

# TOF WALL Reconstruction software status

Niccolò Camarlinghi, Aafke Kraan

# Few words on the TW software

- We developed a C++ Software to process data from TW
- Takes as input the Wave Dream data (either raw or decoded data)
- Depends only on ROOT
- Is tooled with CMake
- Is currently hosted on a private git repo on bitbucket <https://bitbucket.org/ncamar/foot/src/master/> (write me an email if you want to have a look at the code)

# Recon workflow

## TOFWallReconstruction class

Wave dreams data WD .binary format

Waveforms collected by all channels and all boards

Decoded data (WD decoded .root file)

Waveforms collected by all channels and all boards

Level0:

For all channels/boards:

- Charge
- Pedestal
- Amplitude
- Timestamp

Level1:

For each Bar:

- Timestamp
- Charge
- DeltaT
- Charge ratio

Level2:

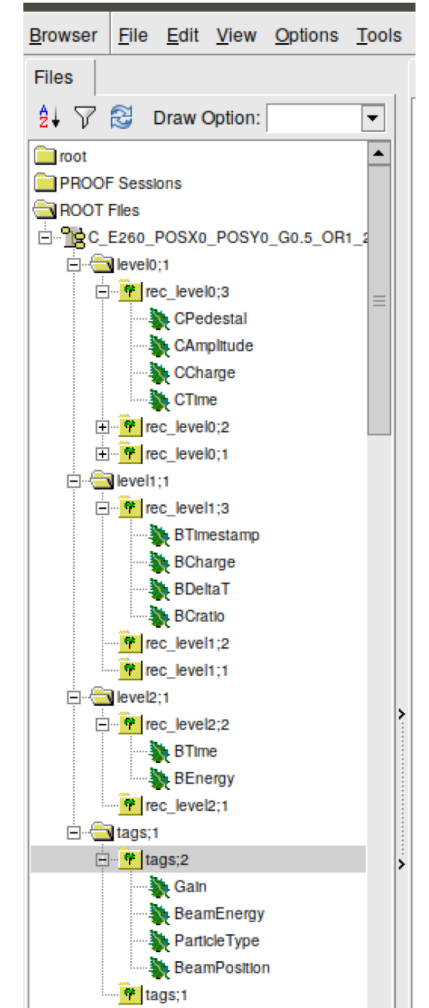
For each Bar:

- Timestamp
- Energy

**Channel Map:** xml containing the mapping between boards, channels and bars

**Calibration Map:** xml containing the factors to calibrate charge to MeV and to correct time offsets between bars.

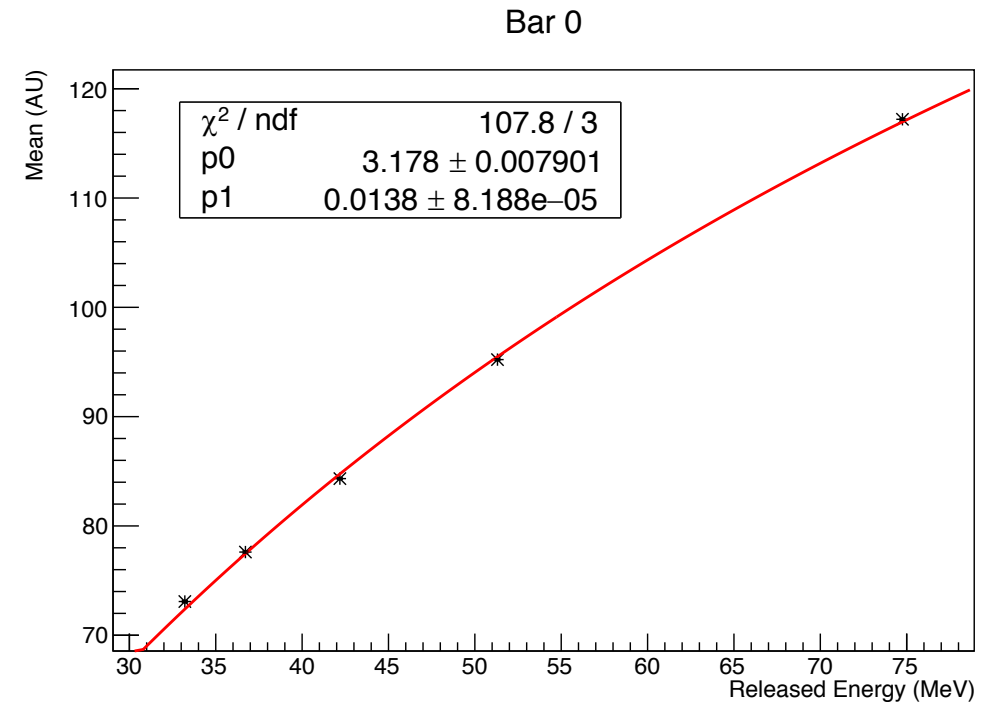
Output .root file



- Three folders for the three reconstruction levels
- Each folder contains a root tree
- A folder for Tags (needed for calibration purposes only)

# TW Calibration

- TW energy Calibration is performed by a dedicated class (do we need to integrate this in shoe?)
- MC is used as ground truth
- In order to perform calibration you need to add tags to a level1 reconstructed root file: e.g. primary particle, kinetic energy of the beam per nucleon, beam position along the bar, gain used...
- TW calibration class export the calibration results to xml files
- TBD: time offset calibration



$$\text{Charge} = \frac{p_0 \cdot \text{Energy}}{1 + p_1 \cdot \text{Energy}}$$

# Conclusion and future plans

- Currently recon fully supports the data from the 3 test beams we performed in 2018
- We are adapting it to the hardware that will be used at CNAO next week (20+20 bars)
- Shoe integration:
  - Check the geometry file of the TW
  - Reading data from DAQ
  - Exports the results of the current recon sw to HitList and PointLists