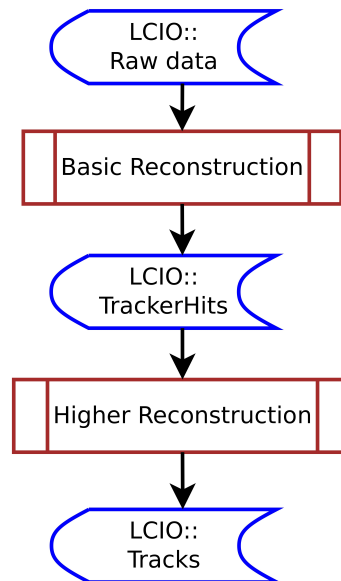


MarlinTPC status report

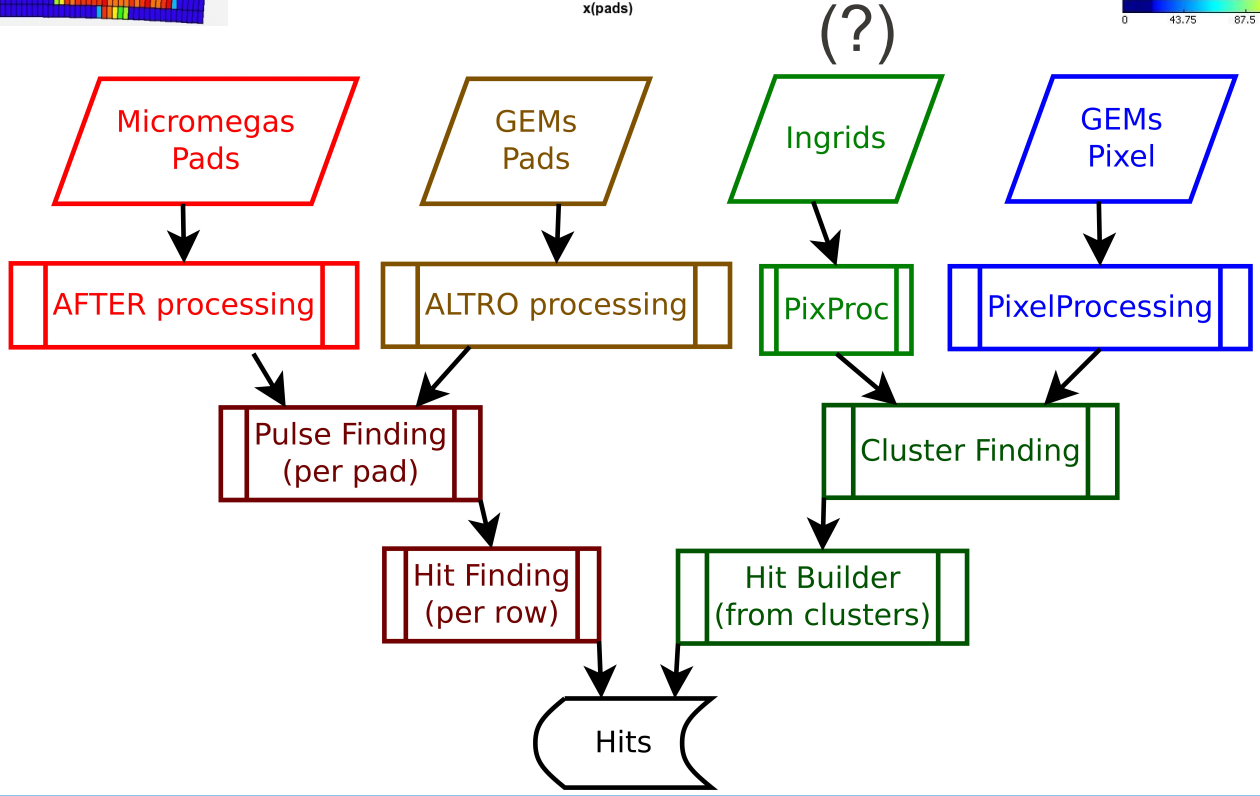
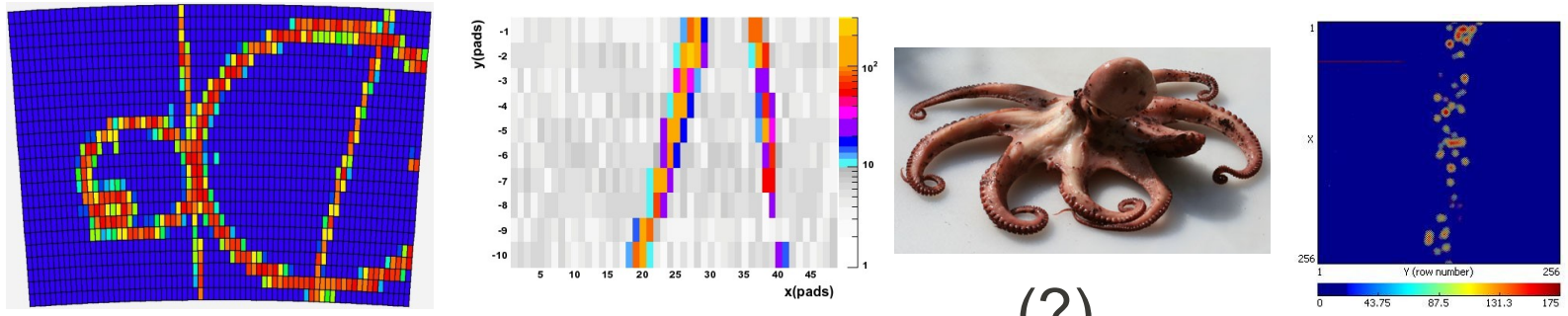
LCTPC Collaboration Meeting

March 26th 2012

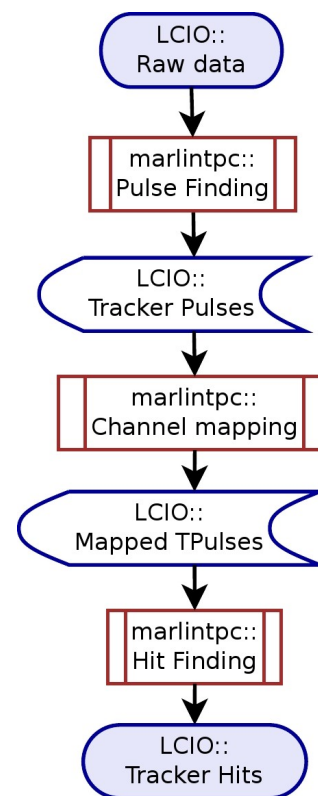
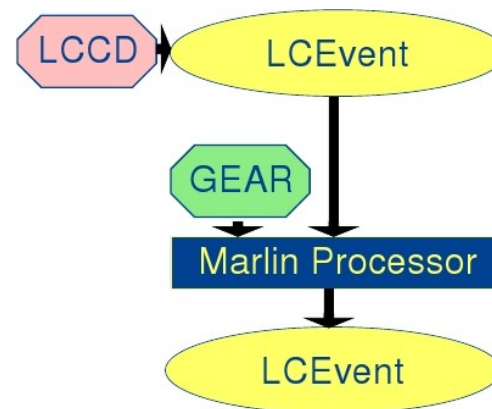
Ch. Rosemann, DESY



- Basic Reconstruction working up to hit level
(in principle for all module types)



- Short reminder: The Marlin Framework
 - Processors acting on events
 - Additional data stream (LCCD)
 - External Geometry description (GEAR)
- Example: pad based data
 - Pulse Finding (single channel data)
 - Hit Building (space point reconstruction)
 - Specific reconstruction for MicroMEGAs
- Similar for Pixel data:
 - Cluster Finding (from TOT/time measurement)
 - Hit Building (space points)

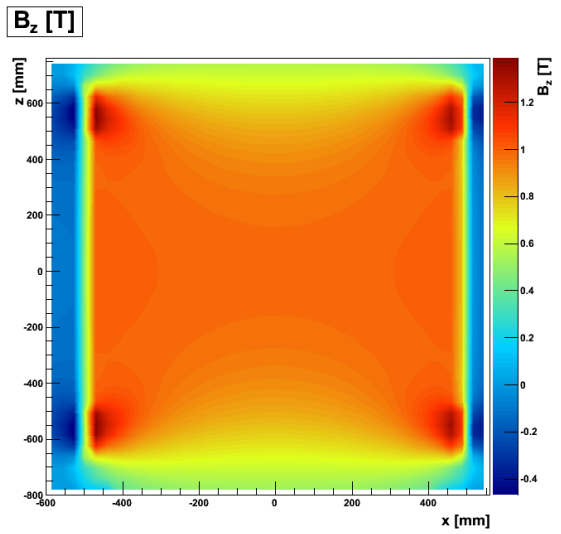
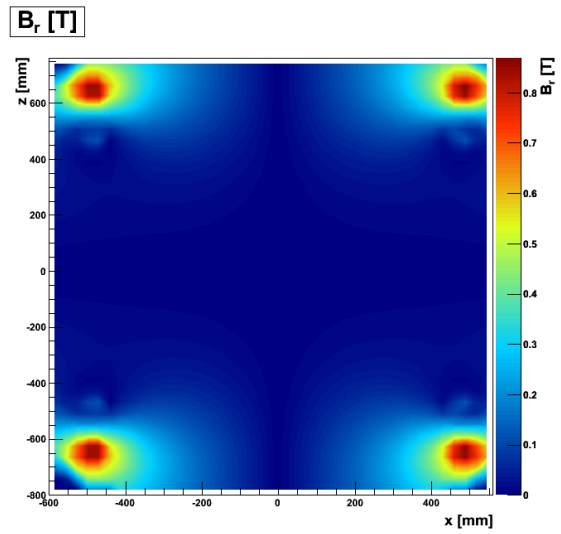
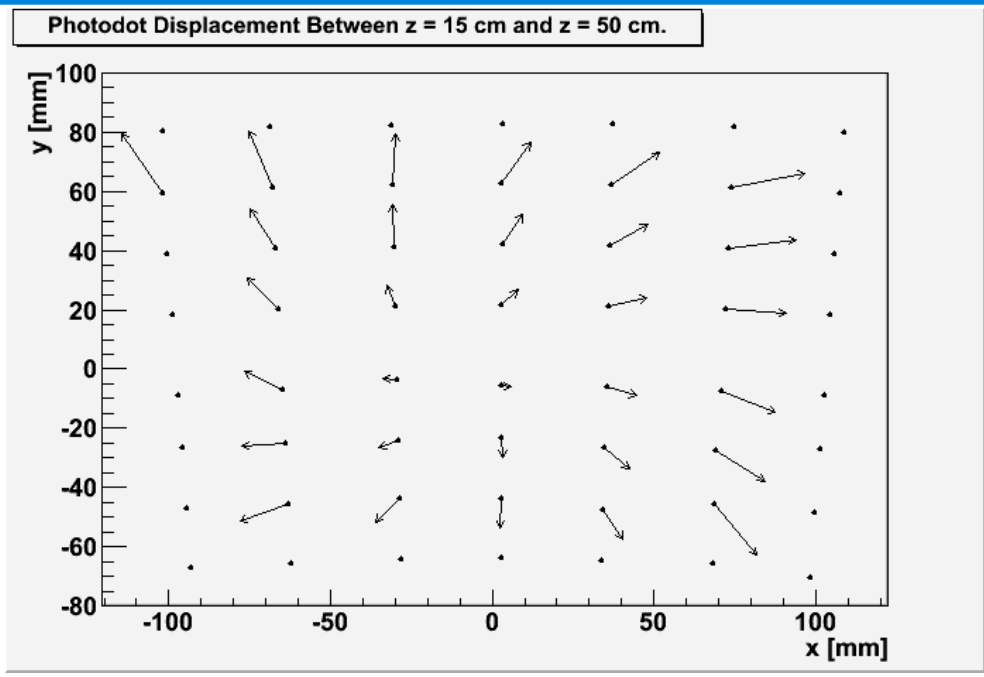


- Independent track finder packages available:
 - *PathFinder* (by Isa Heinze)
 - *Clupatra* (by Frank Gaede)
- KalmanFilter package available (KalTest/Det by Keisuke Fujii et al.)
 - *TrackFitterKalman* (only fitting, needs found track(s))
 - *TrackMakingKalmanFilter* (includes finding, by Li Bo)
 - Works for Asian GEM and MicroMEGAs module (but not yet for DESY module) – needs adjustment to specific geometry
- Additional track fitter in preparation:
 - GeneralBrokenLines* (by Claus Kleinwort), needs found track(s)
 - contains direct interface to Millipede-II (alignment and calibration)

- Code related:
 - Directory structure more organized
 - Improved build system: cmake setup and only single shared library
- Functionality:
 - Altro2LCIO conversion program moved into MarlinTPC
 - Revised and improved Conditions Data access:
 - Removed the “Handlers”, introduced “Listeners”
 - “Database” LCCD data is now default way of obtaining conditions data (manual override is still available, of course)
 - Extension/addition of more data objects
 - Centralized handling of **flagwords** in single header file
 - Lots of small (and great) improvements, bug fixing, cleaning up

- Initial steps are hard (dependency of ilcsoft)
 - Tutorials? Examples?
 - Help the wiki: <https://znwiki3.ifh.de/MarlinTPC/>
- Documentation is slowly growing, but it's a major effort
- Calibration tools are still largely missing and are highly complicated
 - mission critical item! (maybe see Li Bo's talk)
- Testbeam software: try not to duplicate efforts, what's still missing?
 - Live event display
 - Quick checking of reconstruction objects → standard reconstruction chain
 - Logbook
 - Standard logging of conditions data including conversion
 - Runlist

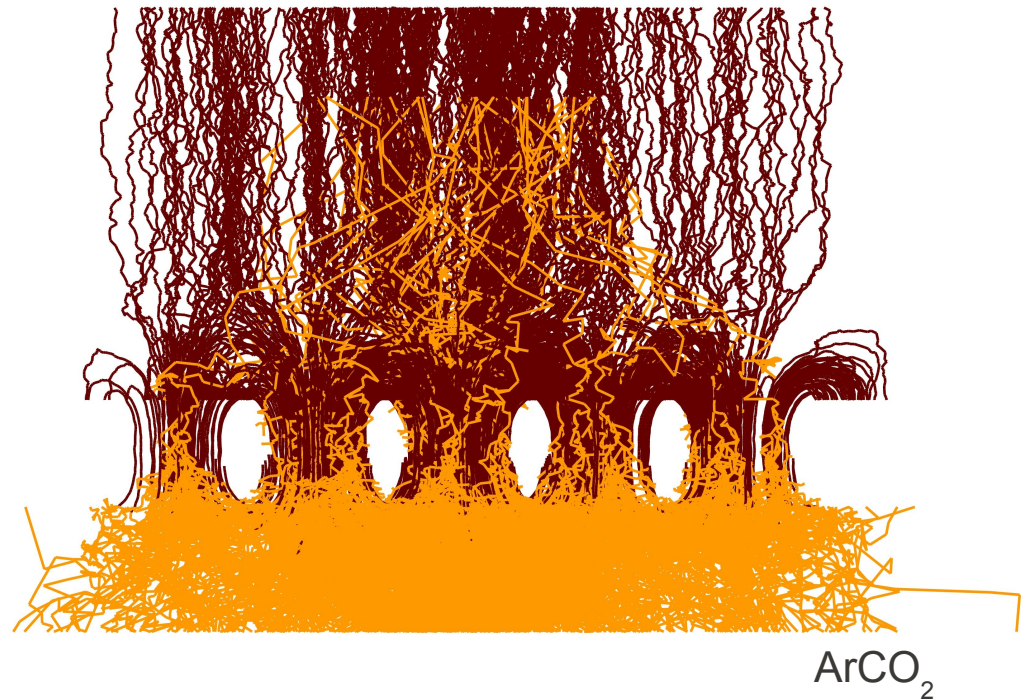
- Alignment
 - Measurements without B field
 - External reference system (?)
- Calibration
 - Crucial for resolution
 - ExB effects affects drift direction
 - Measurements with photodot system show large effects (Jason Abernathy)
 - Correction idea: use field maps to simulate/calculate offset map



- Documentation/example extension
- Data location table (with additional information) → enable free^[*] access for reconstruction and analysis of all taken data
 - LCIO data, GEAR and channel mapping (database) + steering files
 - **Impossible project without outside help**
- Errors and Error propagation from single channels to track parameters (together with all)
- Extension of simulation:
 - Very detailed simulation with Garfield++ (Klaus Zenker and ?)
(still unclear connection to MarlinTPC)

[* free within the collaboration]

- Possible candidate for detailed simulations in amplification region:
Garfield++ (Rob Veenhof & Heinrich Schindler, RD51)
- Needs to be extended by description of drift region and readout
- Needed input: electrostatic field maps (e.g. of a FEM program)



(some example pictures: single GEM, **orange**: electrons, **red**: ions)

Goals

- Standard reconstruction chain
 - Getting closer – but automation might be out of reach
- Critical items:
 - Alignment: **no progress in sight**
 - Calibration: **some effort going on (?)**
 - Documentation: **Help!**
- Crossover ability to reconstruct, analyze and compare data
 - Still impossible**