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# TOF Software

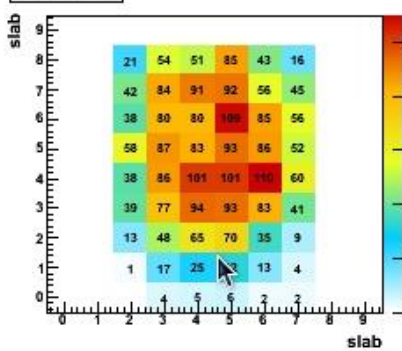
Y. Karadzhov

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# Status of the TOF Calibration

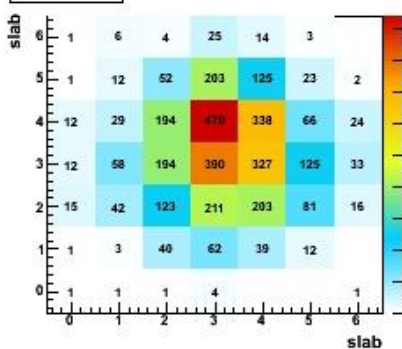
TOF0 profile



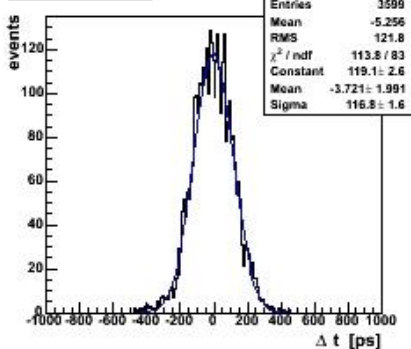
TOF0 resolution



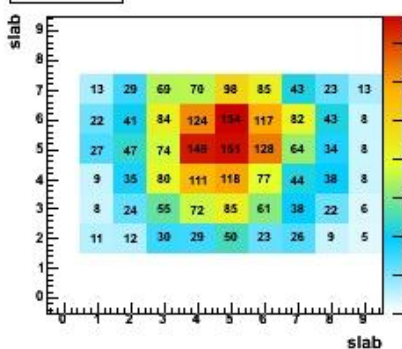
TOF1 profile



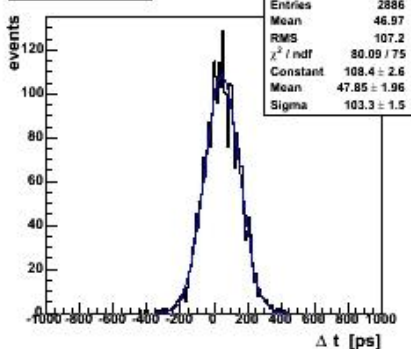
TOF1 resolution



TOF2 profile



TOF2 resolution



Time resolution after the calibration:

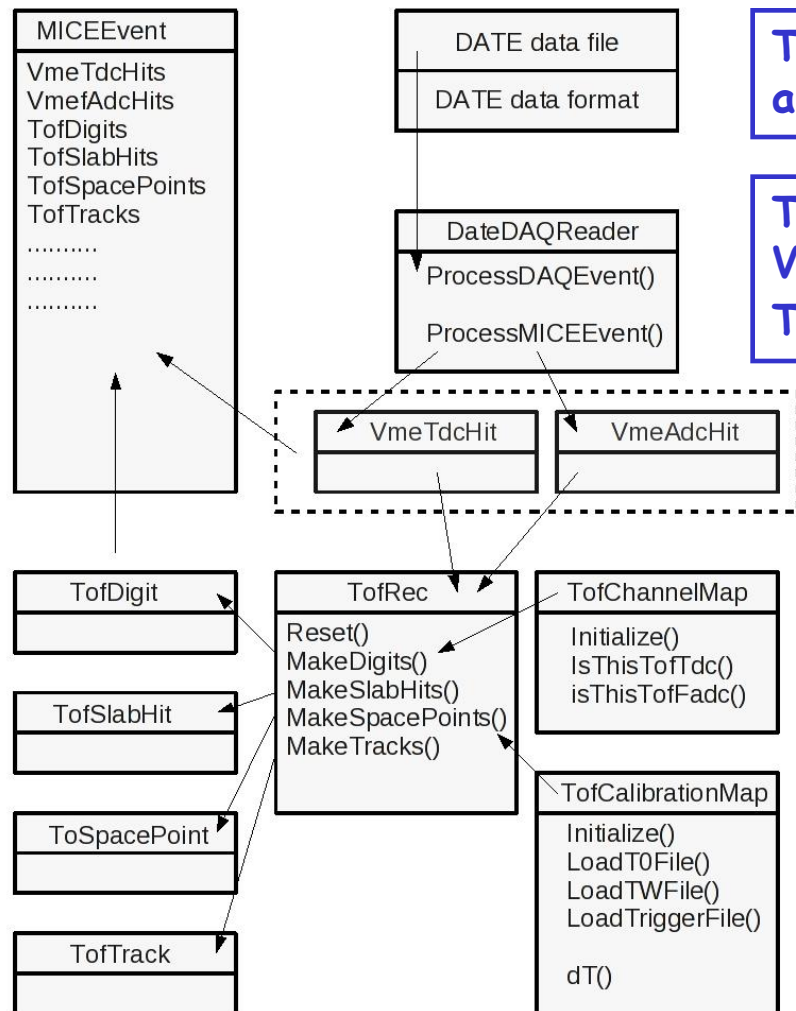
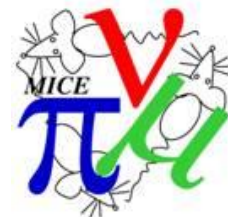
- TOF0 - 51ps;
- TOF1 - 58ps;
- TOF2 - 52ps.

We may need more data:

1. Defocused beam - improve the calibration in the corners of TOF1;
2. Positron beam - for absolute calibration of TOF0.



# TOF Reconstruction for advanced users



**TofRec::Reset()** - the reconstruction is *Reset* and is ready to process the new event.

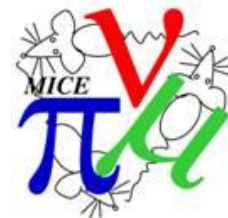
**TofRec::MakeDigits()** if we have **VmeTdcHit** and **VmefAdcHit** in a given channel of the detector **TofDigit** object is created .

**TofRec::MakeSlabHits()** - **TofSlabHit** object is created if we have digits from the two PMTs of the slab.

**TofRec::MakeSpacePoints()** - **TofSpacePint** object is created if we have **TofSlabHits** from the two planes of the detector.



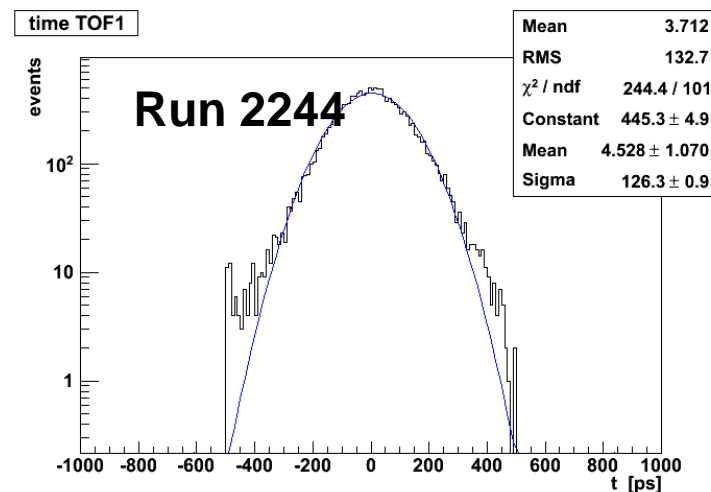
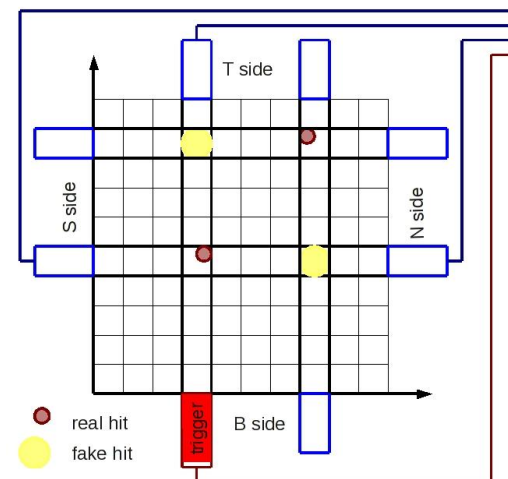
# TOF Reconstruction for advanced users



## TofRec::MakeSpacePoints()

### 1. Find the trigger hit TriggerKey\* ProcessTrigger()

- Try all possible combinations.
- For each combination apply the corrections and examine the resulted value of the time.
- Calibration constants are defined in such a way that the measured time of the hit that generates the trigger have to be  $\sim 0$ . This can be used to recognize the trigger hit.
- The default cut is  $-500\text{ps} < t < 500\text{ps}$  ( $\sim 4\sigma$ , see the plot).
- The cut can be controlled by the user via **TofRec::SetTriggerCut(double cut)**





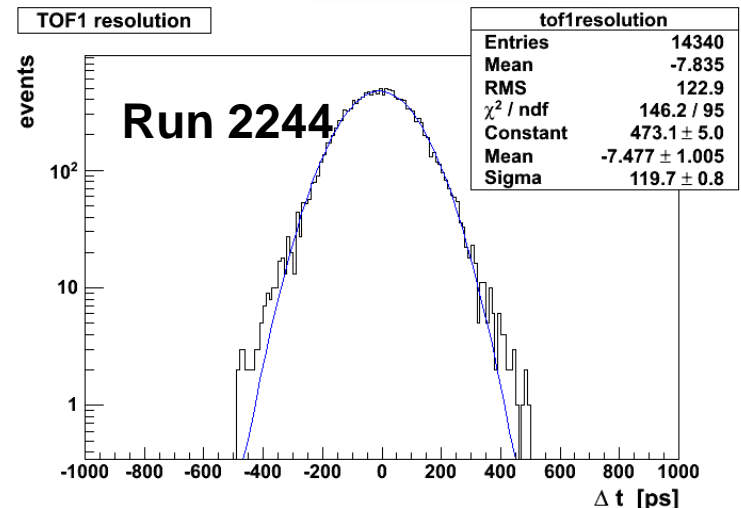
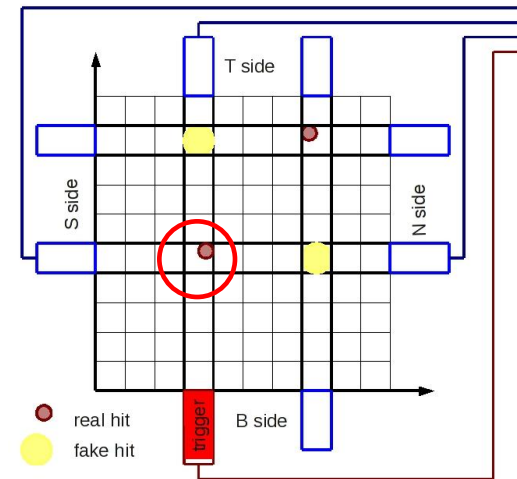
# TOF Reconstruction for advanced users



## TofRec::MakeSpacePoints()

### 2. Check for more real hits

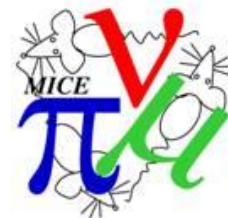
- Check all possible combination.
- Apply the corrections and examine the resulted value of the difference between the time measured by the two slabs.
- The time difference have to be  $\sim 0$ . This can be used to recognize the real hit.
- The default cut is  $-500\text{ps} < \Delta t < 500\text{ps}$  (see the plot).
- The cut can be controlled via `TofRec::SetSpacePiontCut(double cut)`





# TOF Reconstruction for advanced users

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**The efficiency of the reconstruction is an issue and have to be investigated.**

1. The reconstruction can fail because some of the slabs are not calibrated .
2. The reconstruction can fail because no trigger hit is found.

**The efficiency is calculated and can be accessed by the user via**

1. `double TofRec::GetEfficiency()`
2. `double TofRec::GetInefficiency(NoCalibration)`
3. `double TofRec::GetInefficiency(UnknownTrigger)`

**Do not call these functions before the beginning of the work !!!.**

Or via `double TofRec::Print()`

**The event is counted as a successfully reconstructed if we have at least one SpacePiont in the trigger station (trigger hit is found).**

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# Conclusions

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1. Nothing unexpected in the performance of the TOFs.
2. Have to understand better the trigger generation and recognition issue .
3. We need interface between the DB and the reconstruction. To be done.