



Report on Working Group # 2

The MU2E detector: calorimeter

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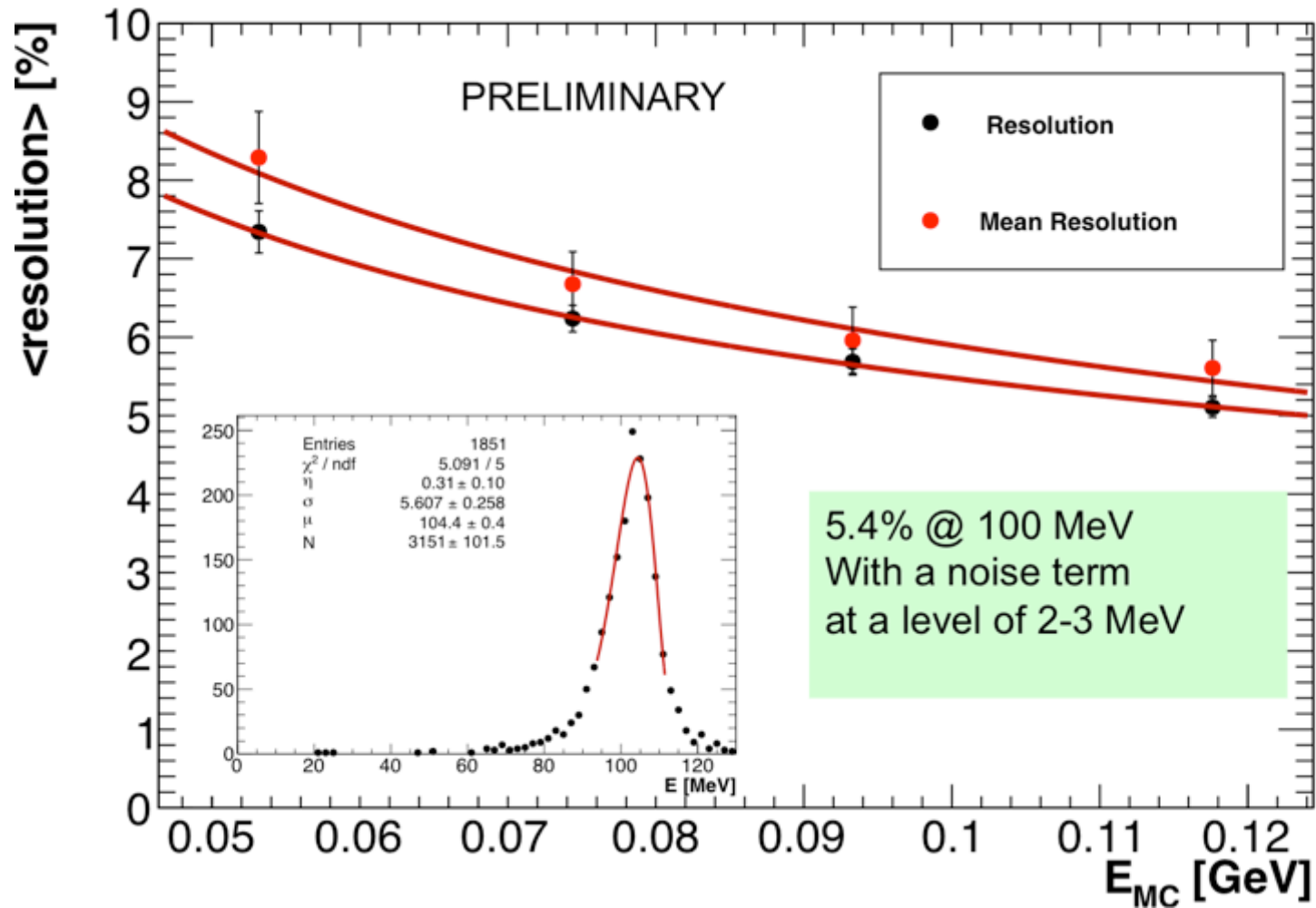
MUSE Scientific Board meeting

5-Feb-2018

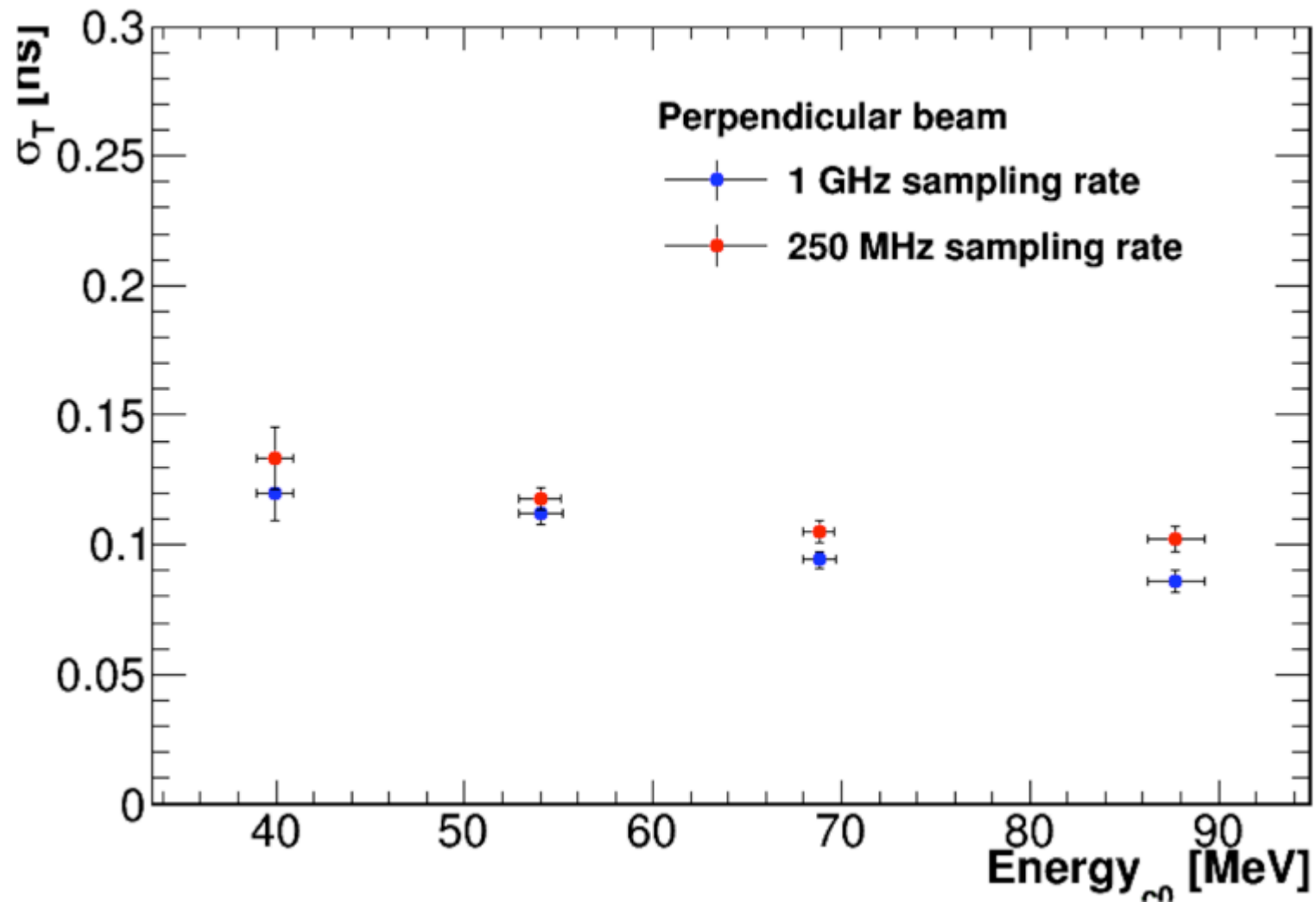
Calorimeter: status and plans

- **Proceeding well on the analysis of Module-0 data**
(see next slide)
- **Work on integration for mechanics and electronics proceeds**
 - Full size mockup and assembly of crystals
 - V2 of preamplifiers
 - Integration of boards towards Vertical Slice test
- **Production for crystals and sensors is starting.**
Pre-series are understudy
Expect to start full production in middle-end of February
- Organization for the test of radiation hardness of FEE, MB, DIRAC with dose being planned

Highlights on energy resolution

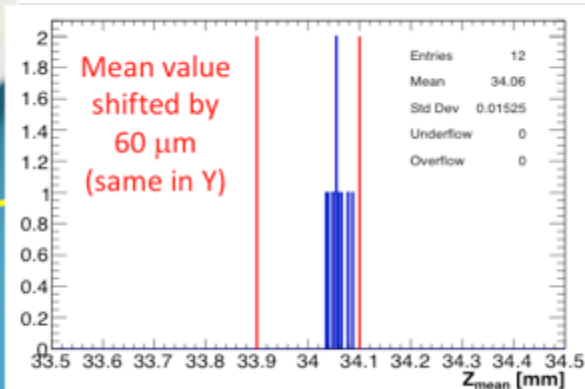
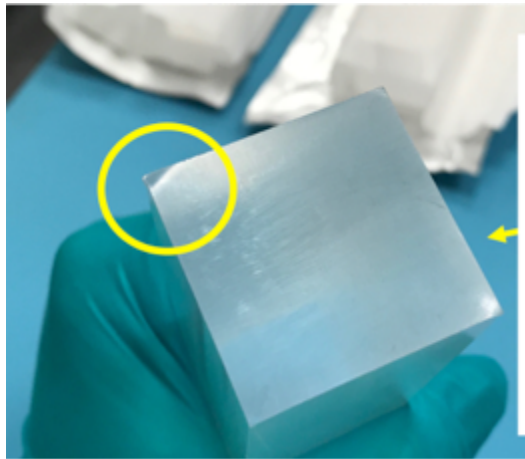


Highlights on timing resolution

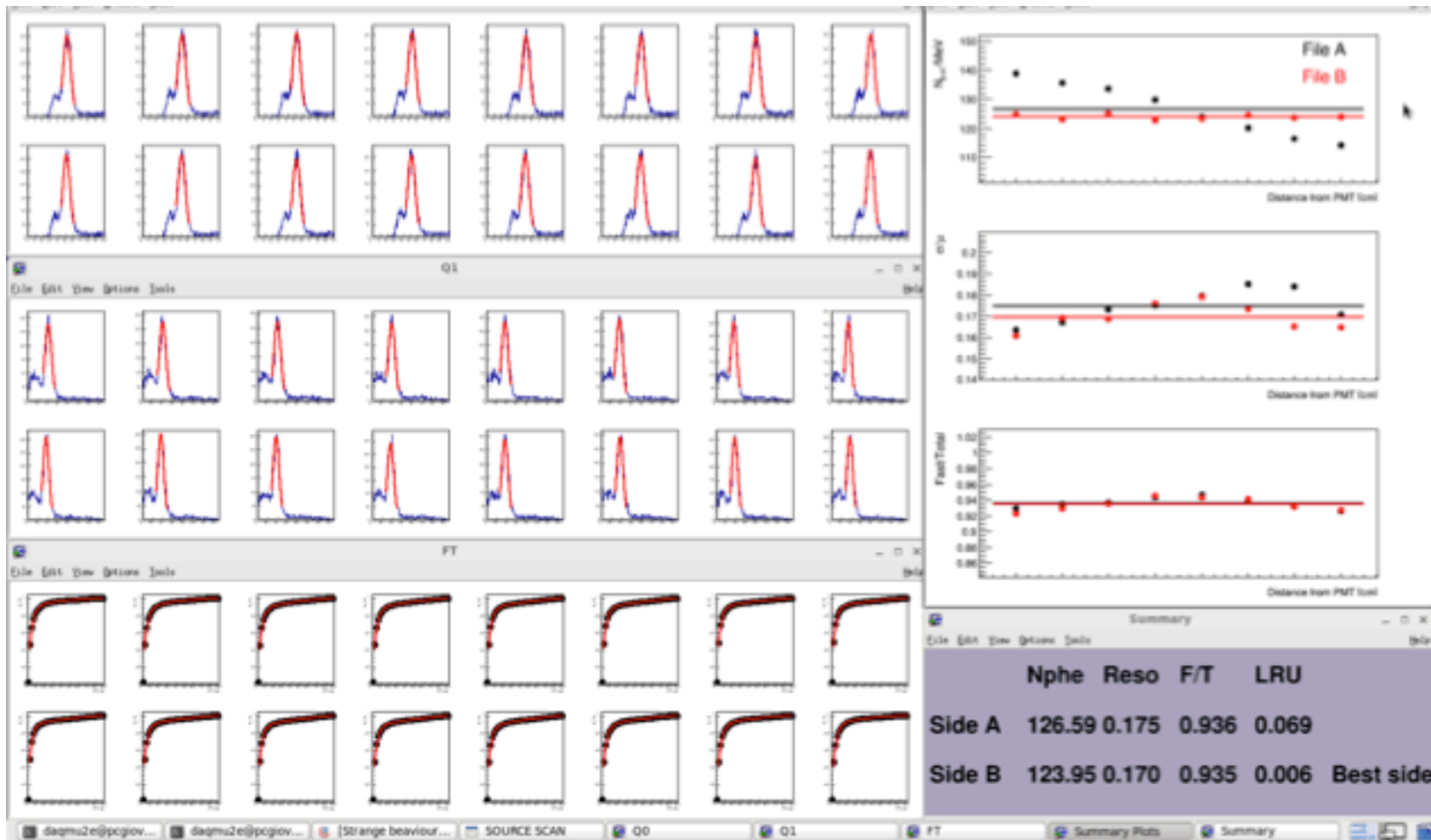


Calorimeter: pre-series from SICCAS (1)

- End of 2017 characterized by arrival of pre-series CsI crystal from SICCAS (12 pieces).
- St. Gobain pre-series is in delay to complete building of new “dedicate” furnaces for production of high quality CsI crystals. **Arrival expected for mid February.**
- **Mechanical precision of milling is OK within specifications.**
- **Some dents found on the readout faces due to problems identified in the handling at SICCAS during wrapping.**
- Other 10 CsI crystals under test at FNAL to check new wrapping and shipping procedures
- **Great results for optical parameters: 6 tested at Caltech, 6 tested at LNF.**
 - Crystals tested with old wrapping and final wrapping with frames
 - To minimize handling of crystals during QA, final tests will be done directly with final wrapping.



Calorimeter: pre-series from SICCAS (2)



Example of “QA-USER” page for source scan of a single crystal on both readout sides

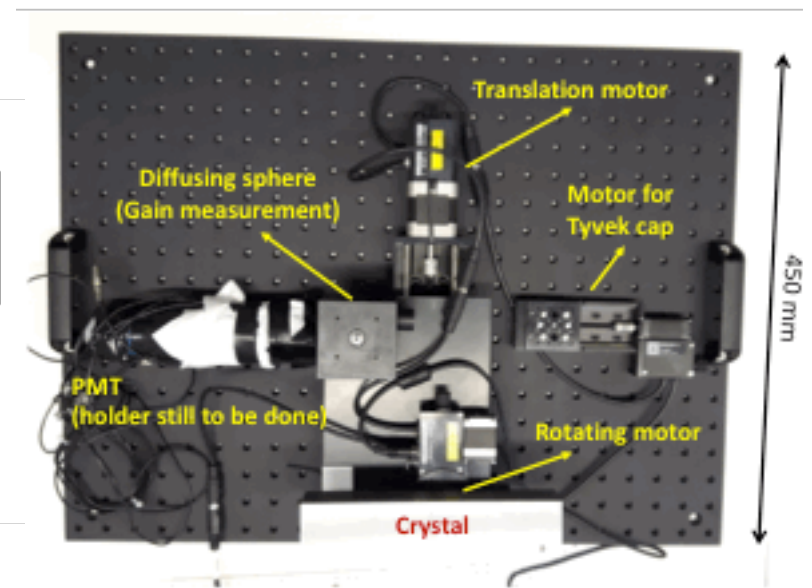
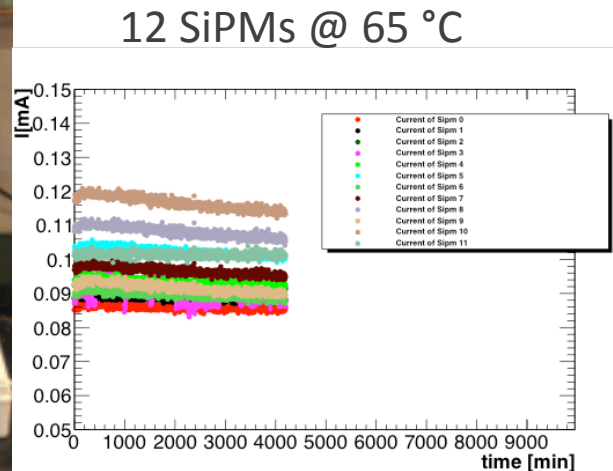
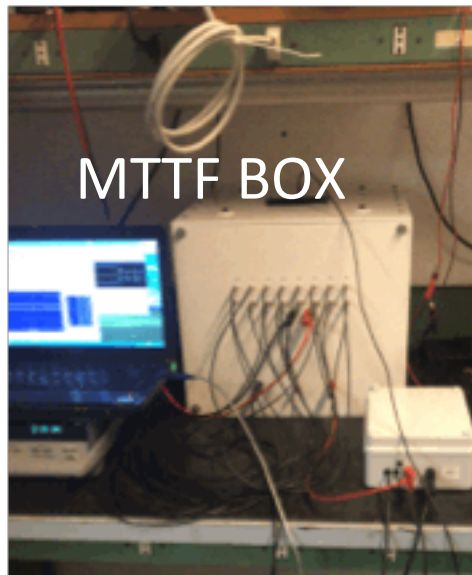
Calorimeter: pre-series from SICCAS (3)

	Best side	LY [N _{pe} /MeV]	LRU [%]	E _{res} [%]	F/T
LNF test <ul style="list-style-type: none">▪ 1 Tyvek Layer▪ Final wrapping	101B	124.5	1.7	17	0.94
	104B	144.6	2.1	16.1	0.92
	107B	123.950	0.6	17	0.93
	108B	134.97	1.6	16.3	0.94
	109A	144.1	2.4	16	0.93
	110B	140.7	1.1	16	0.93

- All crystals within Specs. LY > 125 pe/MeV
- Completion of measurement of Fast/Total in 3 usec in progress
- Radiation Induced Noise test in progress
- Radiation hardness planned

Calorimeter: status of QA stations

- **MTTF station at LNF completed.** Test in progress with 12 pre-series SiPMs. Running at 65 °C for 16 days. MTTF of 10^6 hours reached.
- **Automation of SiPM QA station in Pisa also very advanced.** Running at 3 temperatures. Labview panels ready. I-V curve OK. Gain in progress.
- **Automation of crystal station for optical QA at LNF, 90% ready.** Mechanics under completion. Labview control of step-motors done. Integration of CAEN software + root macros done.
- **Plan is to prepare these stations at INFN and ship them oversea in two weeks.**



Deliverables

- **D2.1 (Technical Design Report) Month 12**
- **D3.3 (Design of the Mu2e Laser system) Month 18**
- **D4.2 (Development of Mu2e simulation code) Month 32**
- **D2.2 (Production DB for crystals and sensors) Month 36**
- **D2.5 (Assembly of the first calorimeter disk) Month 42**

Deliverable for Laser system loaded in October.

Well in line for the production DB of crystals and sensors.
DB already tested for pre-production of crystals.
Now being extended to SiPMs.
In a next step it will be extended also to FEE.