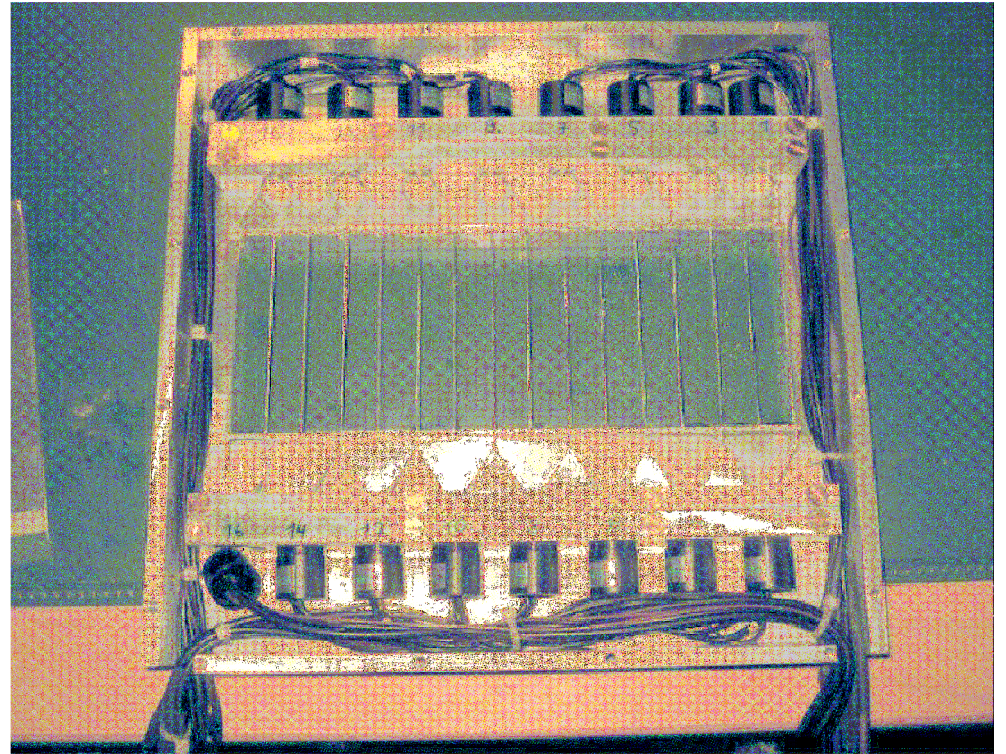


Scintillator tests at Cave C

Martha Liliana Cortés
IKP, TU Darmstadt
GSI Darmstadt

The previous Finger detector

- 15 strips of BC420
- 16 PMTs
- Read out:
 - QDC
 - MhTDC
- Mounted before 2012

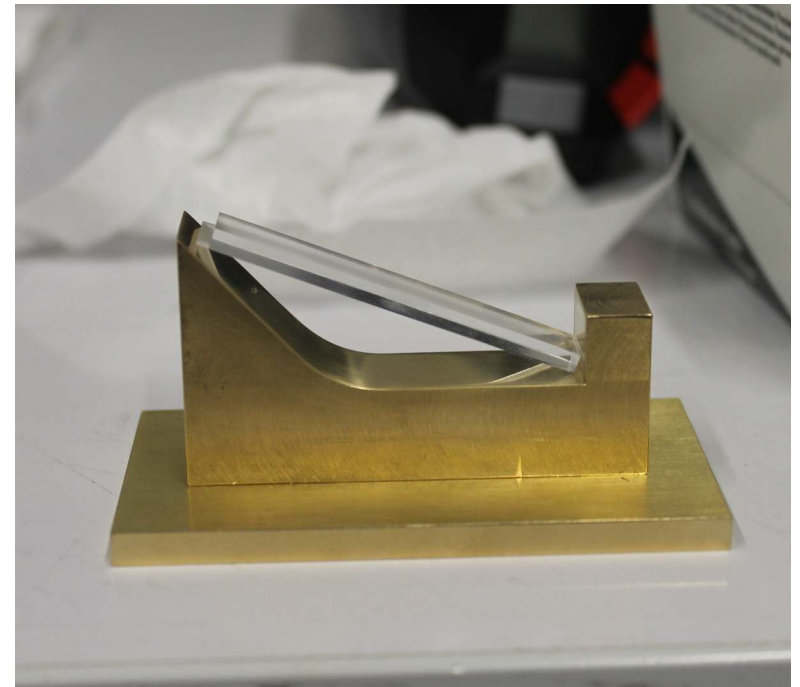
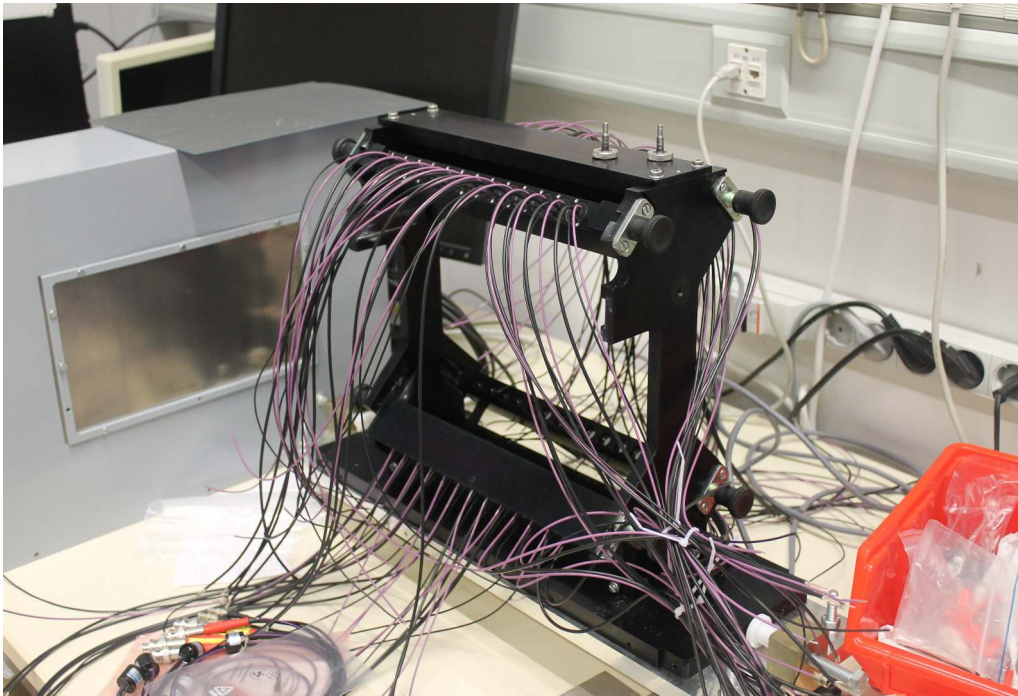


The goal: Stand higher rates in the middle focal plane of FRS

The new Finger detector

- New design of the mechanics done in IFJ PAN, Krakow.
- More space allowed for PMTS by bending the strips.
- Mounting done at GSI
- First mounting done in January 2014
- Remounted for tests in Cave C in September 2014

Mounting the detector

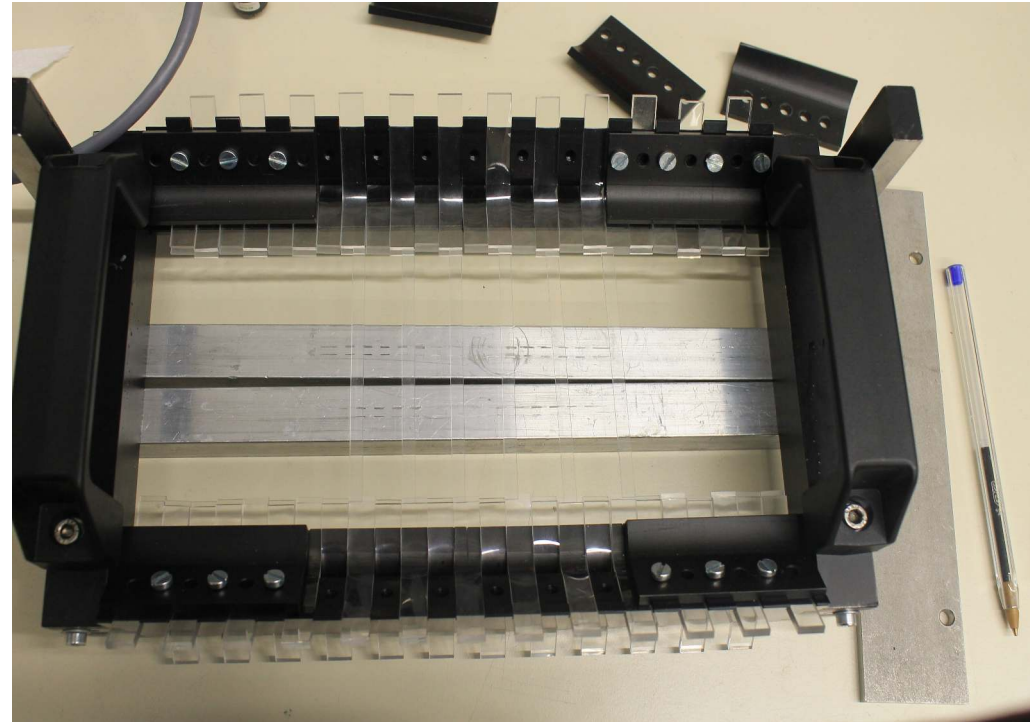


PMTs mounted first
Instead of bending the scintillator we bend the light guides...

More on mounting



Mounting the light guides on the frame: One of the most difficult parts



After light guides are mounted, strips can be mounted.
Problems with the optical contacts

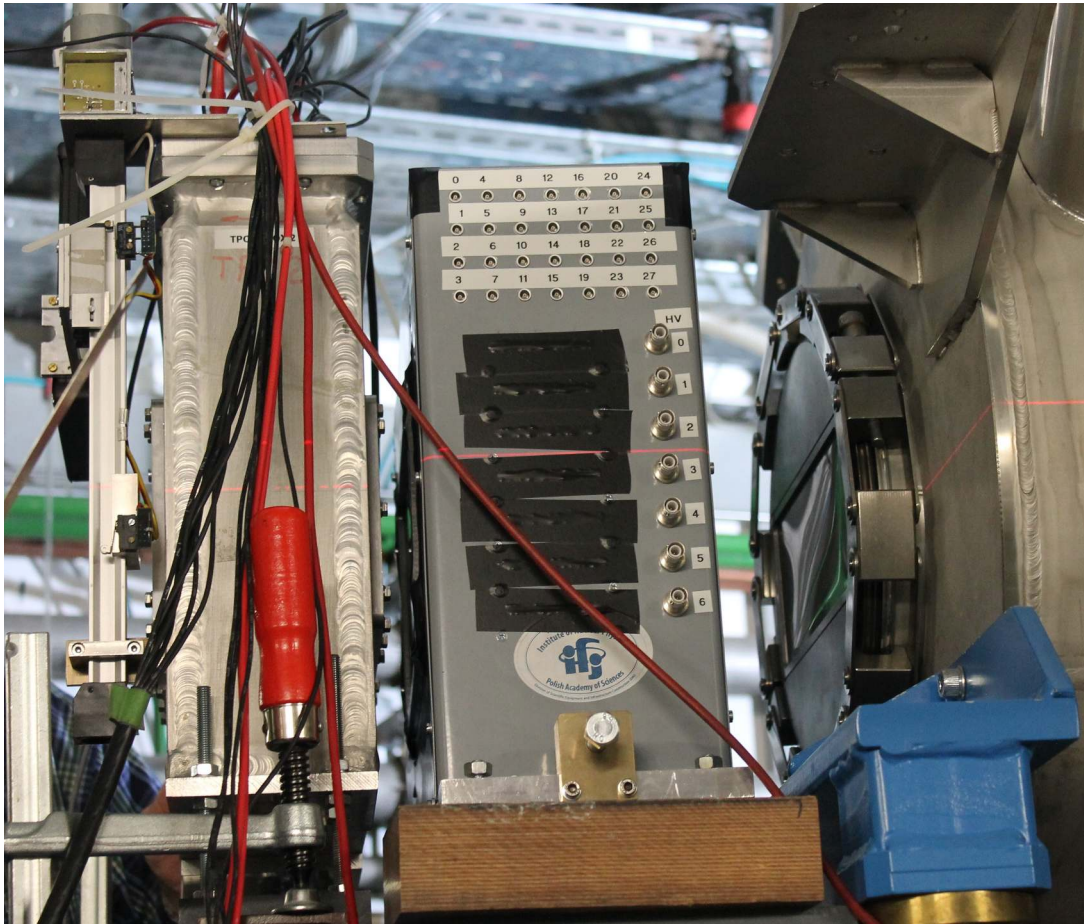
Detector characteristics

- 51 strips, 4.4 mm wide of BC420 plastic scintillator
- Strips connected in pairs to light guides and to Hamamatsu R9880U-01 PMTs
- Silicon glue between strips and light guides
- Silicon pads between light guides and PMTs
- 13 power supplies used, each one powering 4 PMTs
- Independent voltage control of PMTs using potentiometers

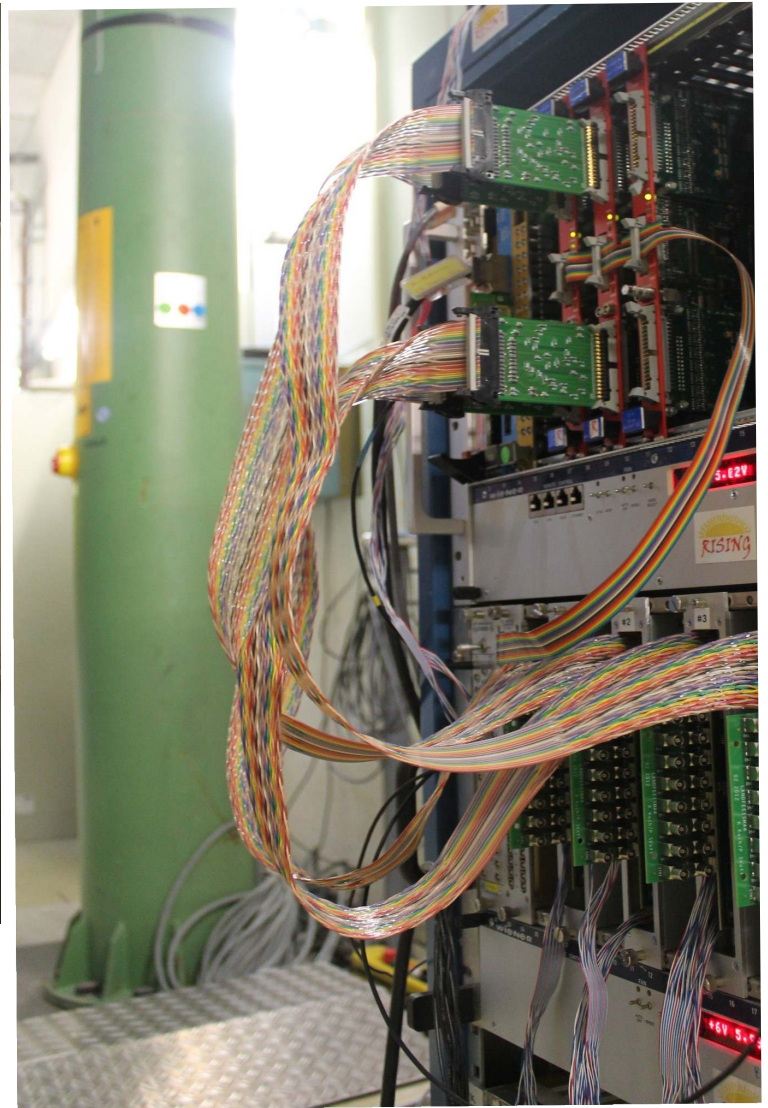
Electronics

- LANDFEE discriminator giving time of leading and trailing edges
- Time and Time-over-Threshold measured with a Caen 1290 MhTDC
- TRIPLEX card used to remotely control the thresholds
- Logic OR and analogue AND of the signals used for monitoring

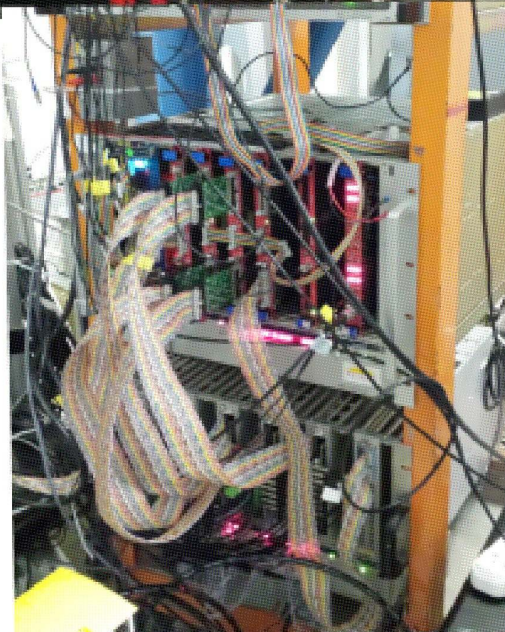
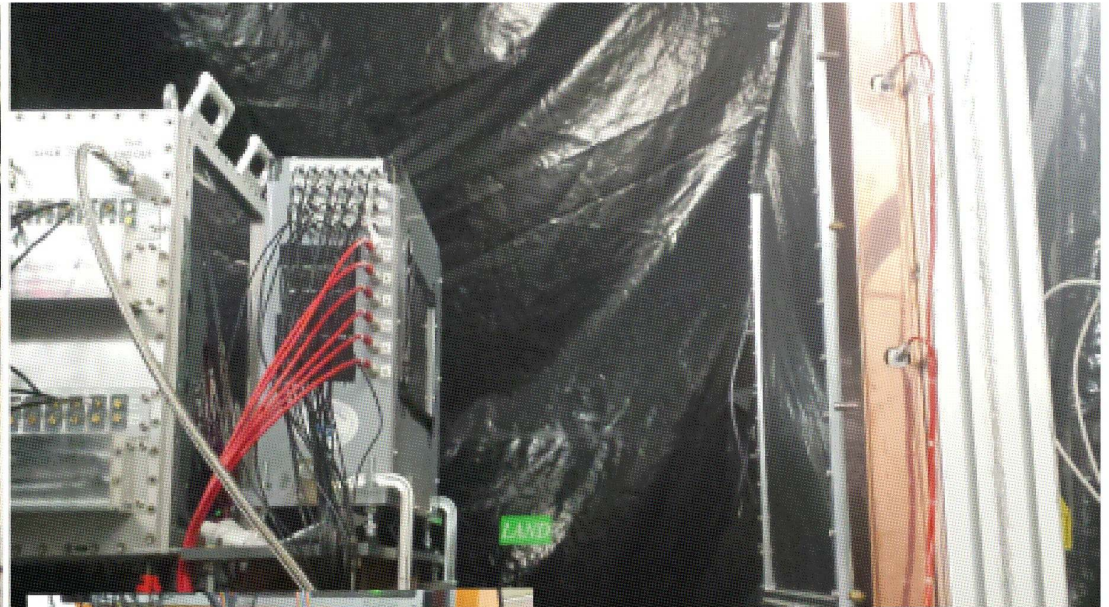
Final mounting at S2



Detector was mounted at 2014
PreSPEC-AGATA campaign

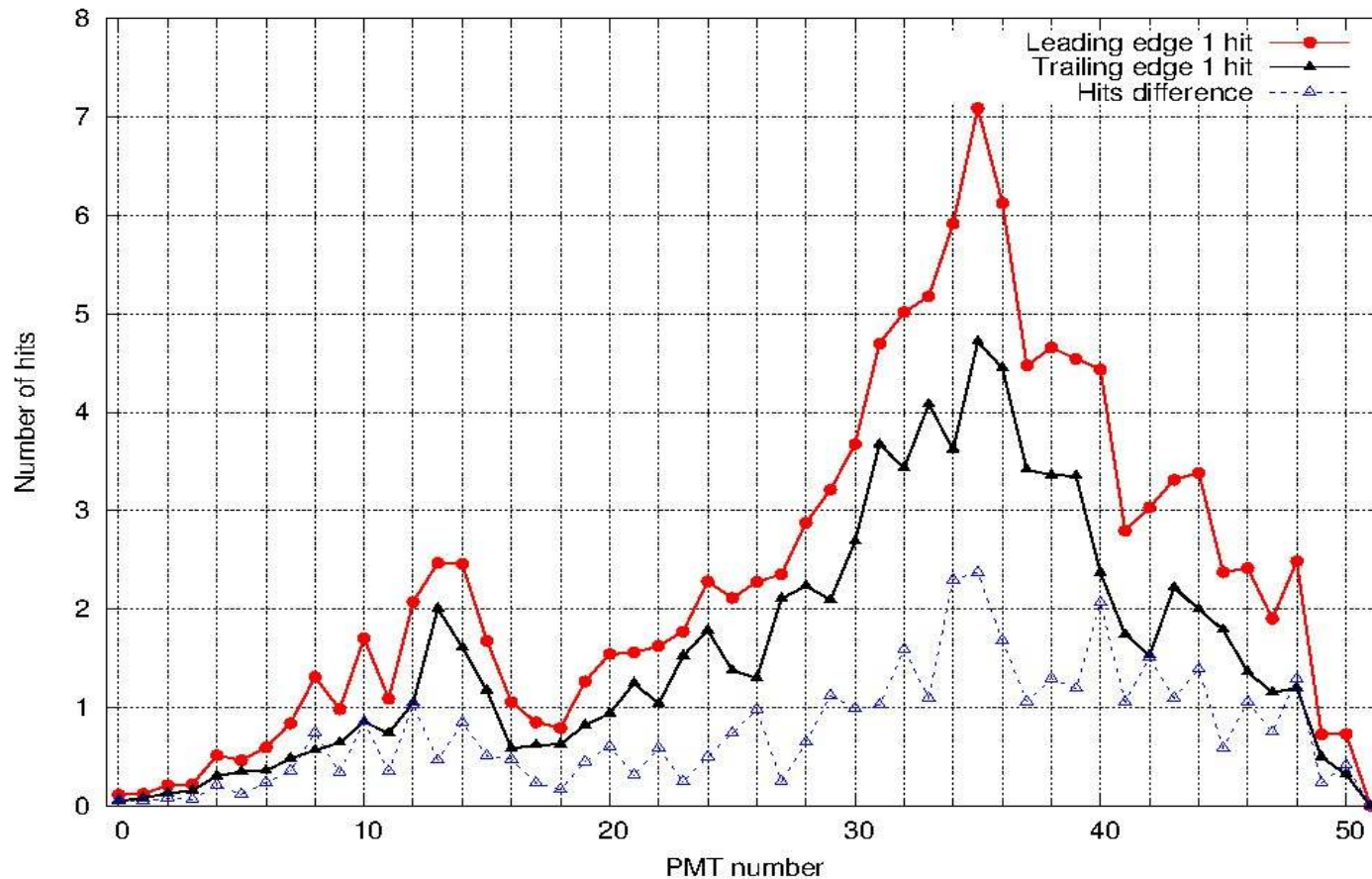


Final mounting at Cave C



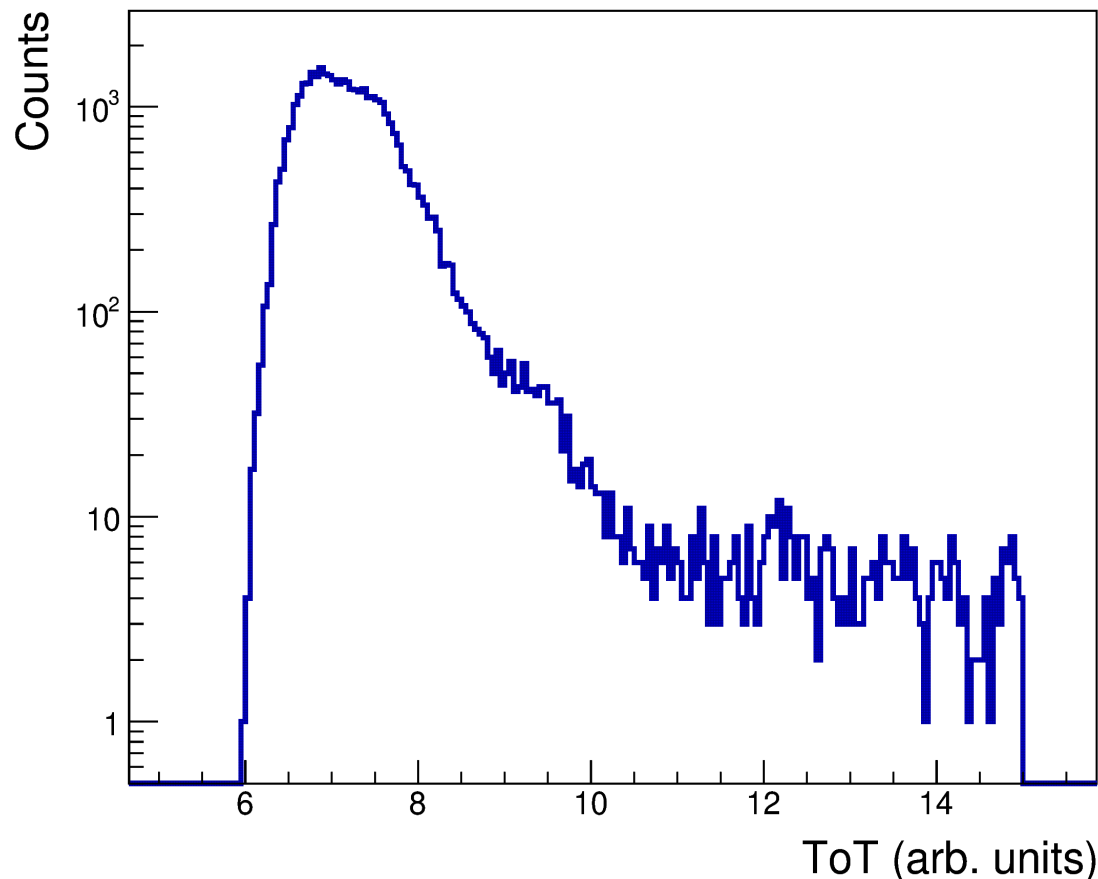
- Plastic scintillator changed
- New support to bend strips
- Same electronics used + a QDC

Performance: Measure of leading and trailing edges



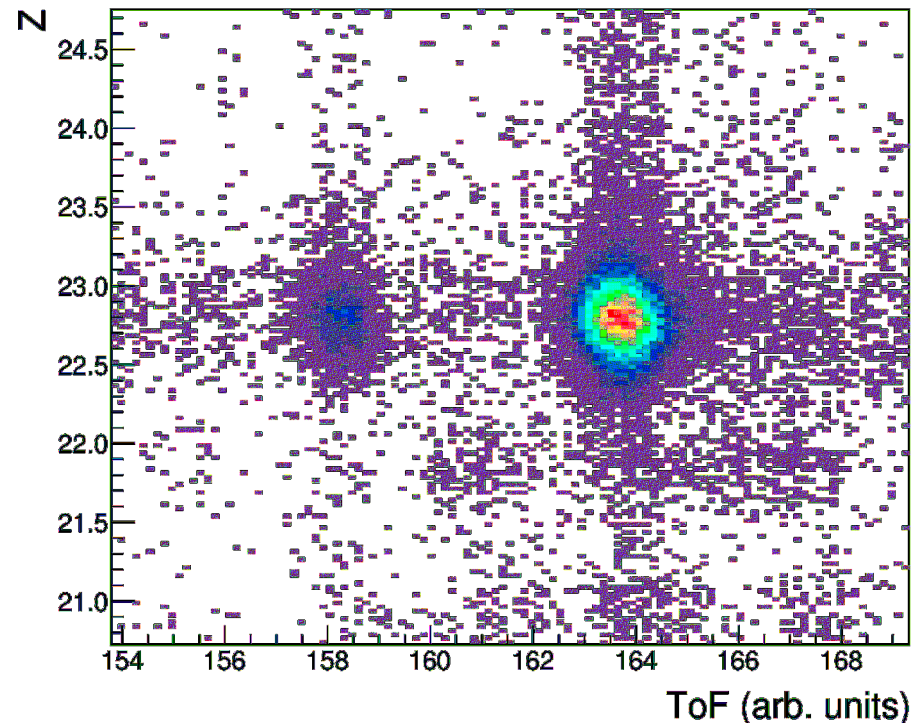
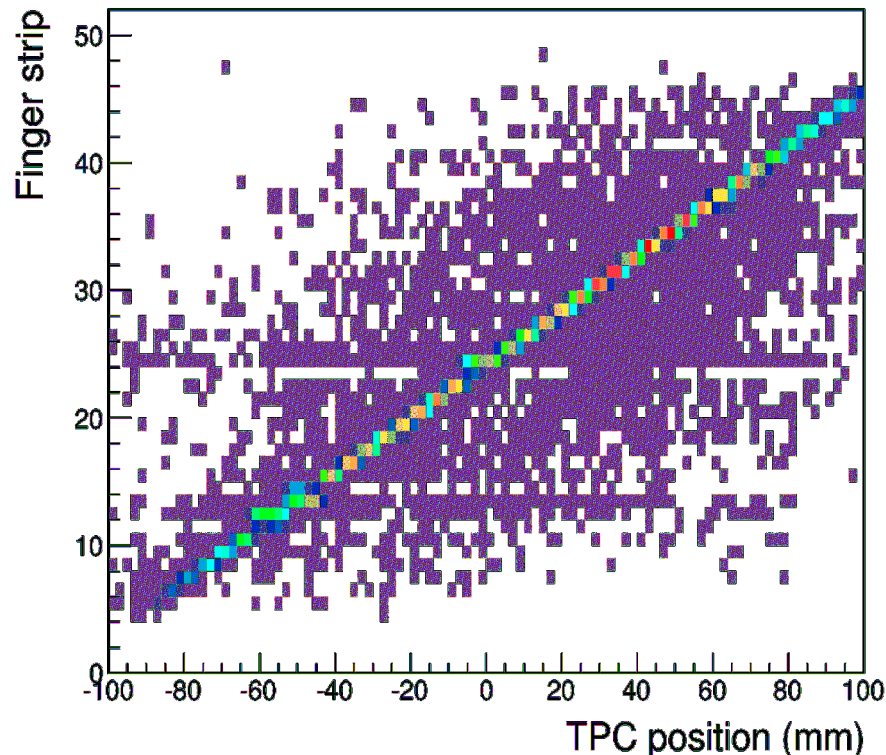
Difference in the number of hits on the leading edge and on the trailing edge

Performance: Measure of ToT



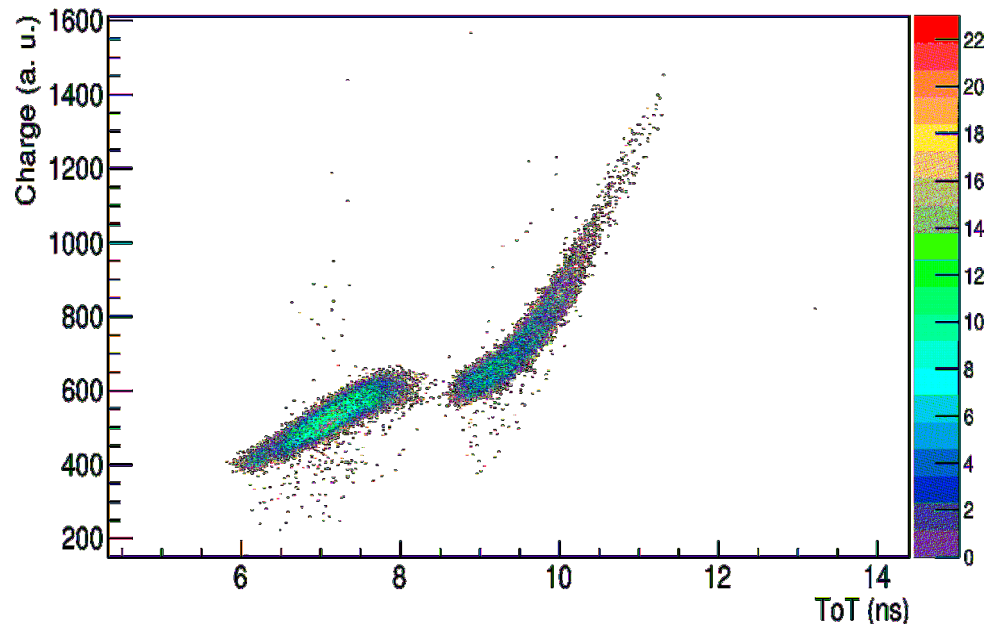
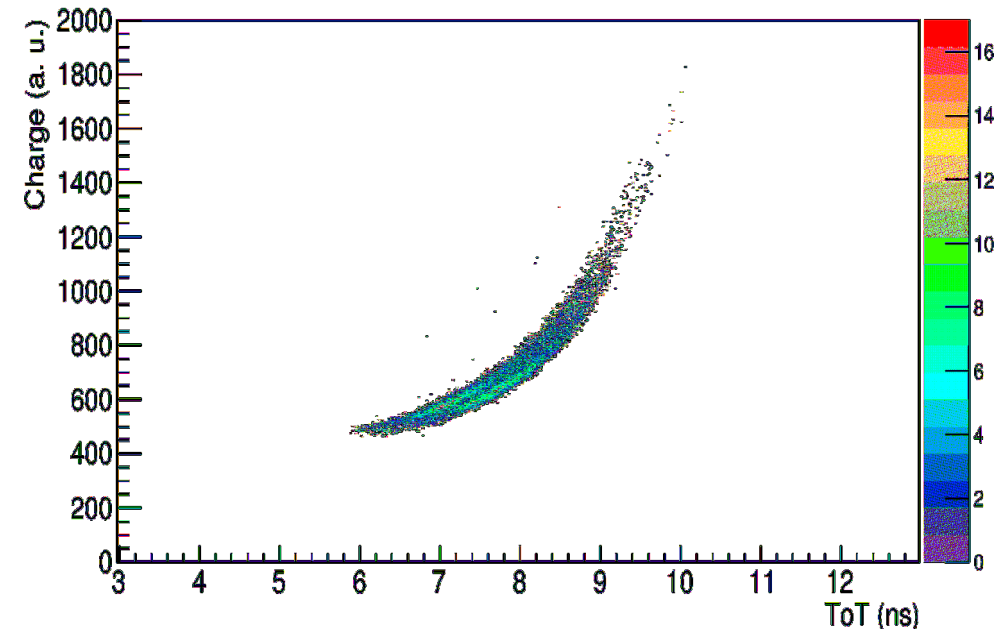
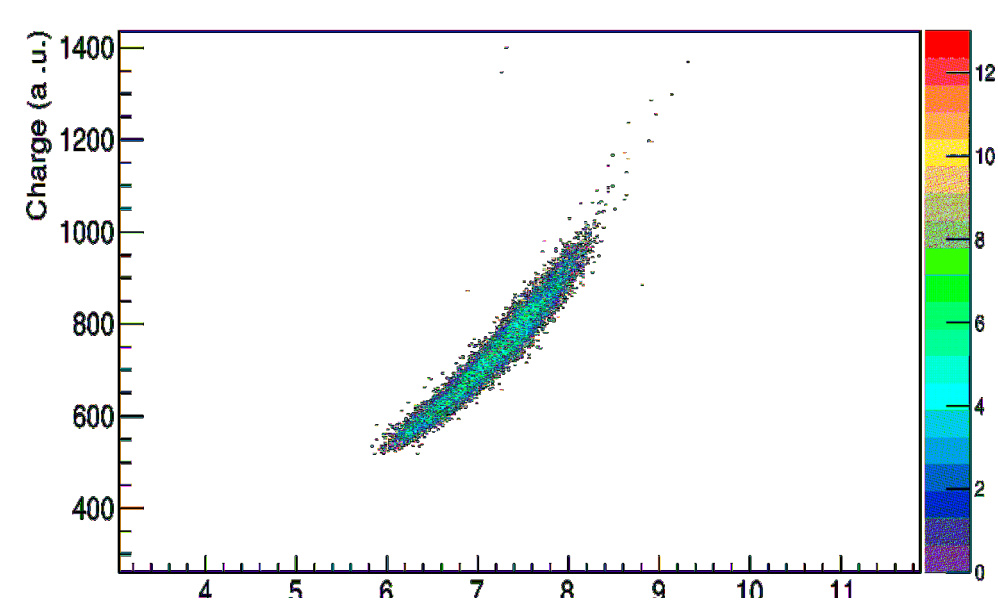
- Time-over-Threshold spectrum obtained
- Efficiency around 2% less than Sc21
- Geometrical efficiency can be improved

Performance: Strip selection for position and time



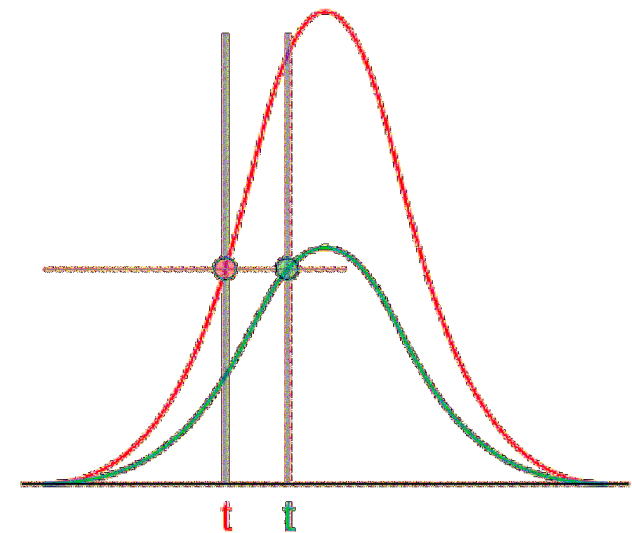
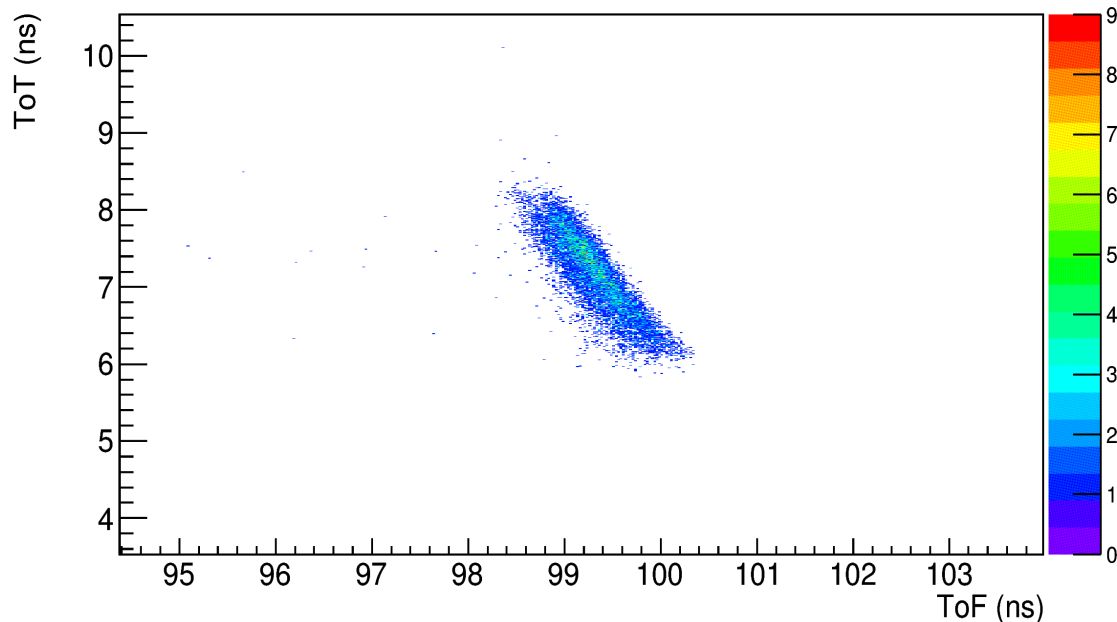
- Correlation with position observed for lower rates
- Use on MhTDC not optimized yet

Performance: ToT and Charge



- Non-linear correlation between the charge measured and the ToT
- The ToT value shows some issues

Performance: ToT and ToF



- The time walk of the Leading Edge Discriminator needs to be corrected
- Time resolution around 72 ps: More analysis on-going

The future Finger detector

- Around 90 strips. Width to be decided
- Use the same PMTs + new more appropriate light guides (Can still change)
- Need for improved cabling, feed-troughs, connectors, etc
- Use of Tamex TDC with LANDFEE discriminators is being considered
- Triplex card to remotely control thresholds
- Use of ToT or QDC still to be decided

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+

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SOFIA group, R3B group

Thank you!