INFN - LASA Activity for TTF/TESLA

A. Bosotti

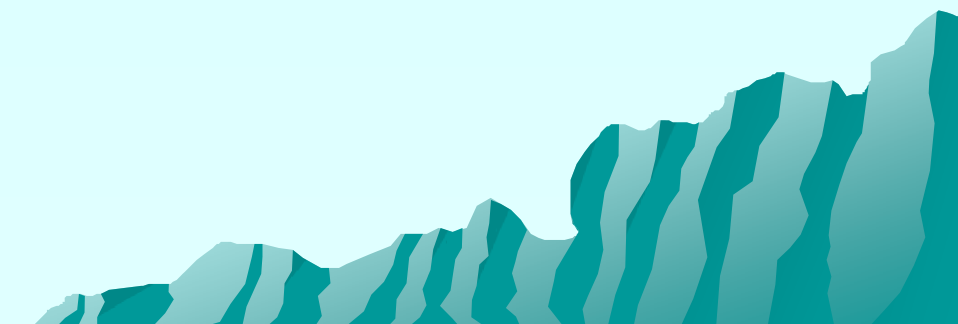
- Microphonics control and characterization of piezoelectric actuators
- Wire Position Monitors (WPM)
- Cathode Activity

Microphonics control and characterization of piezoelectric actuator

A. Bosotti

R. Paparella

F. Puricelli



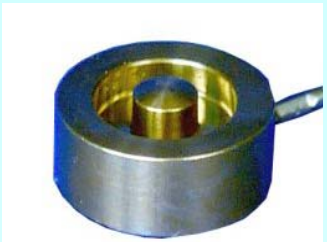
Status

We are currently focused on two different topics:

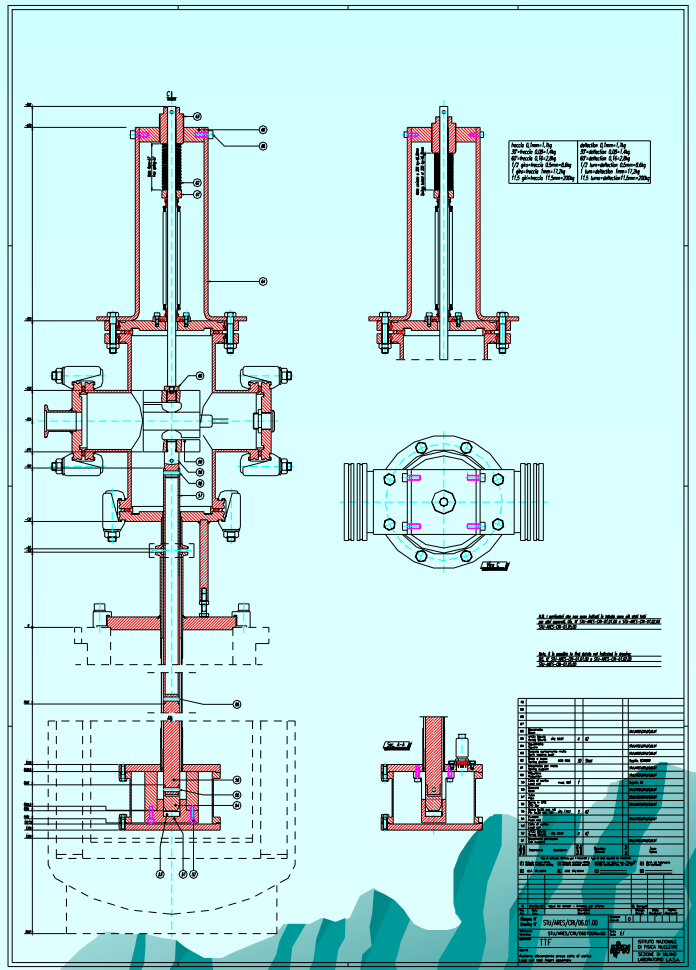
- Developing of a single cell + piezoel. actuator facility for microphonics feedback control loop tests.
- Characterization of a load cell (force sensor) at cryogenic temperature, needed for piezos testing and measurement of the forces in the future piezo environment (e.g: pre-load).

Characterization of the load cell

A new insert was designed to host different load cells and the load generating device. Our goal is the characterization of the sensor at 4 K up to 2kN.

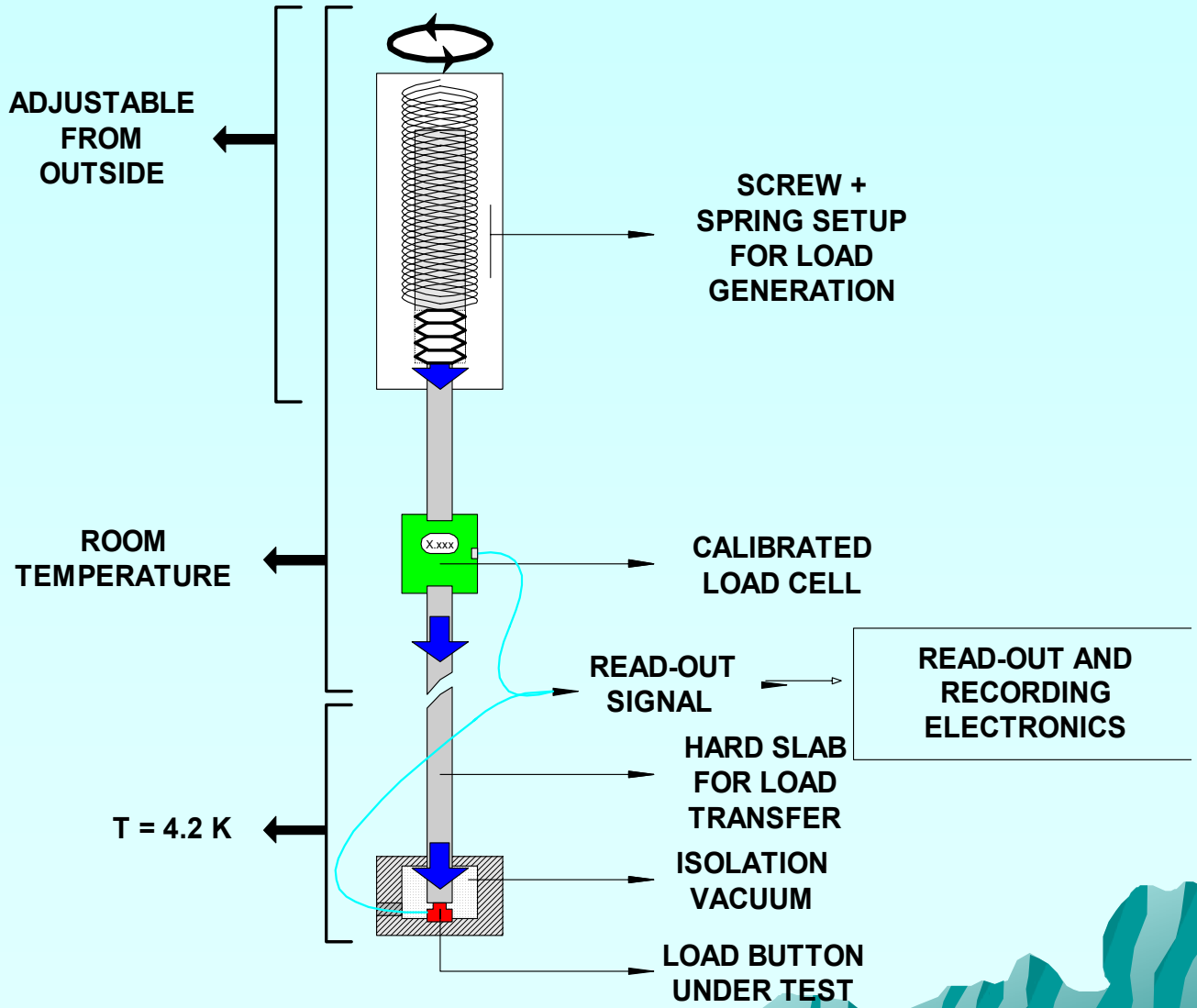


A load cell under test – from Burster



- The button on the cell is **pushed** by stainless steel rod, 20 mm diameter.
- The loading force is **generated** by a screwing device provided with washer springs at the top of the insert.
- The loading force is **measured** by a calibrated load cell placed in the cross junction, working at room temperature.

Conceptual design



The cryogenic setup

The measurements needed for the calibration will take place in our vertical cryostat.

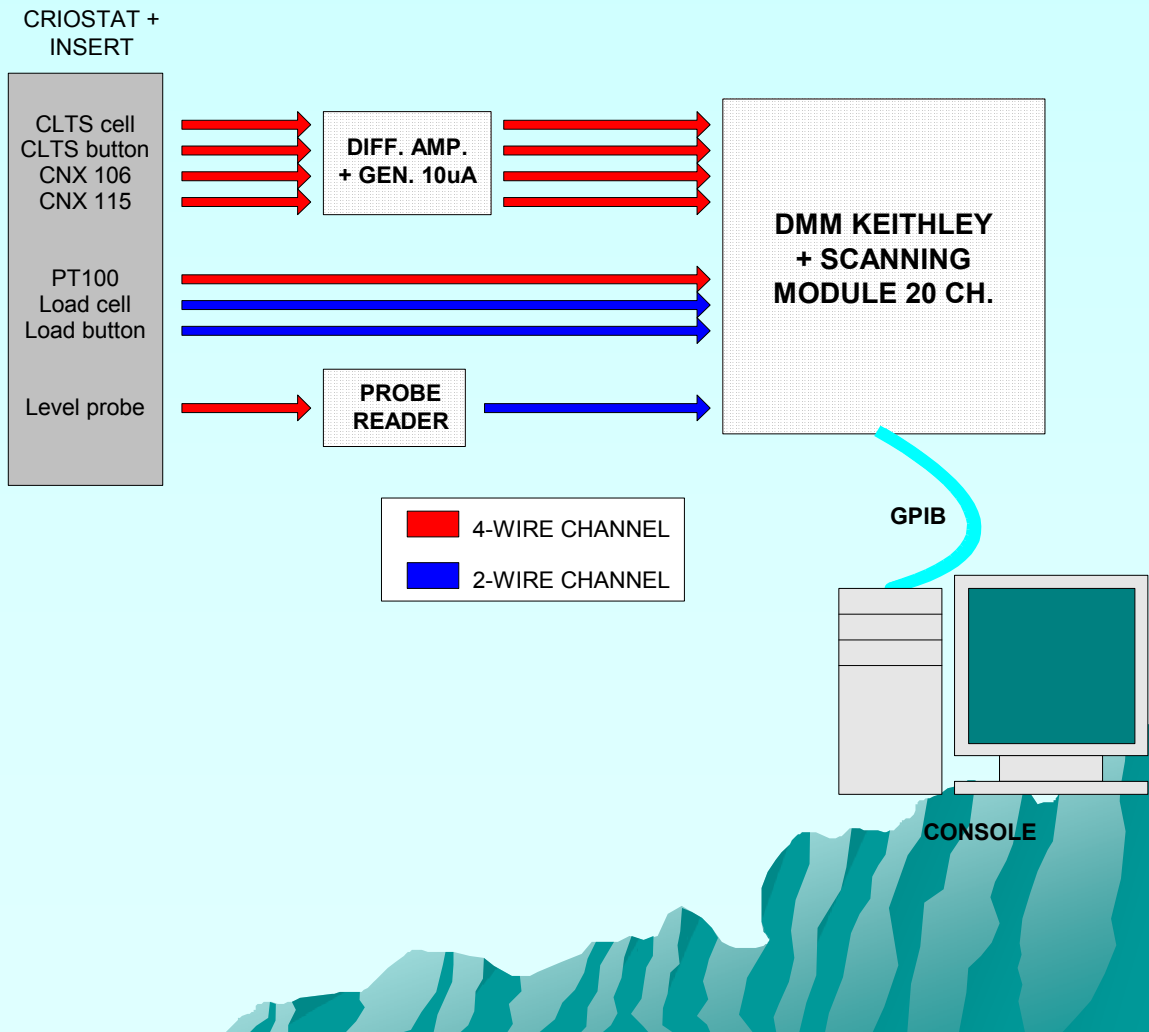
The vertical cryostat and the system used for measurements

The electronics setup

The read-out electronics is focused on a DMM + Scanning Module from Keithley.

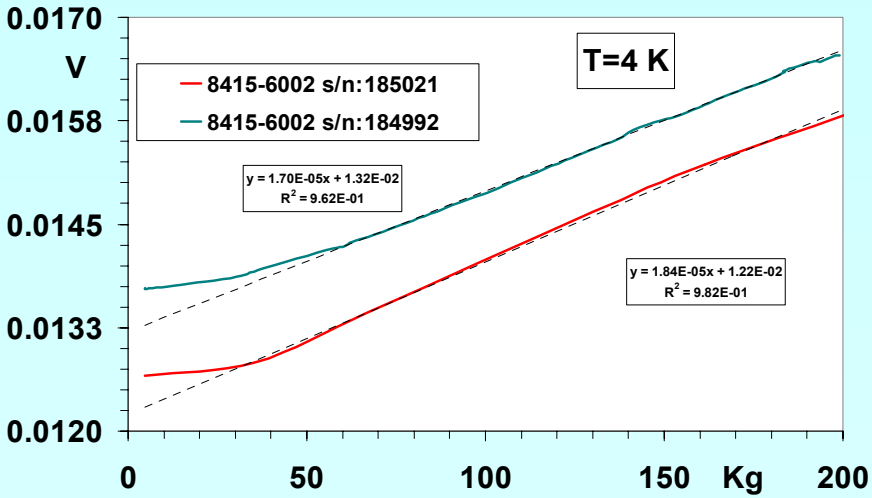
Data from cells,T sensors and probe are viewed and stored by a console PC.

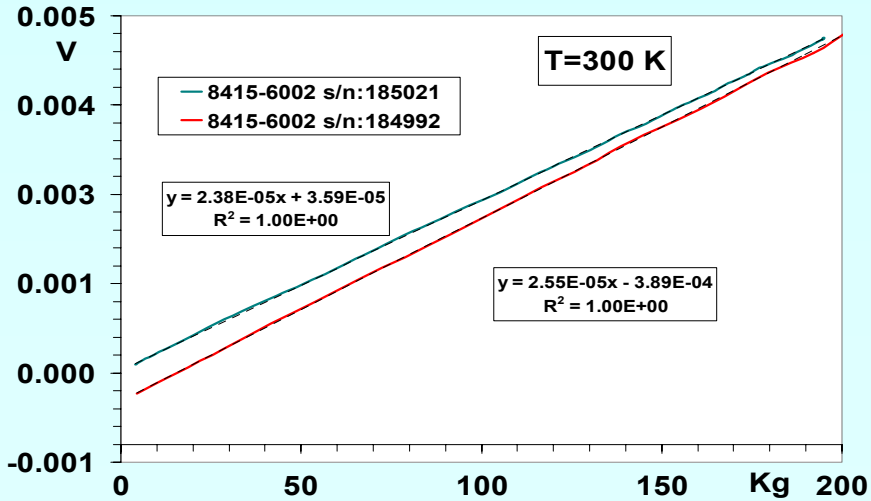
Keithley 2700 DMM + Scanning Module



Some results

Up to now some 2kN load cells from Burster have been tested at 4K.



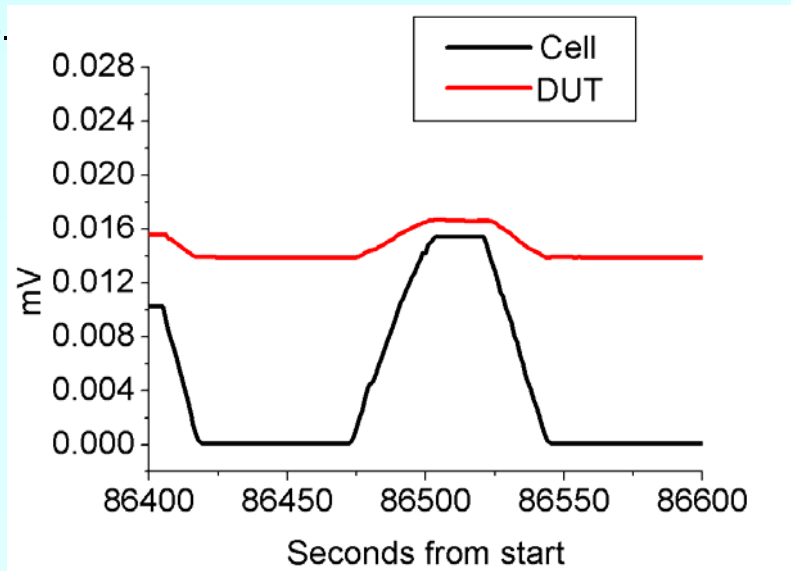


The measured TF of two 8415 model and their beaviour vs time

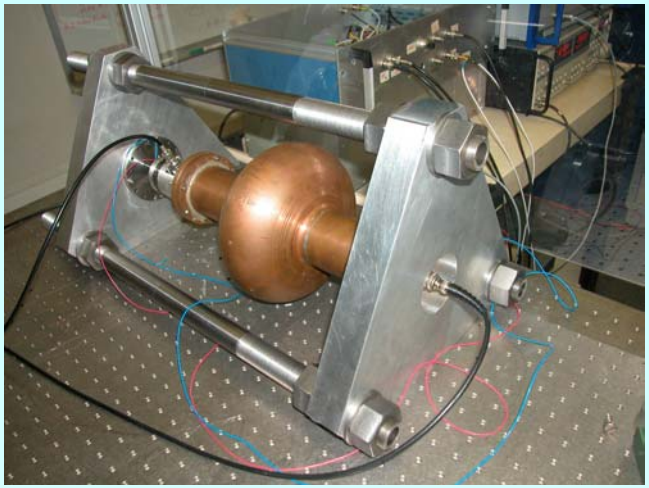
Now some points are clear:

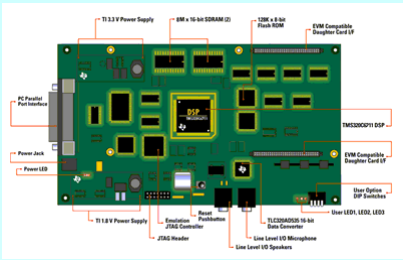
•High *offset* and low *reproducibility* are the main critical problems

•Linear range reduces and reproducibility fails at cold => we'll test cells with *specific cryogenic* features and *higher RT range* (10

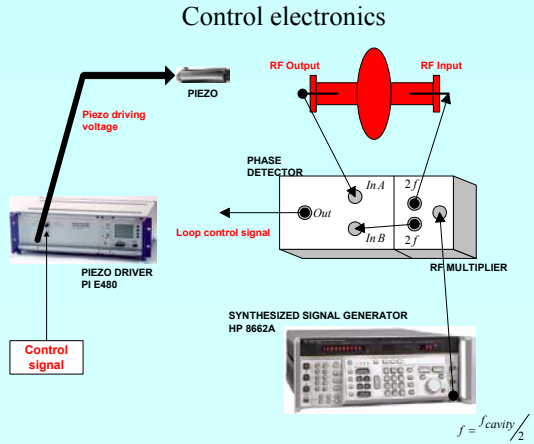


Microphonics feedback control loop facility



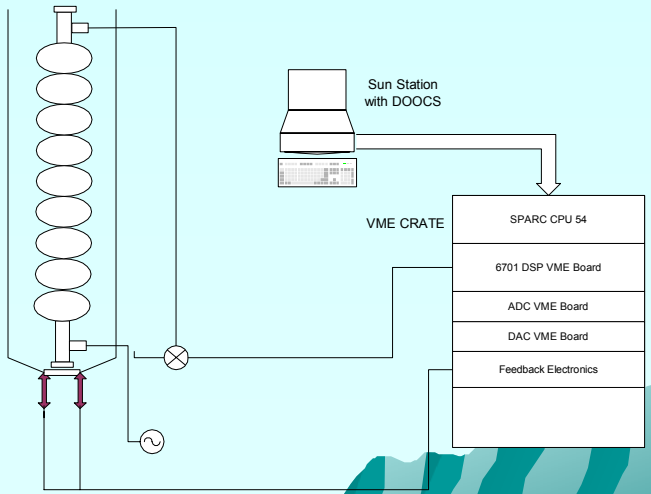


C6711 DSP board for digital filtering



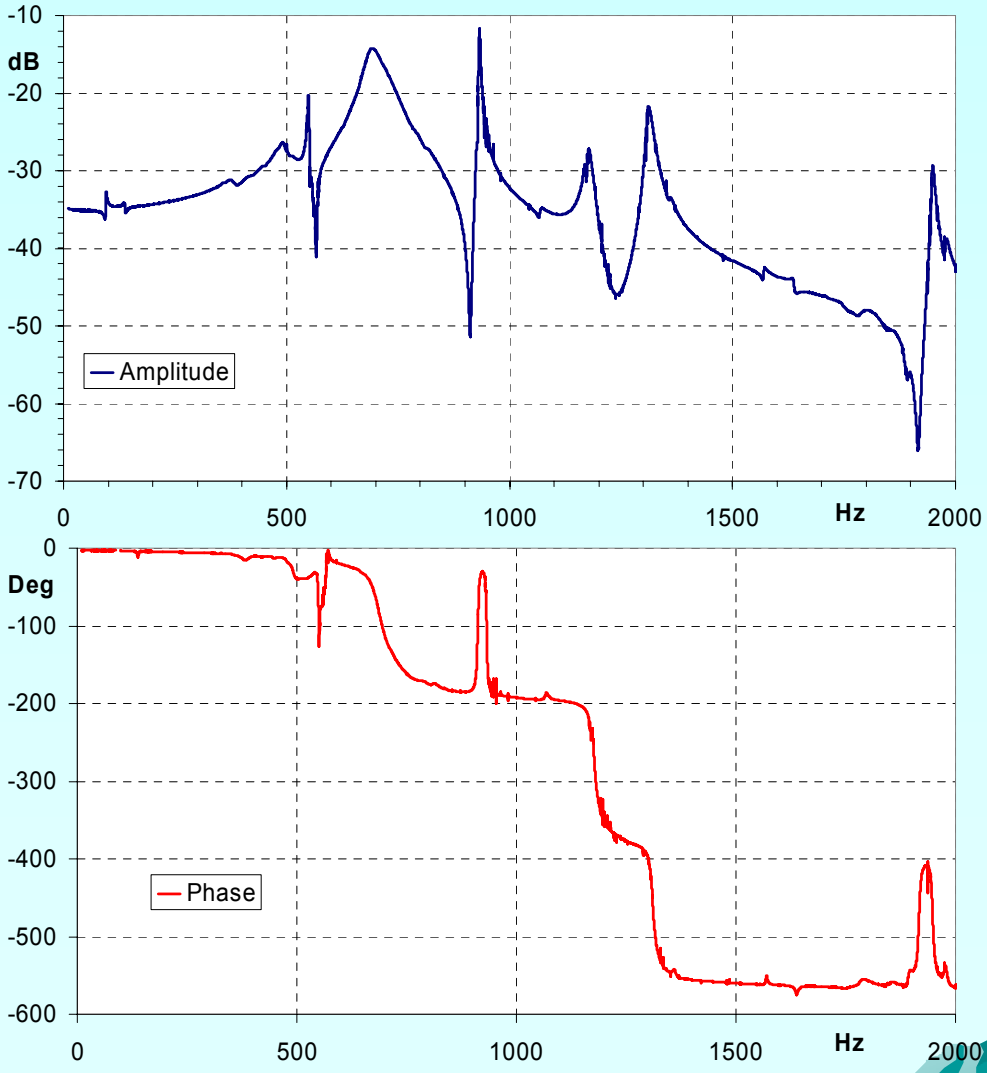
The single cell cavity and its high-stiffness environment, hosting the piezoelectric actuator

Our Goal



A feedback loop will be implemented for the compensation of microphonics

New facility transfer functions



The single copper cell system has been caractherized measuring the transfer function between the piezoelectric *actuator voltage* and the *phase detuning* of the cavity.

Closed loop tests seem possible up to 2 kHz.

NEAR Future

- Test more load cells (Burster 2 & 5 kN + Futek 5 kN)
- Buy and test cryogenic load cell from Futek (*not cheap*)
- Realize insert for calibration of piezo with respect to force applied & displacement (Epcos + Piezomechanik + Piezomechanik with cryo option)
- Implement feedback control for microphonics on VME Bus at room temperature.

On line monitoring of the TTF cryostats cold mass with Wire Position Monitors

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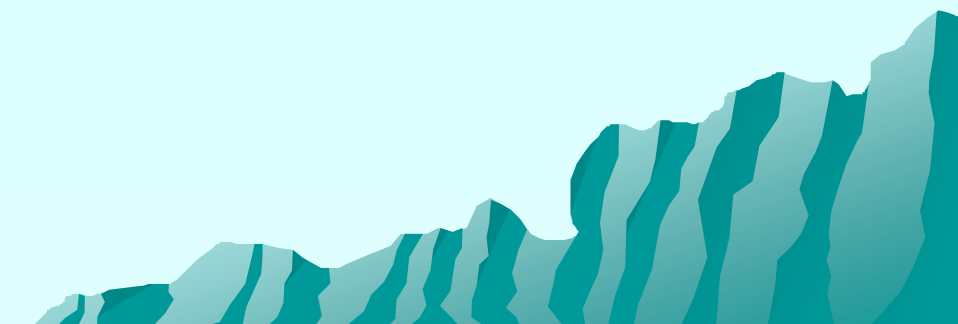
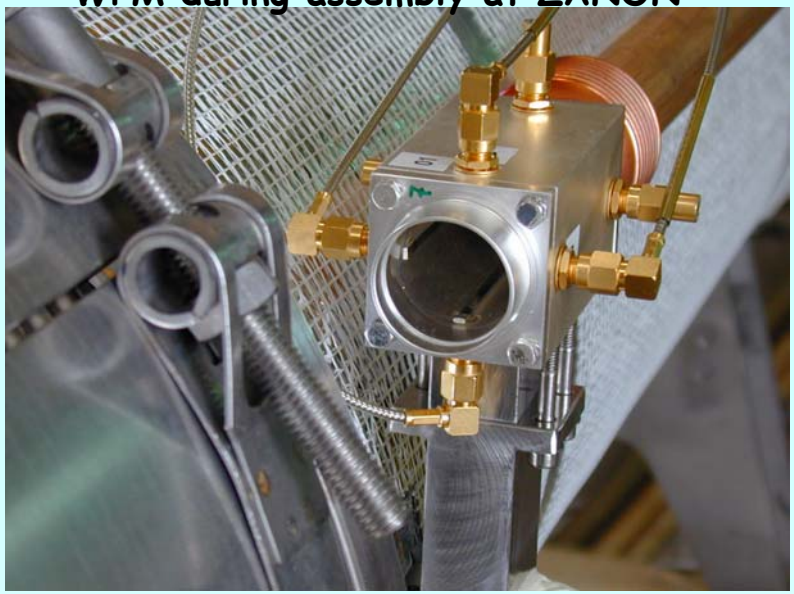
(LASA INFN)

R. De Monte – M. Ferianis
(Sincrotrone Trieste)

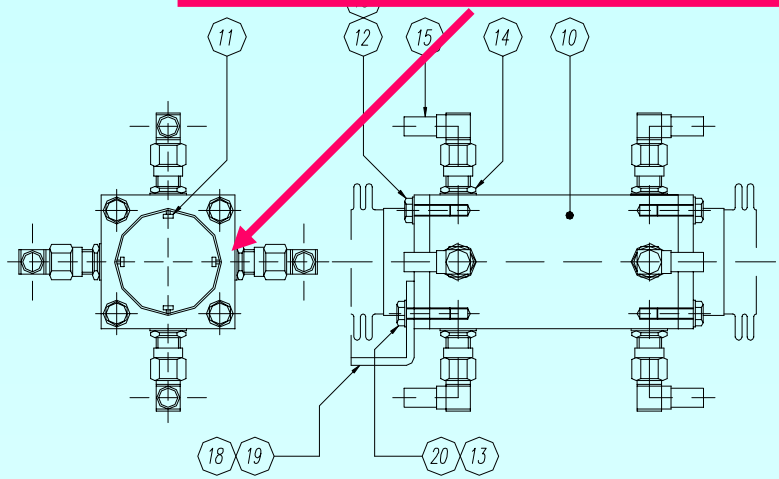


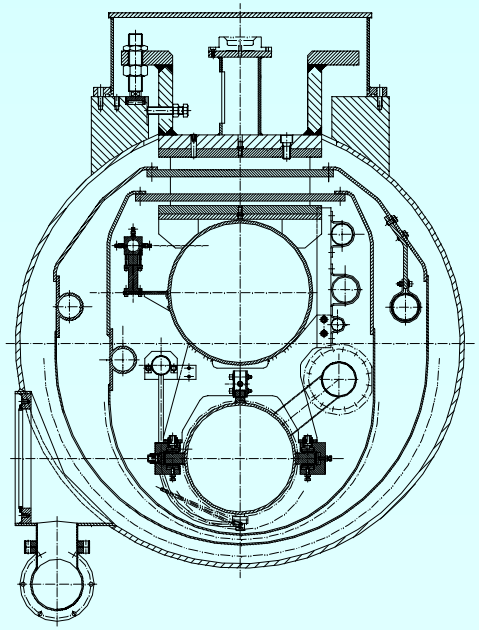
WPM: Wire Position Monitors

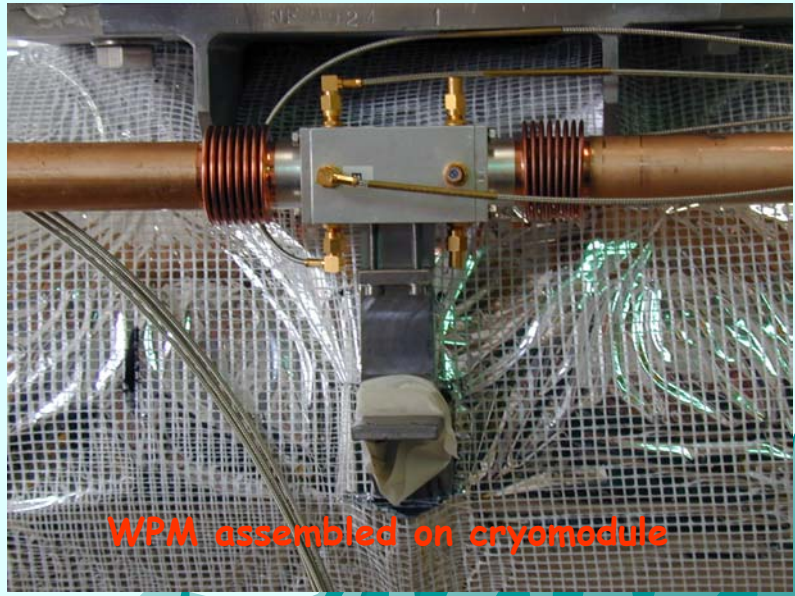
WPM during assembly at ZANON



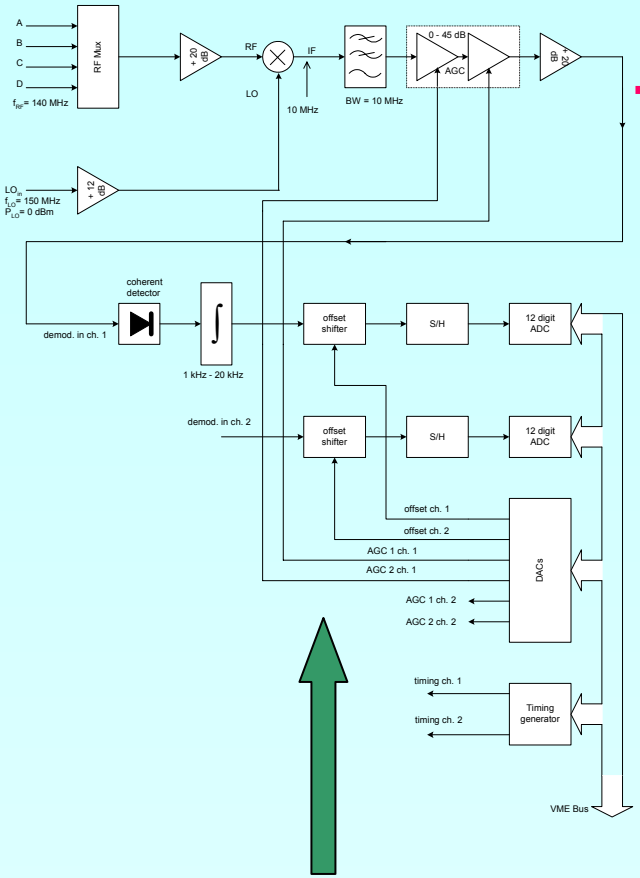
Internal Cylindrical structure
Old version: square







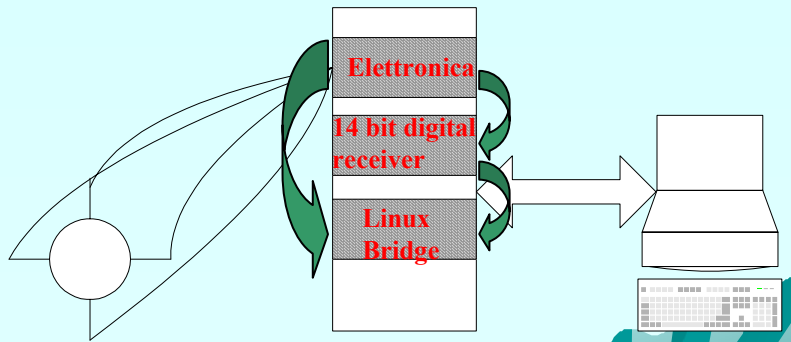
WPM Readout Electronics



Digital receiver

Vibrations

Control Electronics Block Diagram
& Signal Aquisition principle



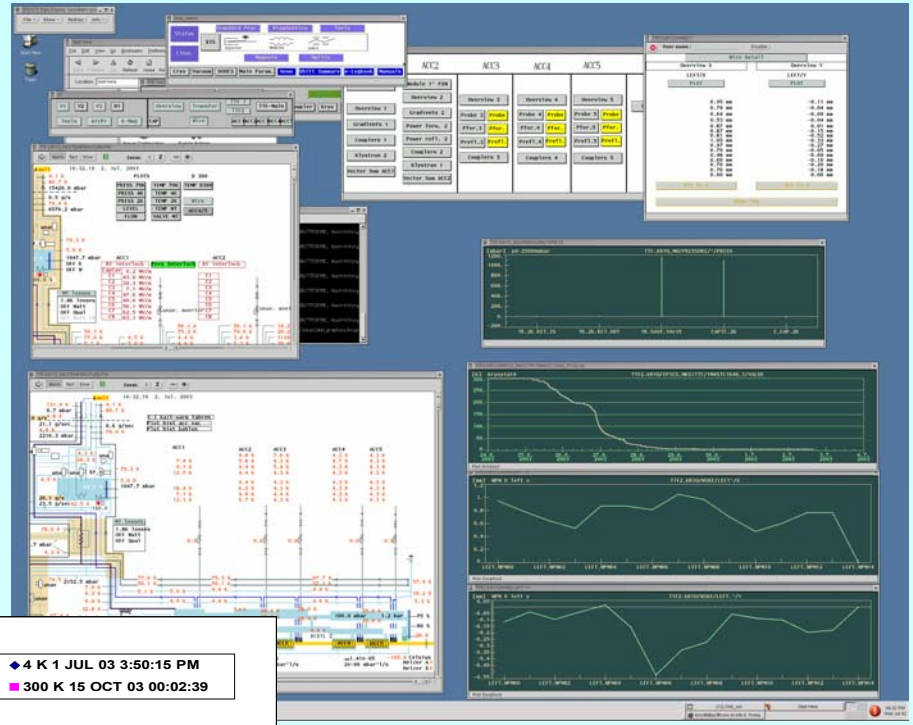
WPM Chain

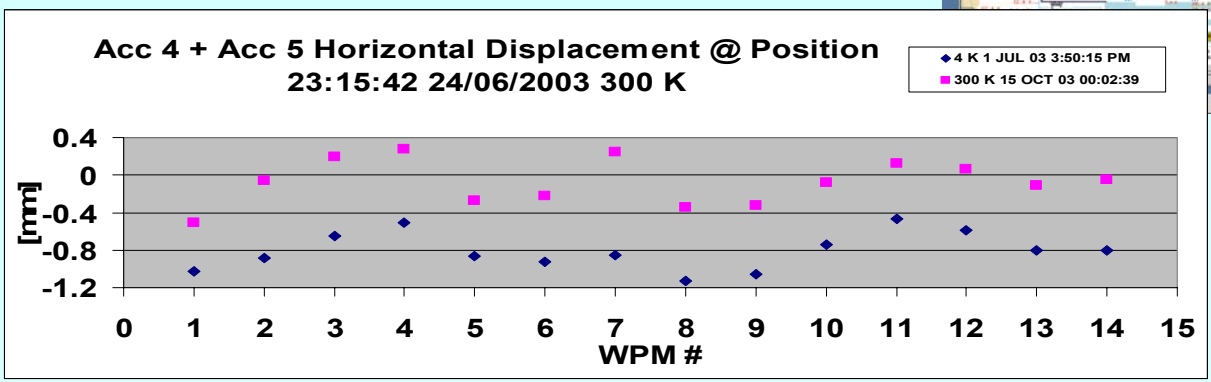
Control Electronics

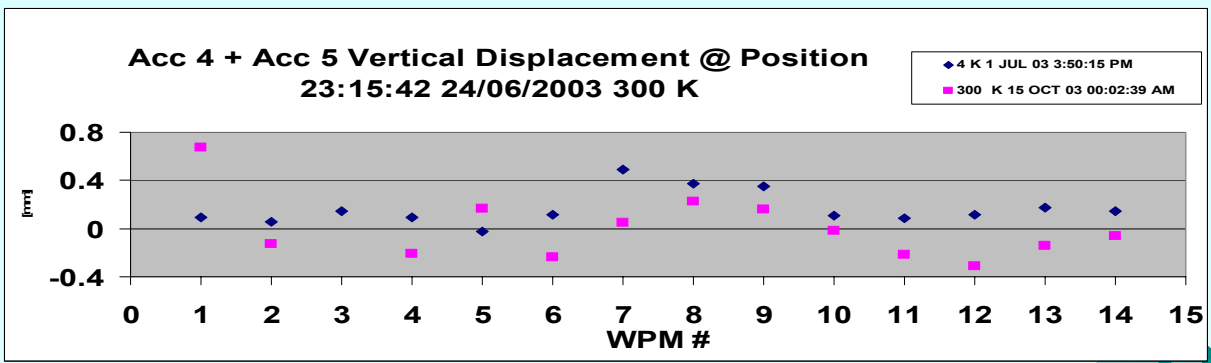
TTF Consolle (terminal)

An Example of WPM OUTPUT

TTF Console







Last cooldown & Warmup cycles

NEAR Future

- Add Digital Receiver System for the Detection of the cryomodules low frequency vibrations
- Integrate Module 6
- Analyze the data for the cooldown and warmup cycles for module 4 & 5

Cathode Activity

P. Michelato - L. Monaco - D. Sertore

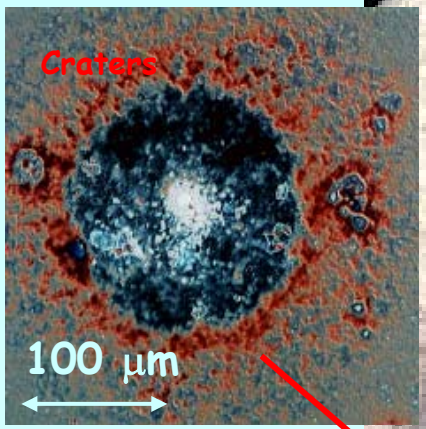
- Cathode Production for TTF2
- Cathode Visual Analysis
- Database Improvement

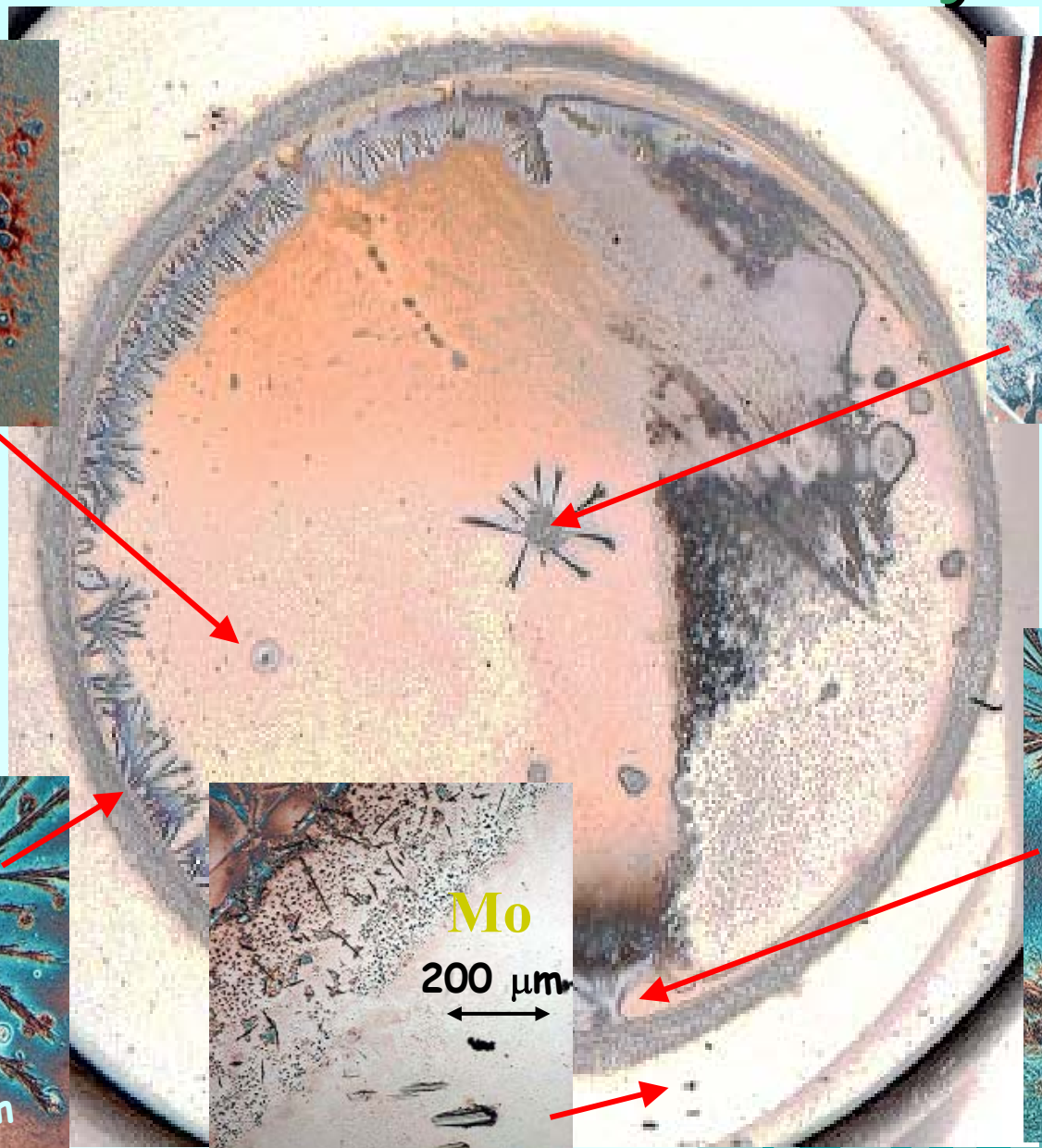
Cathode Production for TTF2

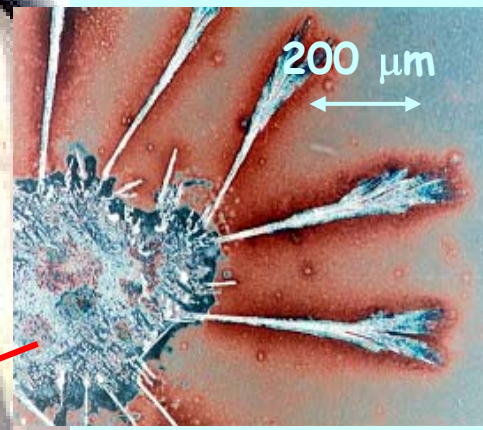
- New Transport Box Ready
- Delivery in the next weeks
- Cathode Content:
  - Dummy (Scintillator)
  - 13.2 Mo
  - 37.2 Cs_2Te QE = 8.5 % *
  - 42.2 Cs_2Te QE = 8 % *

* Measured after production

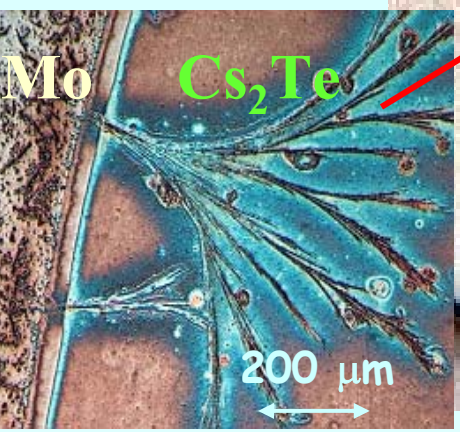
Cathode Visual Analysis

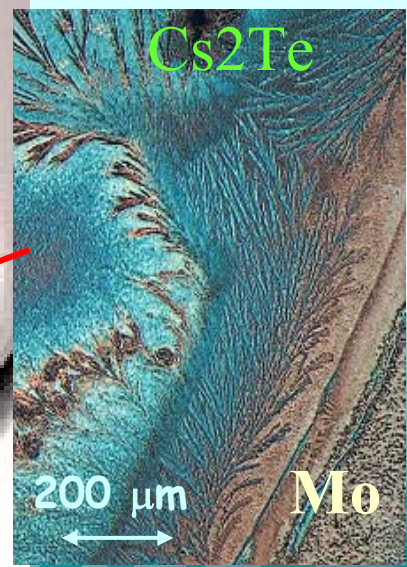






44.2 Cs_2Te
PITZ
05-09 '03





Database Improvement

We are adding also:

- QE maps
- Photos and Microscope Picture
- Plug Physical Properties

Measure	Value	Date	Location
QE [%]	7,5	24/11/1998	LASA
RF Dark Current [uA]	170	01/11/1999	DESY-Hamburg
RF Dark Current [uA]	290	11/11/1999	DESY-Hamburg
RF Dark Current [uA]	310	11/11/1999	DESY-Hamburg
RF Dark Current [uA]	160	12/11/1999	DESY-Hamburg
RF Dark Current [uA]	310	12/11/1999	DESY-Hamburg
RF Dark Current [uA]	100	05/01/2000	DESY-Hamburg
RF Dark Current [uA]	60	08/01/2000	DESY-Hamburg
RF Dark Current [uA]	70	17/01/2000	DESY-Hamburg
RF Dark Current [uA]	120	28/01/2000	DESY-Hamburg