Calorimeter Test Beam @CNAO 30.08.2020

Physics meeting

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NEWS FROM AUGUST

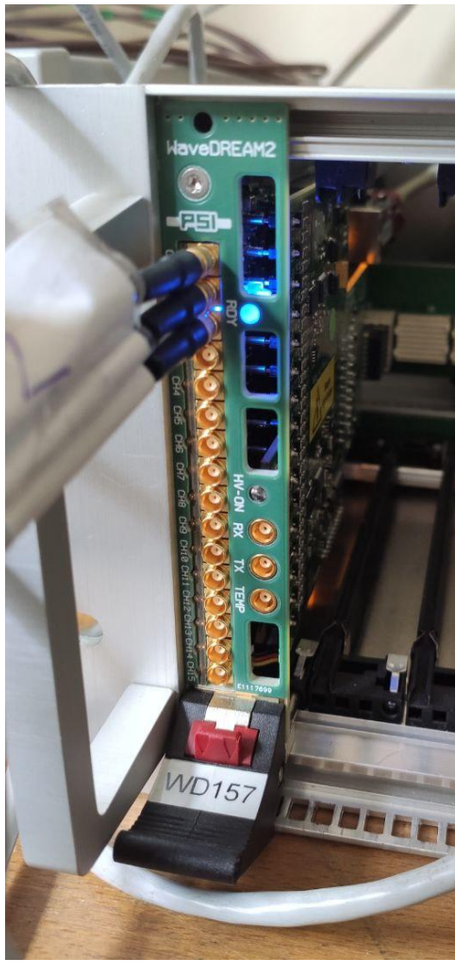
v1740

Testbeam 02_2020
dynamic range: **2V**
frequency: **62.5 MS/s** (192 samplings in 3µs)
HV SiPM: **35V**

v1742

Testbeam 07_2020
dynamic range: **1V**
frequency: **1 GS/s** (1024 samplings in 1µs)
HV SiPM: **33V**

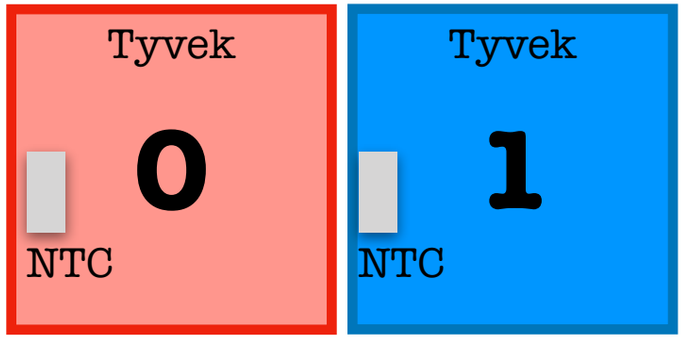
Wavedream

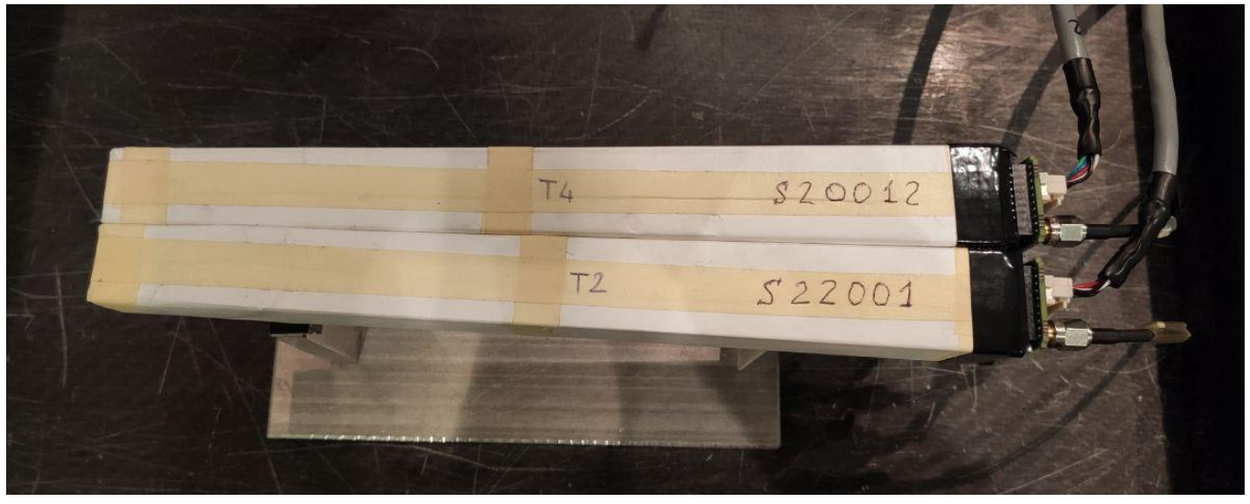


Testbeam 08_2020
dynamic range: **1V**
frequency: **1 GS/s** (1024 samplings in 1µs)
Gain: **0.5**
HV SiPM: **34.5V**

(many thanks to Luca and Marco)

TEST BEAM SETUP





SETUP

1. Temperature monitoring of both crystals
2. One scan (70-220 MeV proton, 115-400 MeV/A C) with BGO+Wavedream setup
3. Scan along the crystal length with 70, 170 MeV proton beam and 115, 260 MeV/A carbon beam

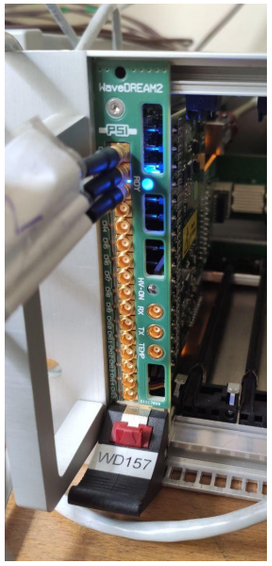
GOAL

1. Understand better the temperature fluctuations
2. Study the performance (energy resolution) of BGO+Wavedream
3. Study the optical light absorption along the crystal

- frequency: 1GS/s (1024 samplings in 1μs)
- gain: 0.5
- HV SiPM: 34.5V (33V w/ v1742 CAEN)

Wavedream

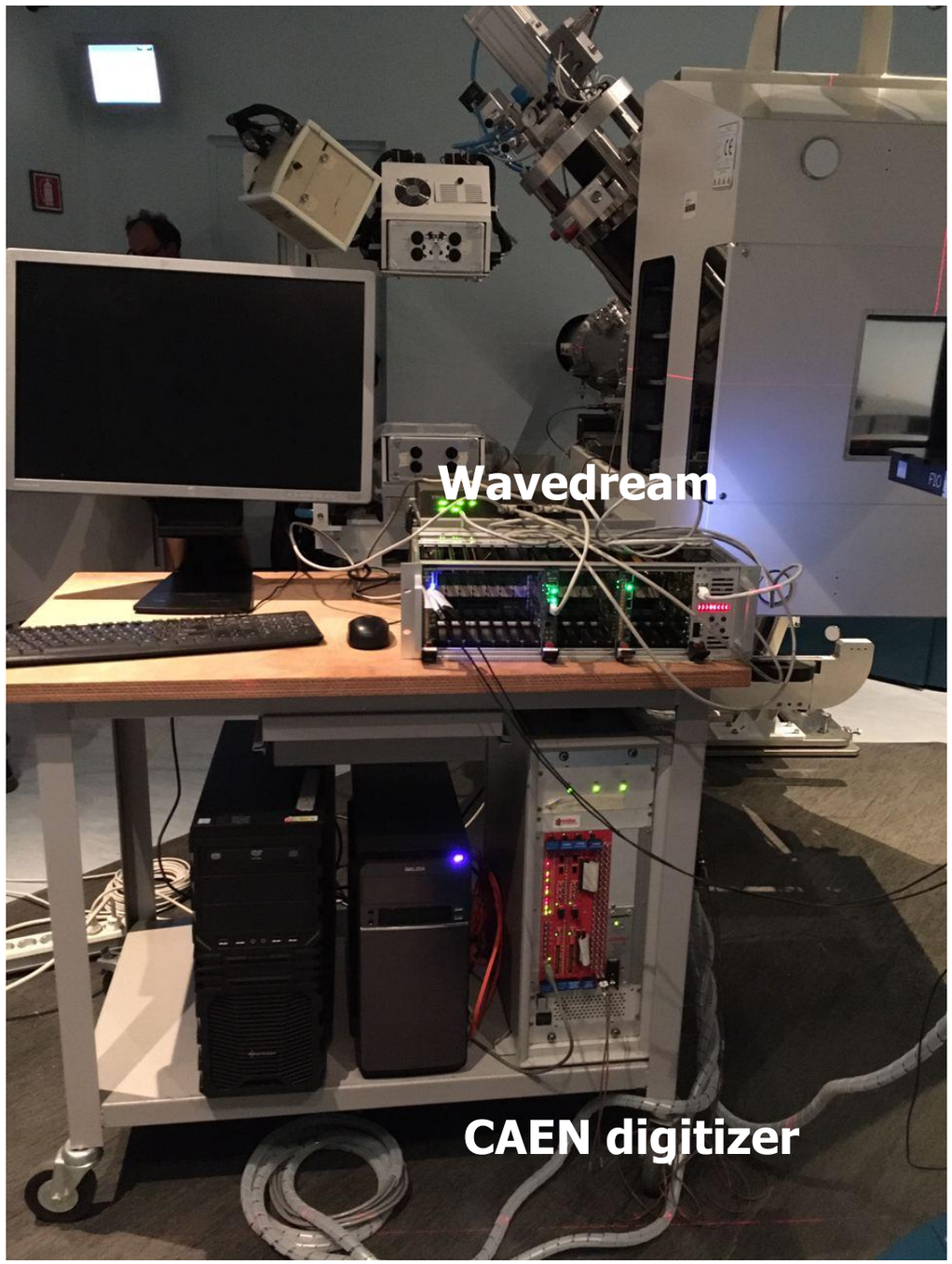
Read SiPM signals

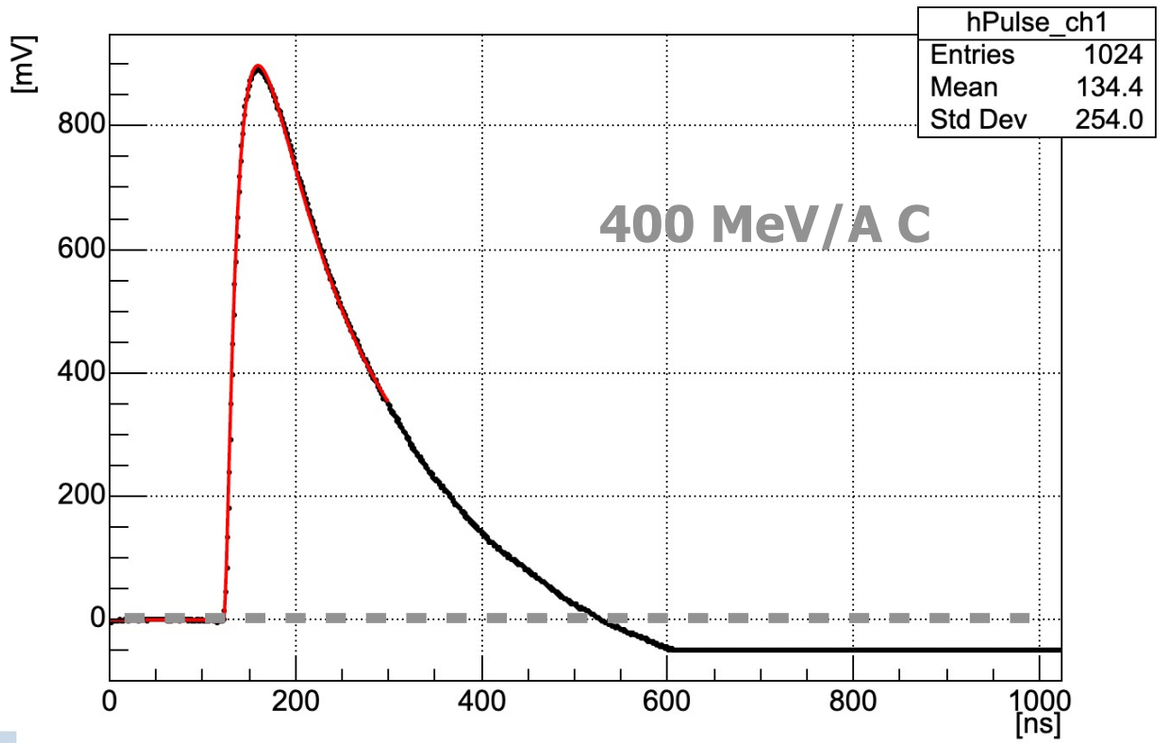


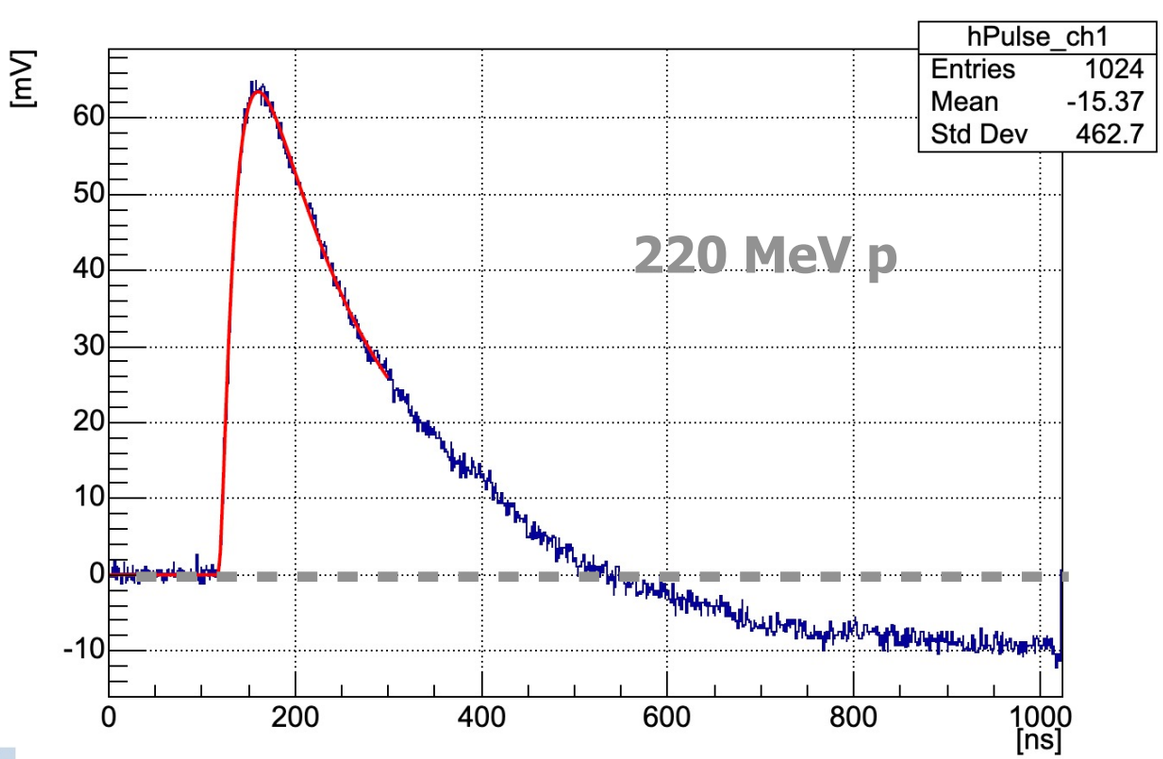
v1740 (10V)

Read temperature sensor

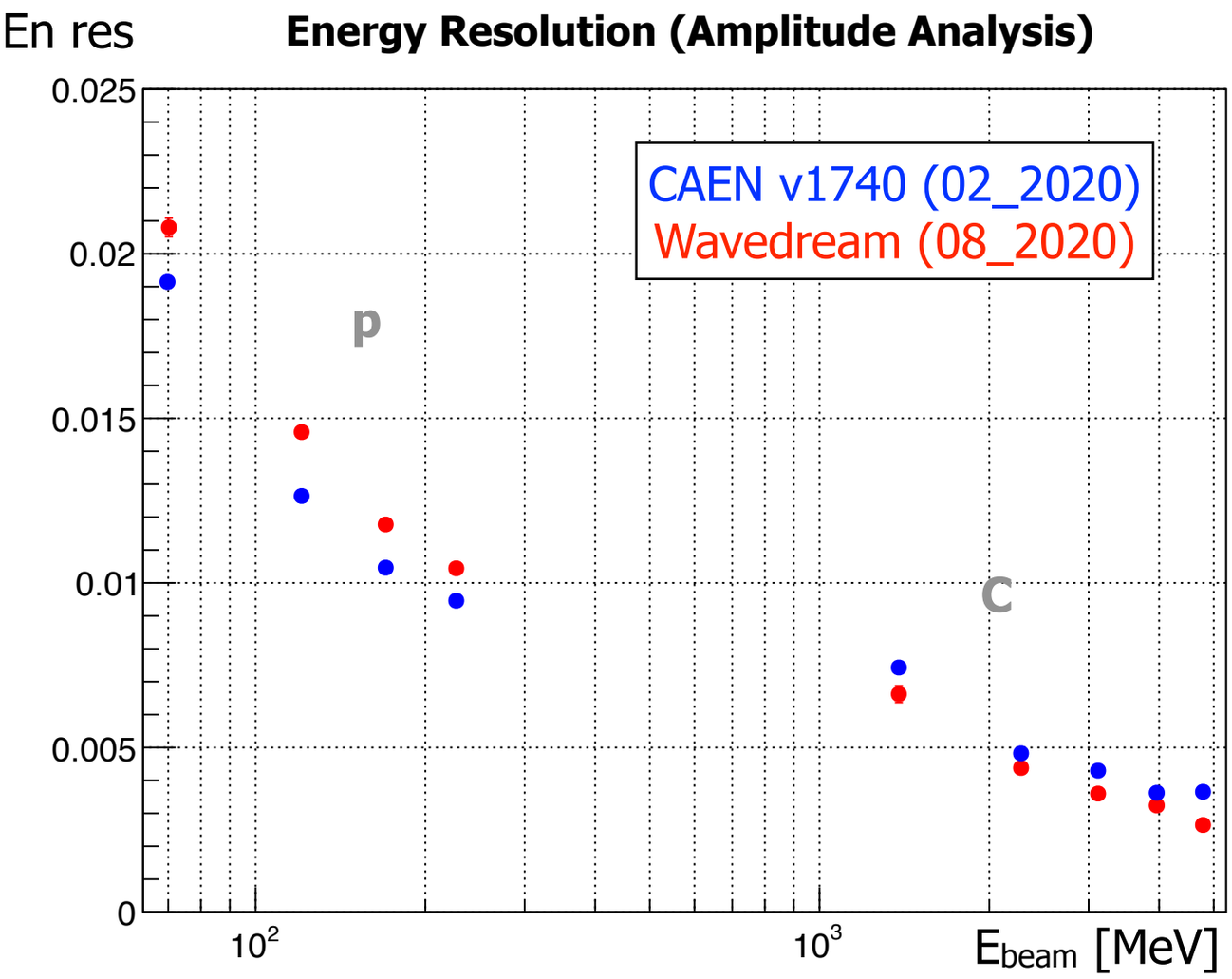
TEST BEAM SETUP

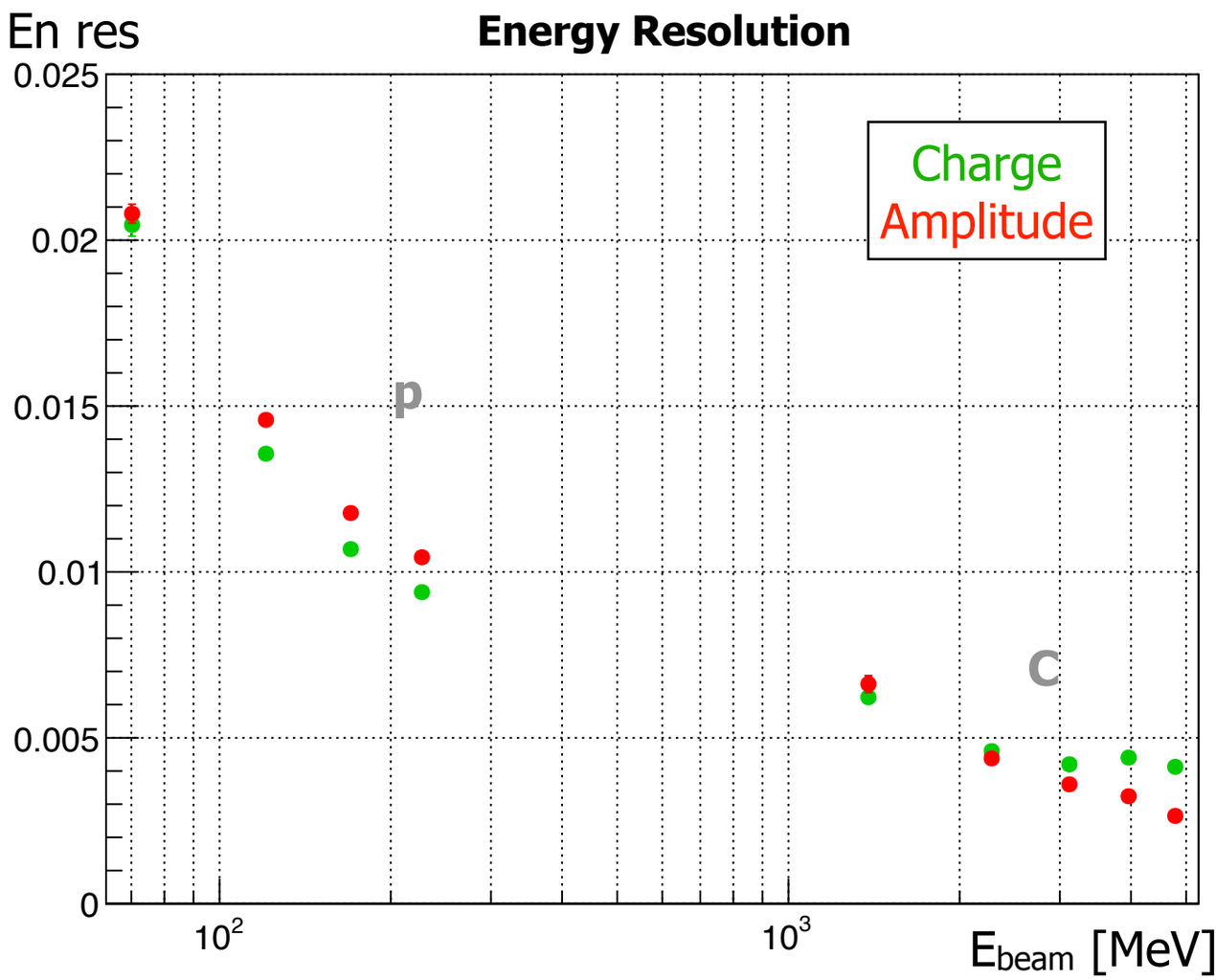






ENERGY RESOLUTION





CONCLUSION

The wavedream are the optimal solution regarding the pulse digitisation for the calorimeter:

- they are cheaper
- they allow to sample the pulses at high frequency (pulse shape analysis is possible)
- Thanks to a software attenuator it's possible to increase SiPM HV (in order to avoid energy resolution deterioration) in 1V of dynamic range
- Easier integration with the Global DAQ

The preliminary testbeam results have confirmed:

- energy resolution < 2%
- the wavedream allow to achieve the task in the energy resolution