

# **Status of the Athena Software** **for the Combined HEC/EMEC Testbeam**

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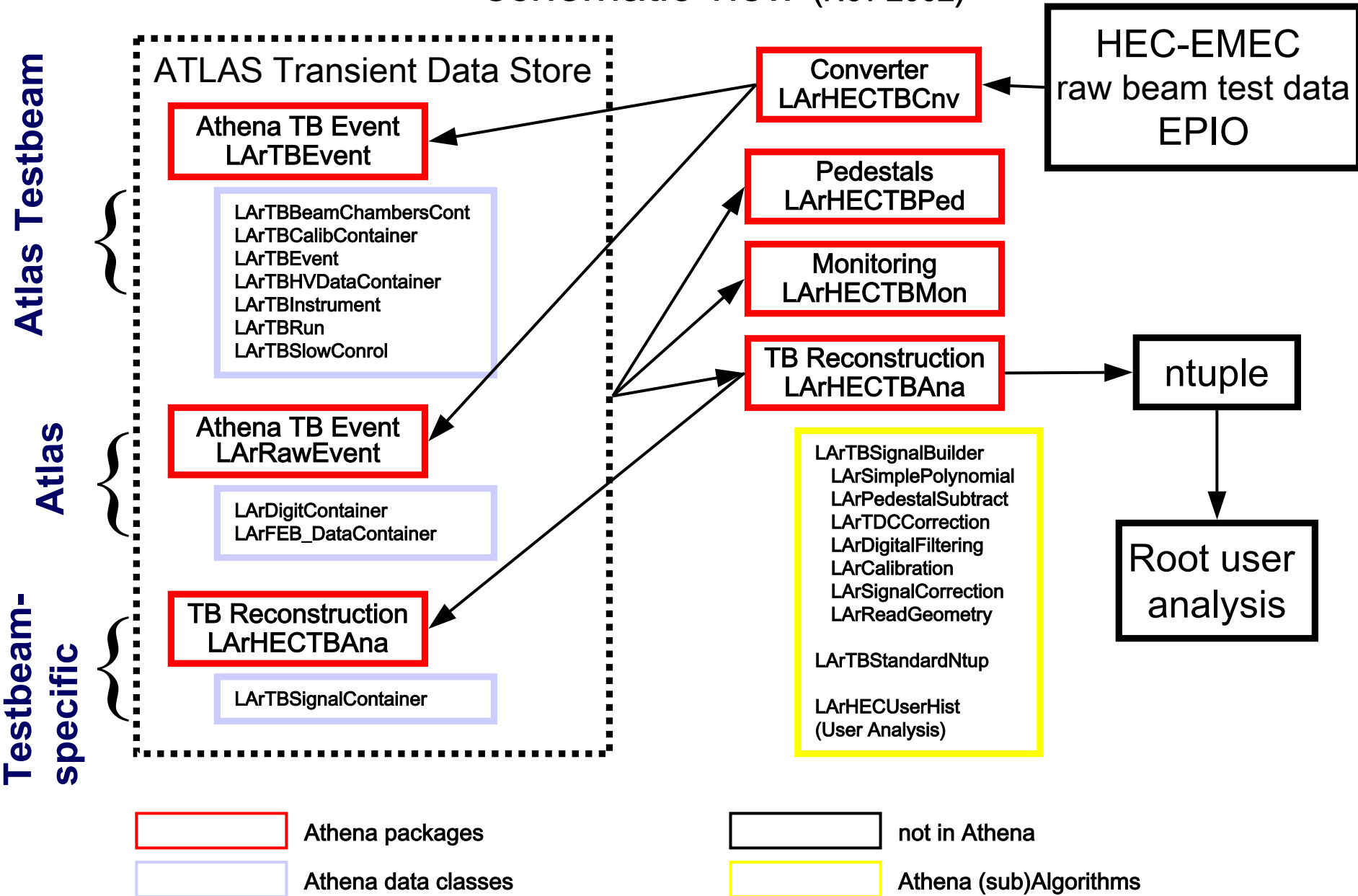
- **Combined HEC/EMEC testbeam data can be read and analyzed within the ATLAS Athena framework**
- **A “cookbook” gives an introduction for how to access the data in Athena**

# Athena Algorithms for Analyzing Combined HEC/EMEC Testbeam Data

- At present: **Use Athena version 4.0.0**
- It is maintained in the **hectbmon repository**.  
The development of this code is still under way.
- At the beginning of October code was committed to the ATLAS repository under version 4.4.0 - Do **NOT** use this version! It is for the software architecture development team only.

# HEC-EMEC Beam Test Software

schematic view (Nov 2002)



**LArTBSignalContainer contains Information**  
**that is specific to “our” testbeam :**

Information for every read-out cell (e.g. TDC time, geometry,...)

Pointers to all LArTBSignal information for each cell

Information that is the result of a  
LArHECTBAna/LArTBSignalBuilder subalgorithm  
(e.g.: net signal peak - height (in ADC or nA) and time)

... Look up the information available in **.h** files:

LArTBSignal.h   LArTBSignalContainer.h

# Example:

In LArTBSignal.h:

```
/** Get signal peak calculated by Polynomial  
    (unit=adc count, NO pedestal subtraction) */  
float get_CubicPeakADC() const { return m_CubicPeakADC; }
```

```
/** Get pedestal from PedPara */  
float get_pedestal() const  
    { return (m_PedPara != 0) ? m_PedPara->get_mean() : 0; }
```

In user program (this example: LArDigAna.cxx):

```
for (pSignal = pSignalBegin; pSignal != pSignalEnd; pSignal++) {  
    float cubsig = (*pSignal)->get_CubicPeakADC() - (*pSignal)->get_pedestal();  
}
```

## TB Reconstruction LArHECTBAna

LArTBSignalBuilder  
LArSimplePolynomial  
LArPedestalSubtract  
LArTDCCorrection  
LArDigitalFiltering  
LArCalibration  
LArSignalCorrection  
LArReadGeometry

LArTBStandardNtuple

LArTBExampleROOT  
LArHECUserHist

## Testbeam Analysis Package

Athena (Sub-)Algorithms for Analysis:

- Perform pedestal subtraction.
- Find signal peak with either cubic fit  
digital filtering.
- Find useful TDC timing (see talk by M. Lefebvre).
- Perform ADC  $\rightarrow$  nA calibration
- Obtain eta, phi and z index for any given cell number.
- Produce a standard Ntuple for HEC testbeam data taken before 2002.

Examples for how to create your own histograms.

(Your own User Analysis Algorithms)

# **HEC/EMEC Testbeam Athena Cookbook**

Find it on the web page for the  
EMEC+HEC 2002 Combined Run Information

**<http://emecheccombined.web.cern.ch/EmecHecCombined/>**

It gives in depth instructions on how to get started running Athena code to read the HEC/EMEC combined testbeam data.

1. How to set up your environment to access testbeam data under Athena version 4.0.0 (...from scratch).
2. Create a pedestal file.
3. Create a standard HEC Ntuple (this only works for data taken up to 2001 – so far there is no standard Ntuple for the combined testbeam of Aug./Sept. 2002).
4. Create your own Athena algorithm.
5. Access some of the raw data taken during the combined run.
6. Produce a ROOT Tree and read it.
7. Where to find information to proceed on your own.



## Technical talks and progress: see minutes of the HEC/FCAL combined test beam meeting

1. **Vincter:** Noise studies in EMEC/HEC
2. **Strizenec:** Status of Calibration
3. **McPherson:** EMEC filtering weights with FFT Algorithm
4. **Lefebvre:** Filtering weight synchronization and timing
5. **Menke:** EMEC and HEC timing
6. **Fincke-Keeler:** Status of beam test ATHENA software
7. **Kurchaninov:** HV correction from beam test data

## Open issues for the future

- Integration into production ATHENA
  - How far do we want to take this ?
  - Integration with other ATHENA packages ???

# Conclusions

Athena version 4.0.0 is available for reading data taken during the combined HEC/EMEC testbeam period in 2002.

Detailed instructions on how to get started using the Athena environment can be found in a “cookbook”.

Used for many studies reported at this LArg week.

Open question: integration into ATHENA?