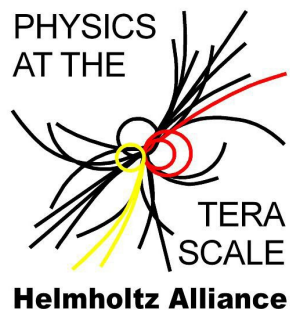


Track Reconstruction Chain for Octoboard

Amir Noori Shirazi

Siegen University

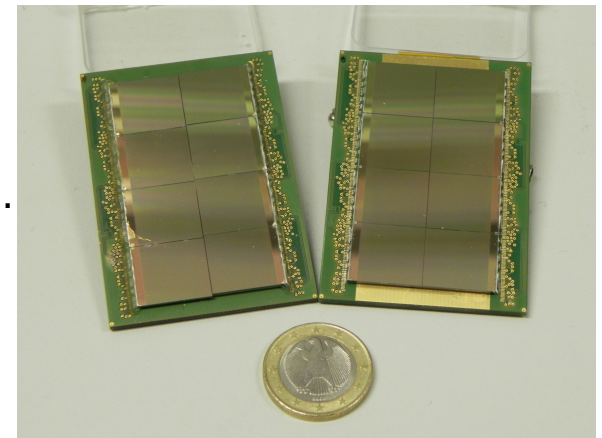
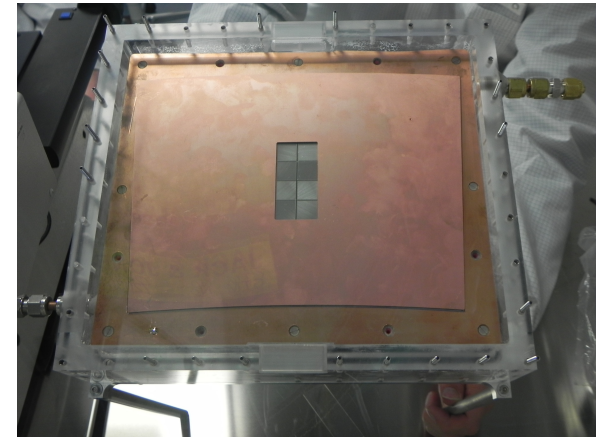


Contact:

- Introduction
- The Chain of Track Reconstruction
- Result
- Outlook

Introduction:

- LCTPC – Pixel Groups:
 - NIKHEF:Module construction
 - University of Kiew: Simulation
 - LAL Orsay: Simulation
 - CEA Saclay / Desy: Data analysis
 - Uni Bonn: Module construction, readout system, data analysis
 - Uni Siegen: Simulation, data analysis
- March/April 2013: testbeam with 2 LCTPC Octoboard modules .
- Different amplification structures: GEM and InGrid.
- Preliminary data analysis in MarlinTPC Robert Menzen.



Andrii Chaus (DESY/CEA Saclay):

- MAFalda analysis framework for fast analysis at testbeam
- MarlinTPC for real analysis (using GEAR information)

Amir Shirazi (University of Siegen):

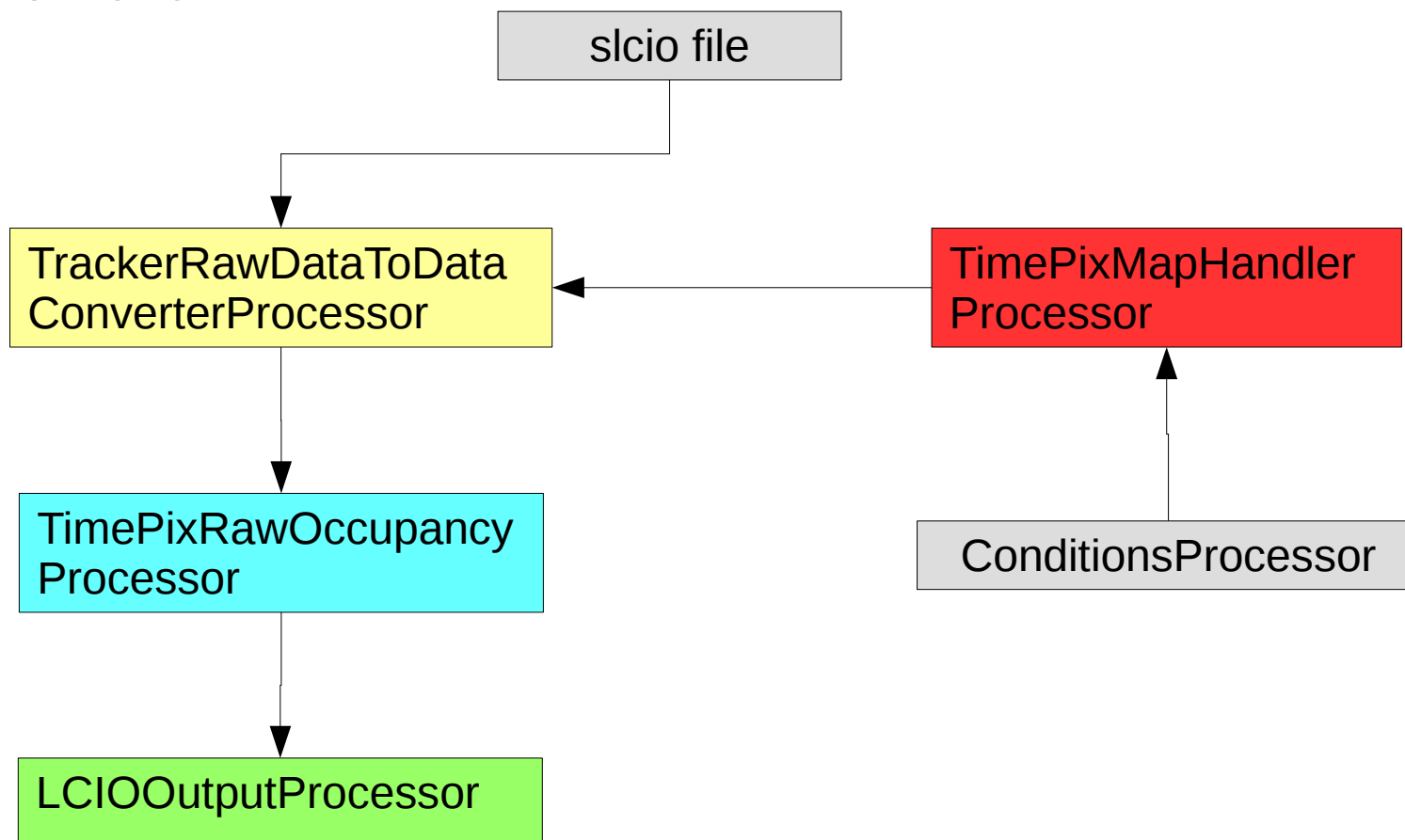
- MarlinTPC for data analysis.
- MarlinTPC for simulation: 1 Octoboard and 96 chip module

Martin Rogowski (University of Bonn):

- Algorithm from Forward Tracking Detector for ILD.
- MarlinTPC for comparison of different algorithms: Standard Hough Transform, Fast Hough Transform (DESY), Randomized Hough Transform and windowed Hough Transform.

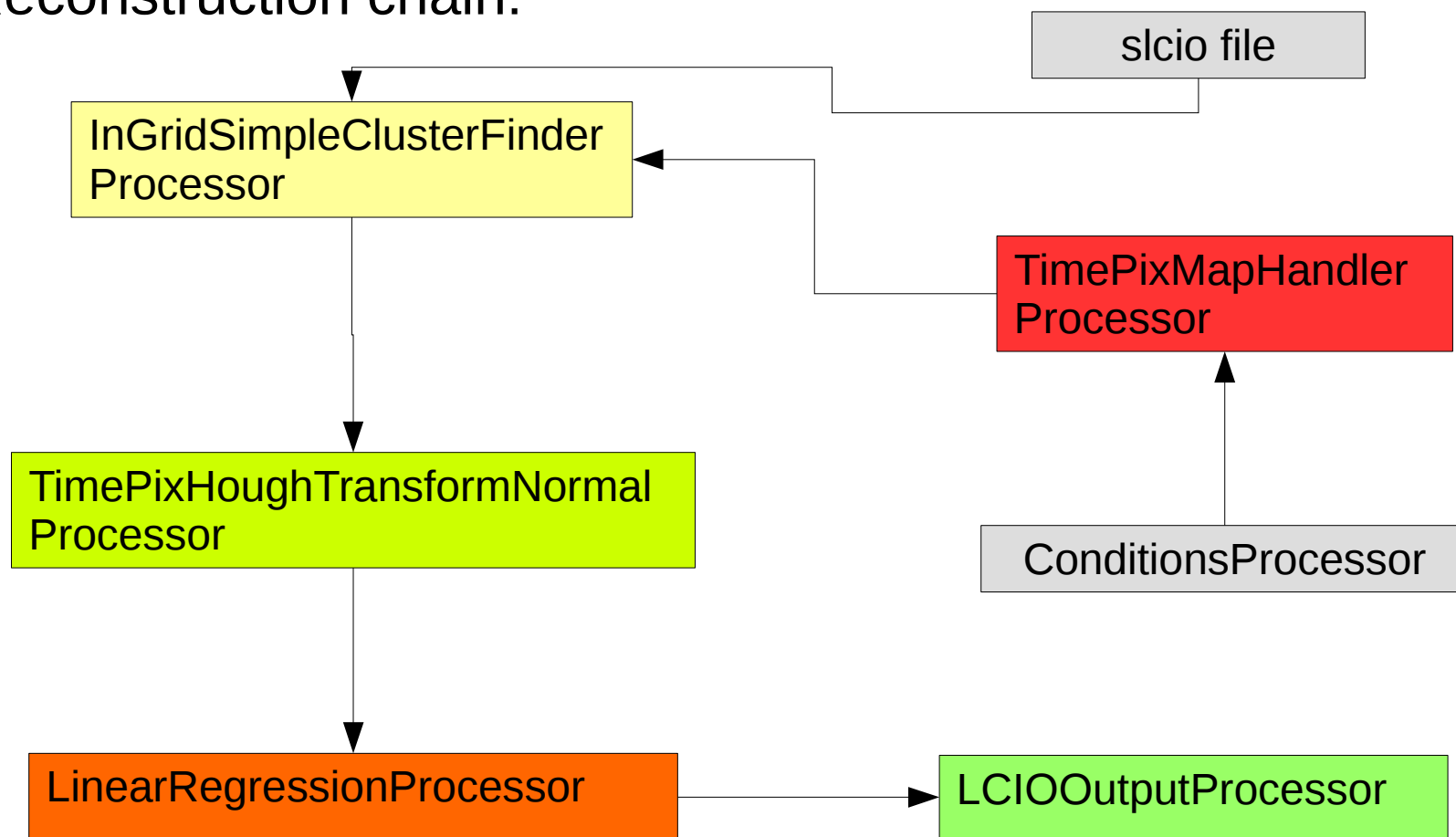
The chain of Track Reconstruction

1. Calibration chain:



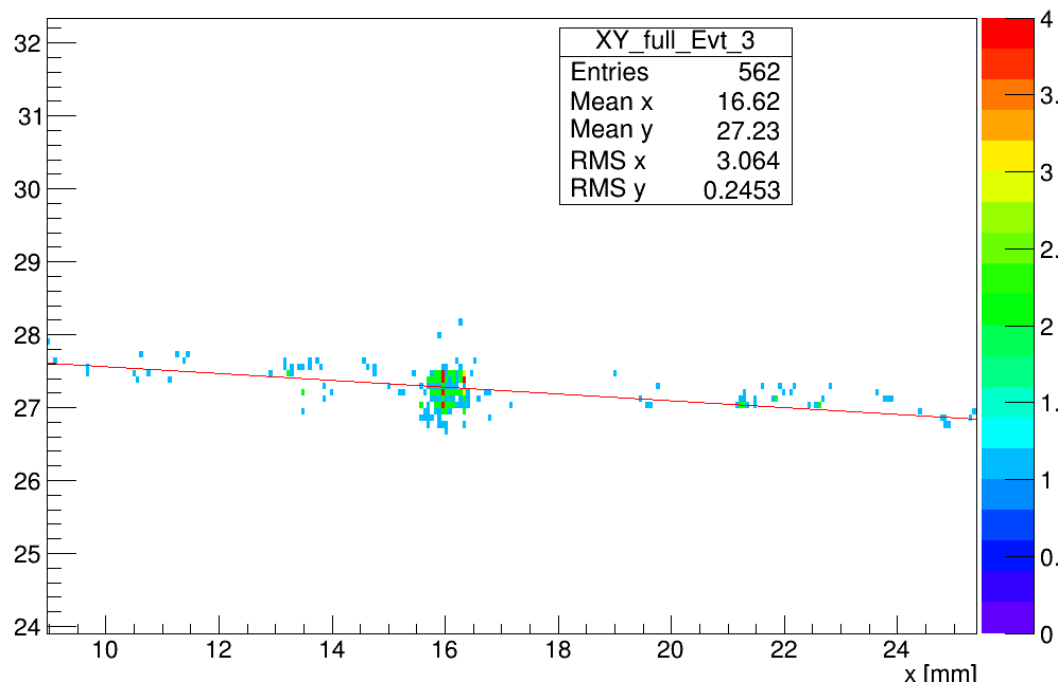
The chain of Track Reconstruction

2. Reconstruction chain:

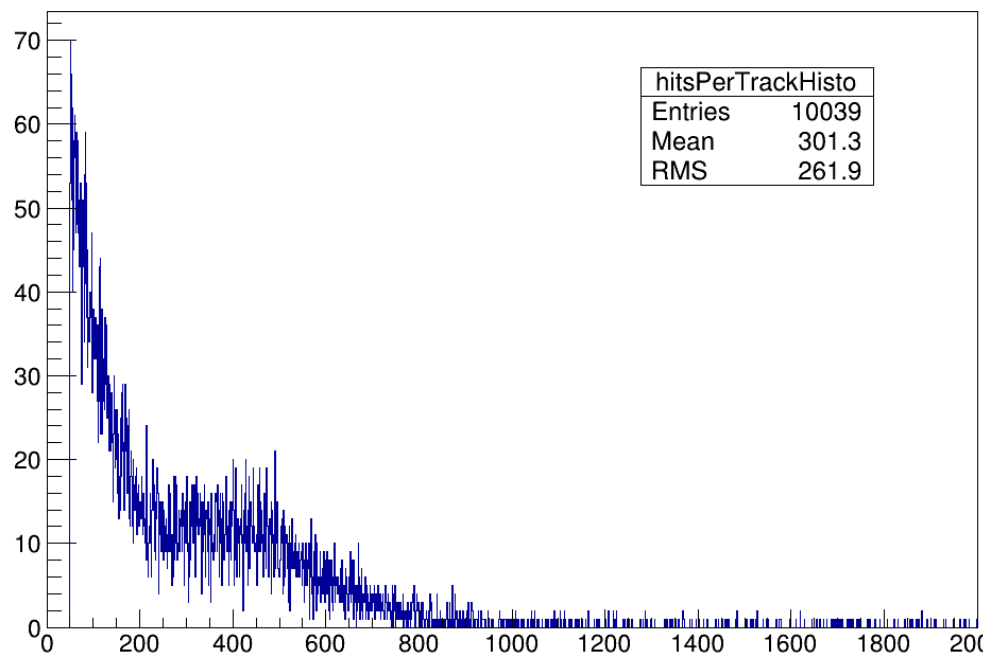


Result:

Drawing_1_Tracks_562_Hits



Number of hits per track

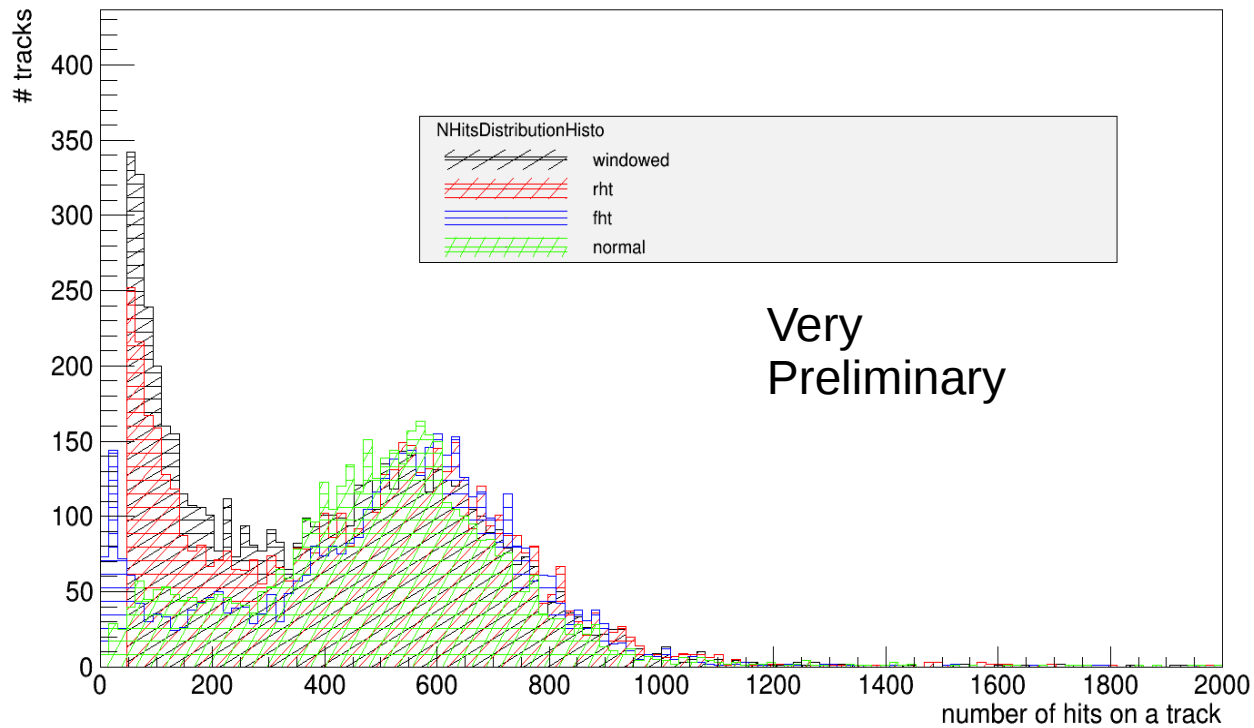


Different to pad based algorithms:

- Large number of track points
- Not raw based
- Different hit density along the track

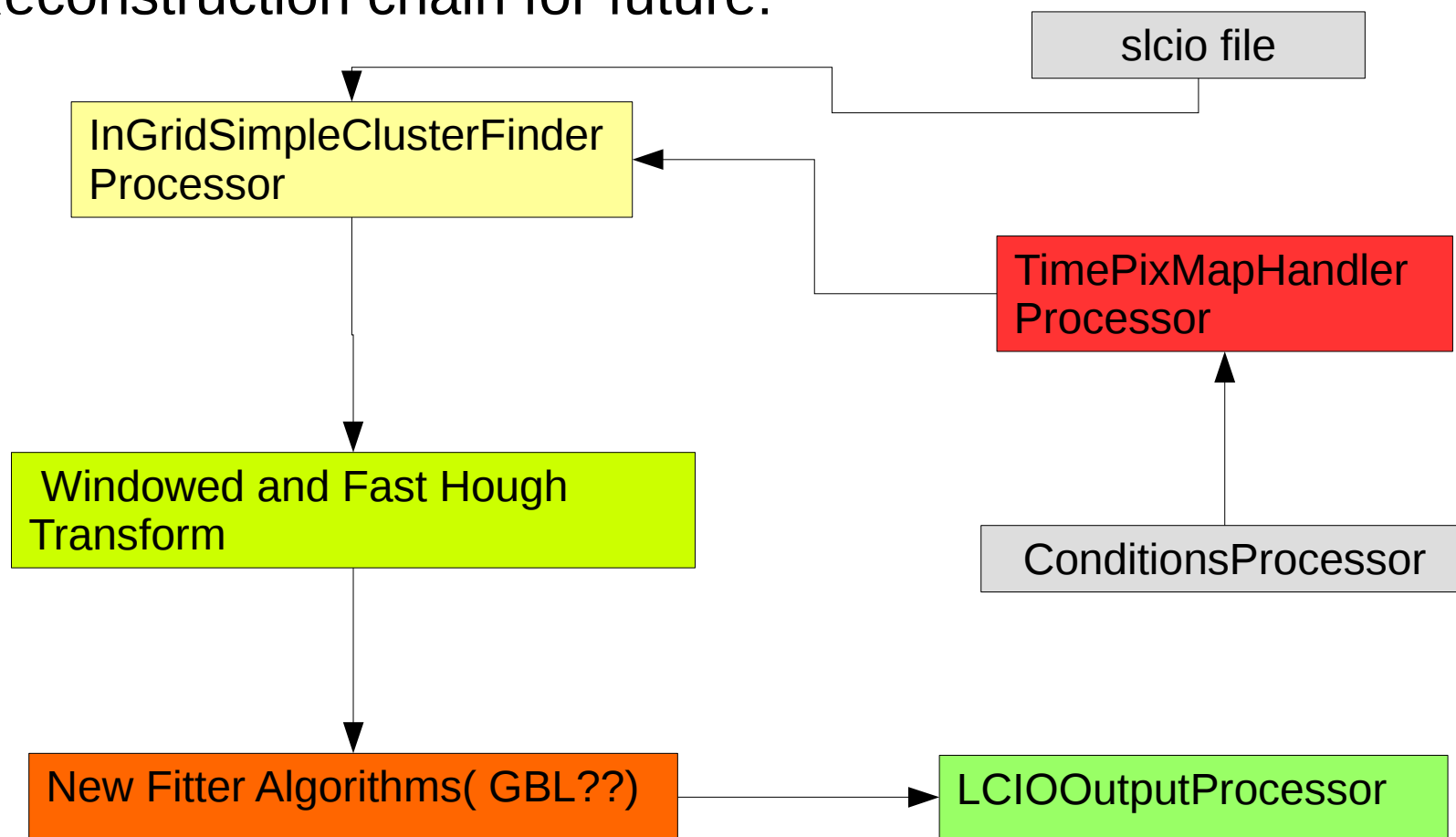
Result:

Standard Hough Transform	2.520000e+00 s in	160 events	==> 1.575000e-02 [s/evt.]
Windowed Hough transform	1.180000e+00 s in	160 events	==> 7.375000e-03 [s/evt.]
Fast Hough Transform	5.300000e-01 s in	160 events	==> 3.312500e-03 [s/evt.]



The chain of Track Reconstruction

2. Reconstruction chain for future:



Outlook:

- **comparing Fast Hough Transform , windowed Hough Transform and standard Hough Transform.**
- **Simulation of 96 chip Module for next testbeam experiment.**
- **Improving algorithms for finding and fitting processors based on the pixel.**

Reference:

- The Pixel TPC : Michael Lupberger, Bonn University, 29th April 2014, Linear Collider Forum.
- Processing Octoboard test beam: Andrii Chaus, DESY /CEA Saclay, 27th January 2014, TimePix Collaboration Meeting.
- A track finding method for a TPC based on fast Hough transformation,(LC-TOOL-2014-006): Claus Kleinwort, DESY, Germany, April 28, 2014.
- InGrid based TPC readout (Master thesis): Robert Menzen, Bonn University , September 2013.