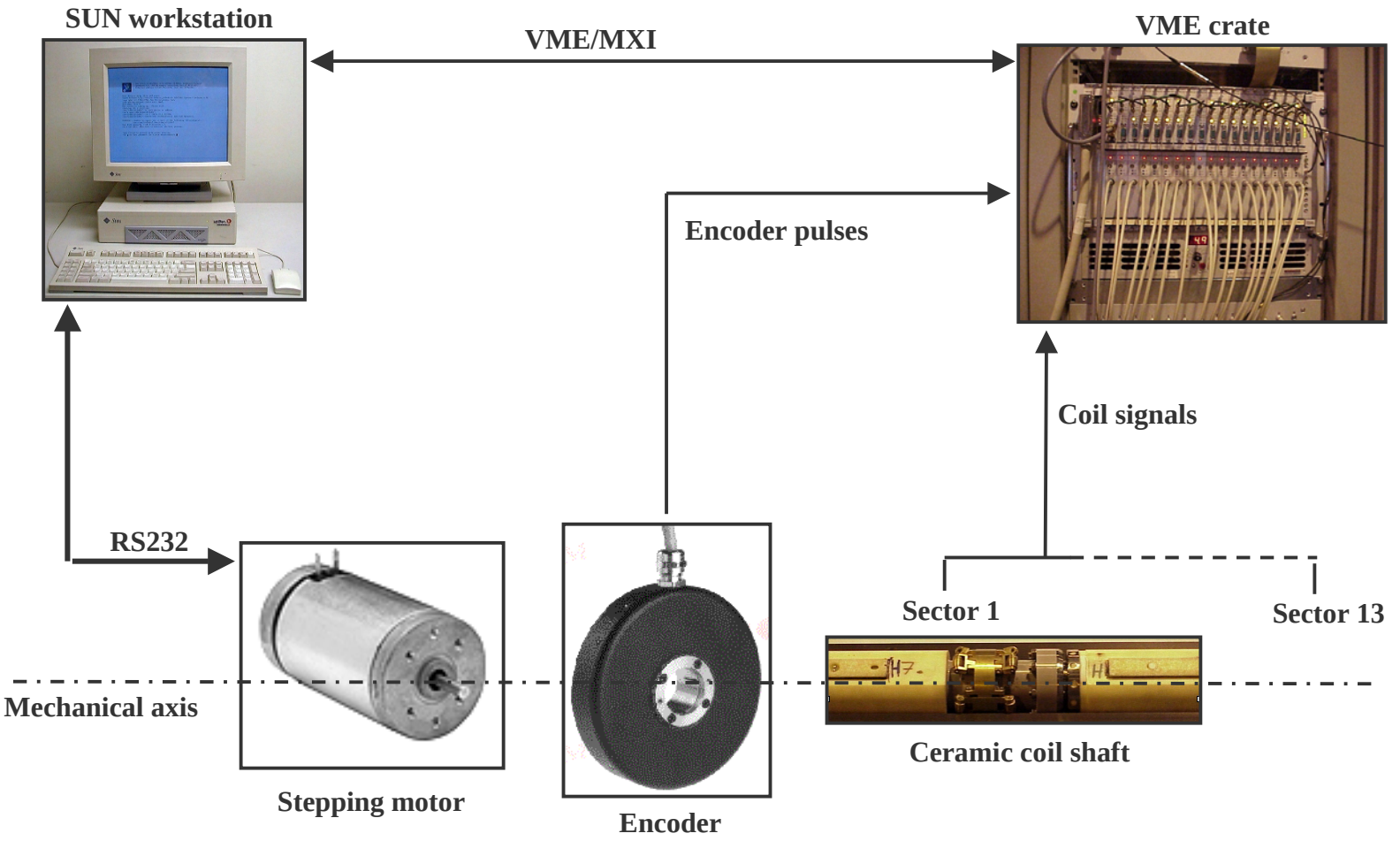
Short prototype test bench

- **3 cryostats dedicated for the 1m magnet prototypes**
- **Used for fast mechanical & electrical design**
  - **coils geometry**
  - **coil spacers**
  - **choice of the collars material**
  - **-...**

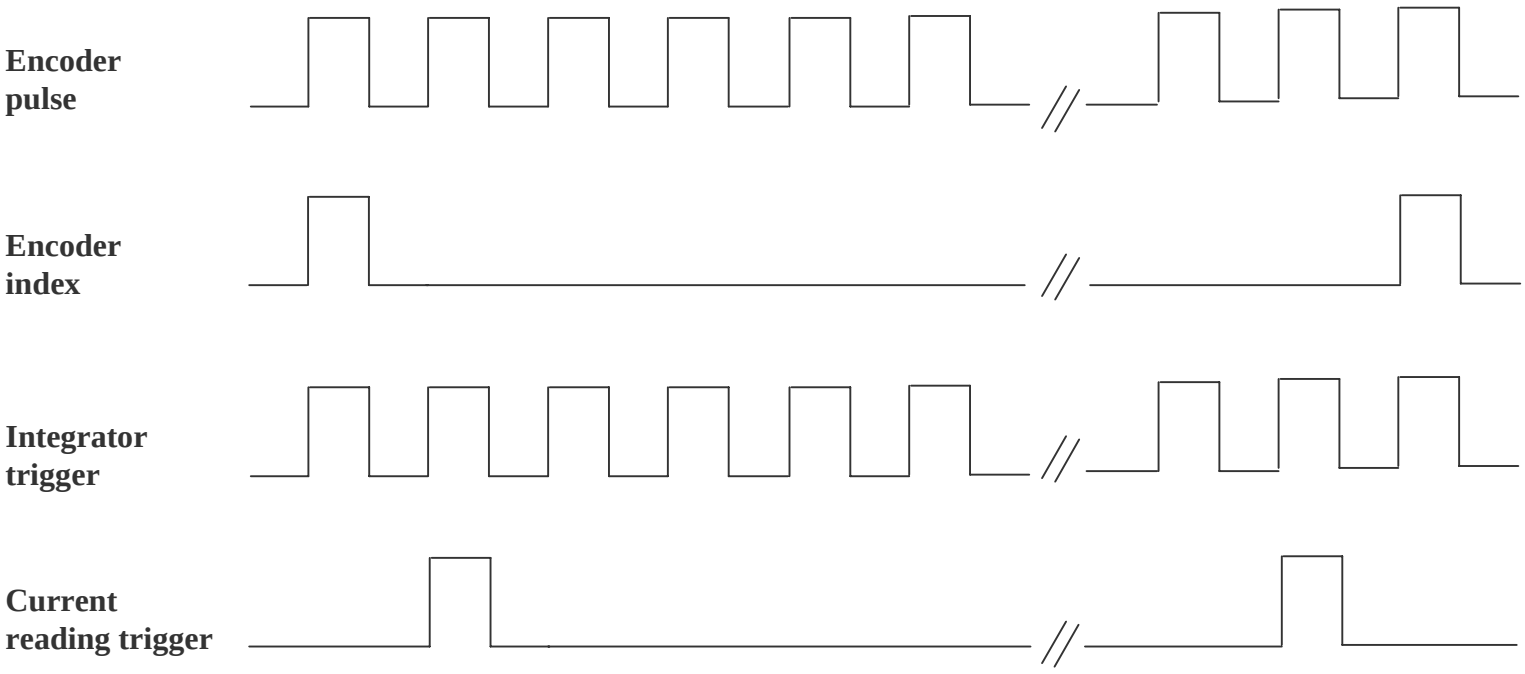
The Magnetic Measurement System



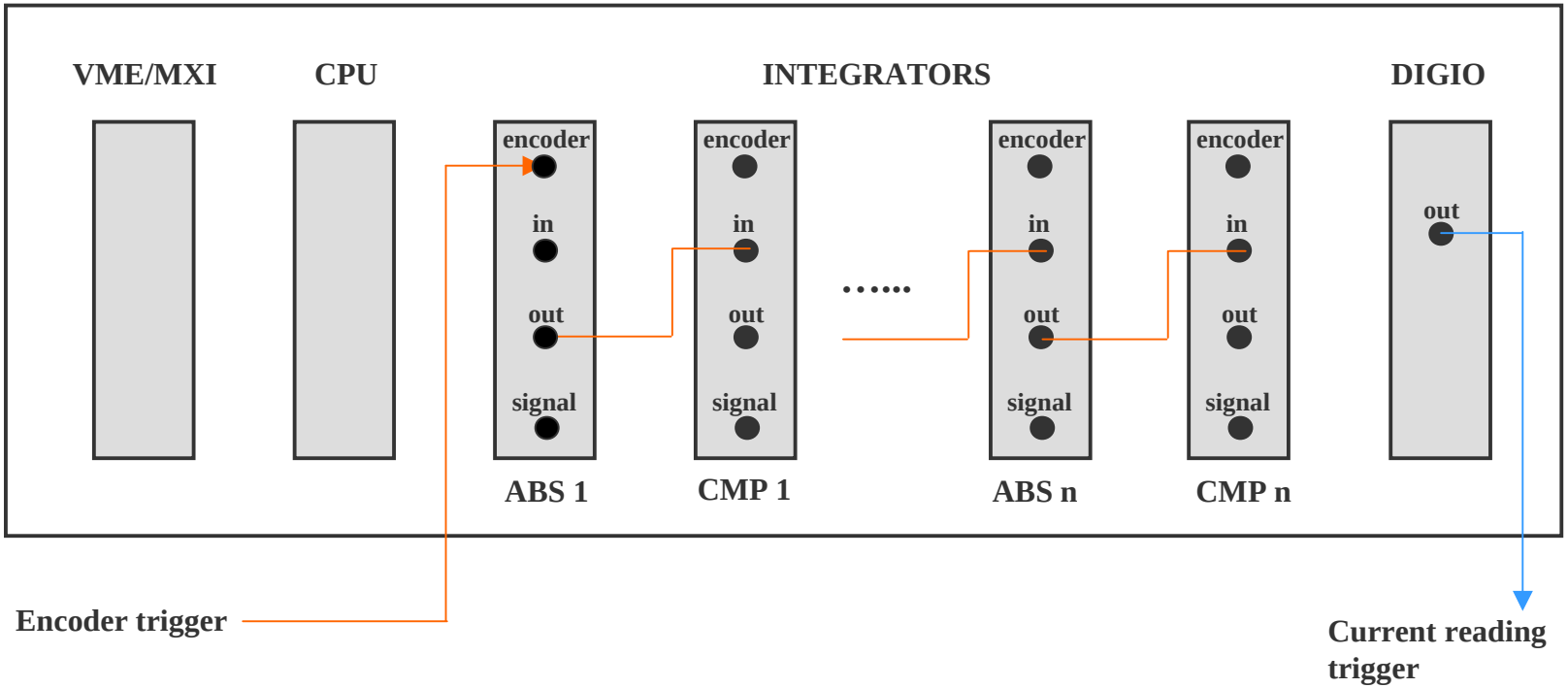
The MM acquisition loop



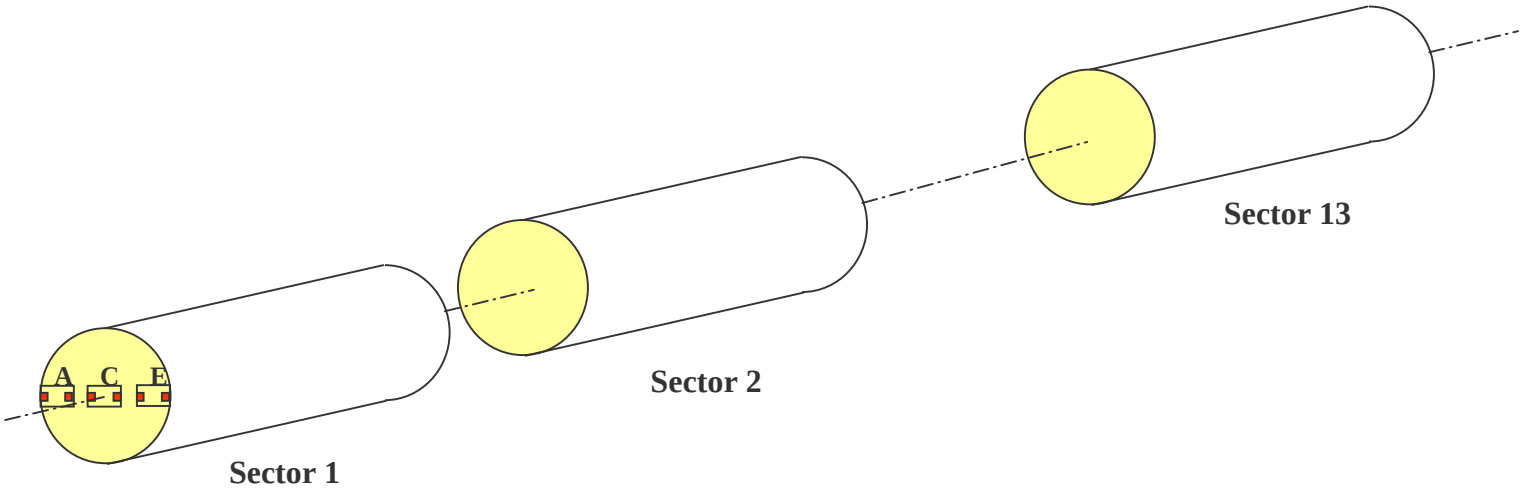
Triggering events



Mapping of the VME crate



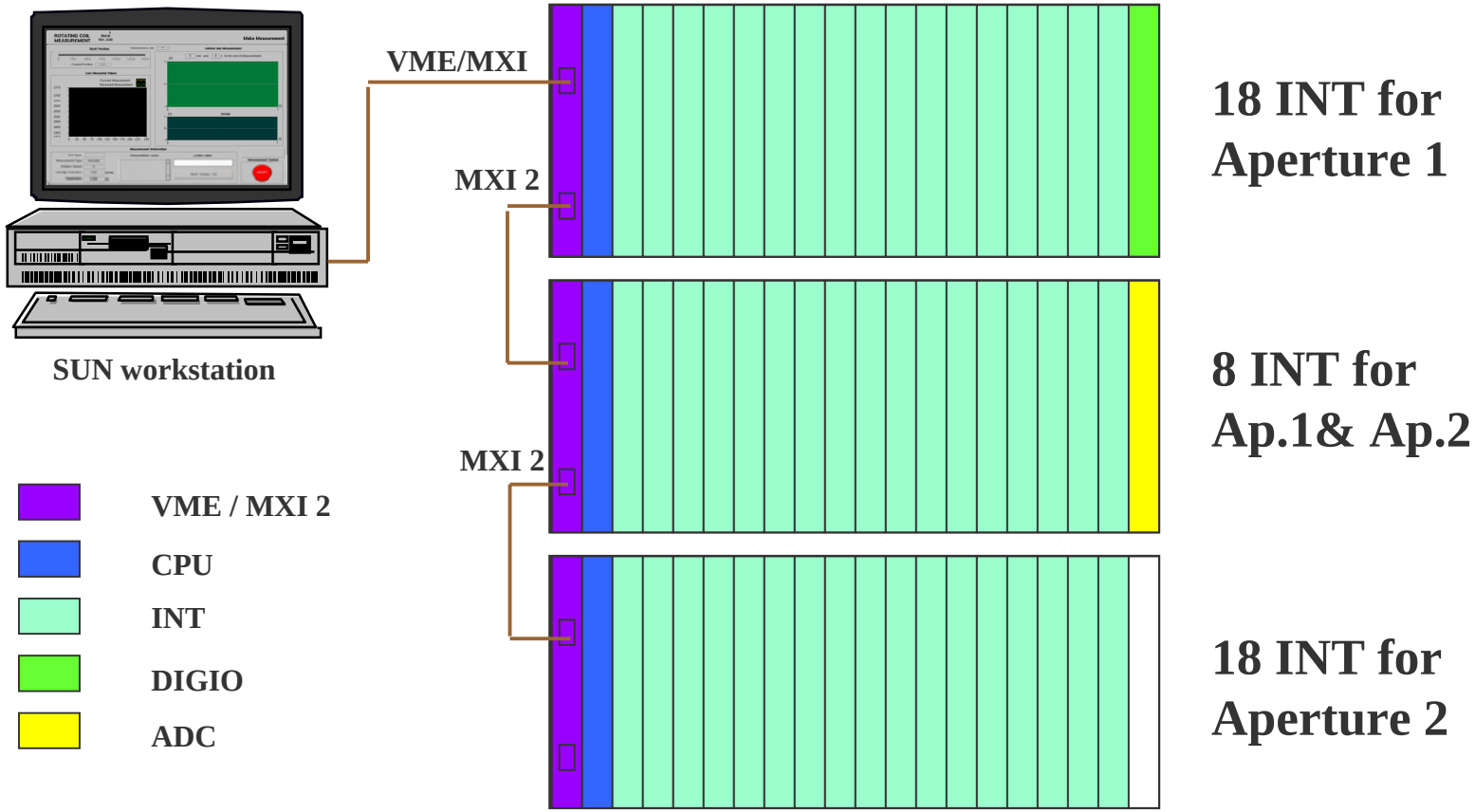
Design of the 15m coil shaft



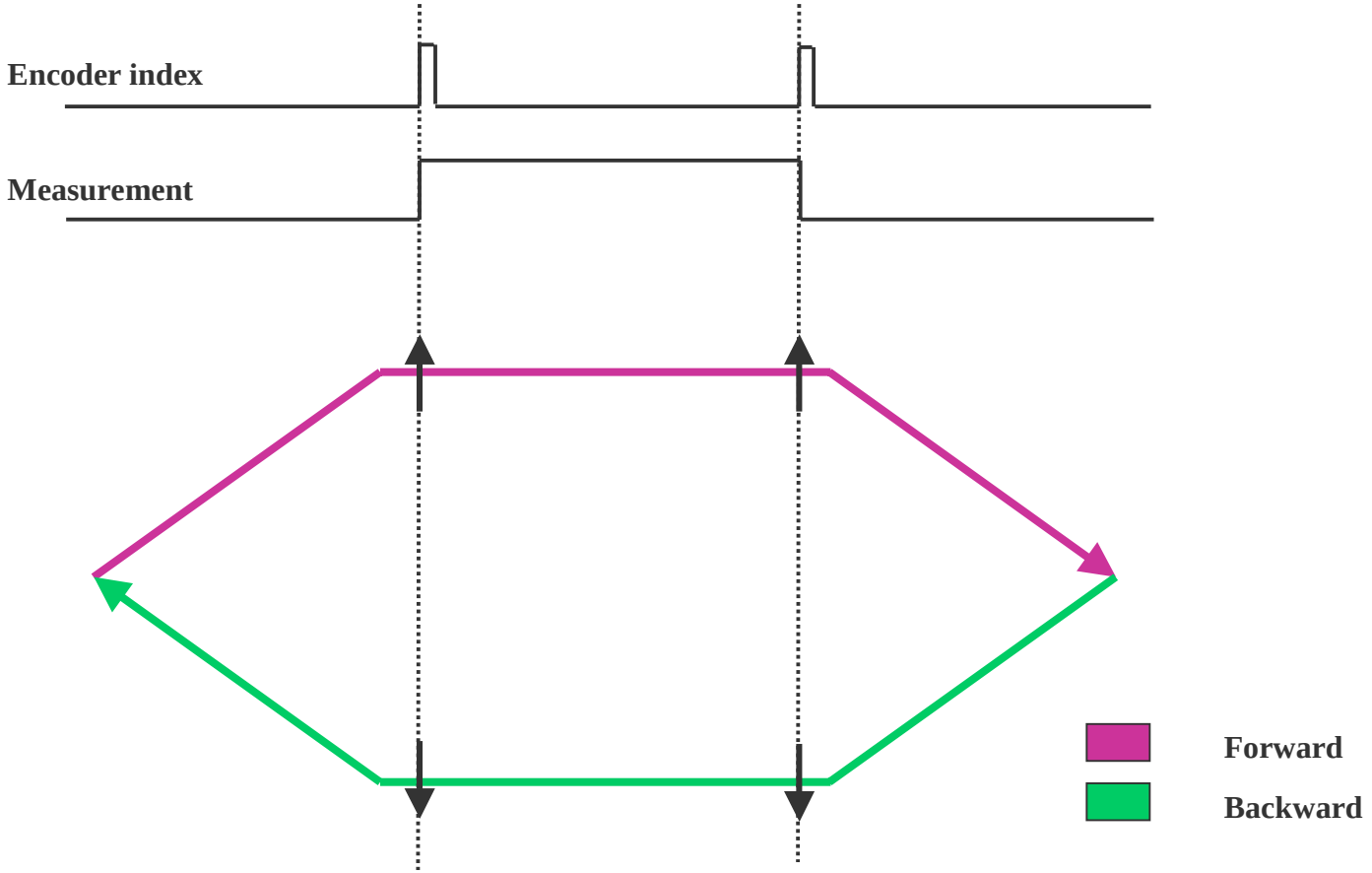
- ABS signal = coil A, CMP signal = coil A - coil C

- 13 sectors * 2 signals = 26 integrators / aperture

The whole VME system



Coil rotating motor speed map



The measurement cycle

MMP6	Real time
- VME configuration (CPU, INT)	- Enc. steps -> CPU, INT1 = Enc. Trig
- Start the coil rotating motor	- Coil signals reading
- CPU state polling	- Trig output for current reading
- Stop the coil rotating motor	- INT data -> CPU memory
- Read CPU data	

Actual status of the MMP toolkit

- **15 devices can be driven during the MM cycle**
- **Up to 6 different types of each**
- **Current cycle: Editor / Management**
- **Axial move cycle: Editor / Management**
- **On-line analysis feature**
- **Database exportation facilities**

MMP toolkit in industry

- **1 warm Corrector test bench in INDIA(CAT)**
- **1 warm Corrector test bench in SPAIN(ANTEC)**
- **1 warm Corrector test bench in UK (TESLA)**
- **1 warm Corrector test bench in FRANCE (SIGMA-PHI)**
- **1 warm Dipole test bench in ITALY (ANSALDO) (planned)**
- **1 warm Dipole test bench in FRANCE (ALSTHOM)**
- **1 warm Dipole test bench in GERMANY (NOELL) (planned)**

Summary

- **LabVIEW based application**
- **Open architecture system (1 - 4 crates, 2 - 72 integrators)**
- **Wide range of devices management**
- **Compliant with Dipole, …, Dodecapole**