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

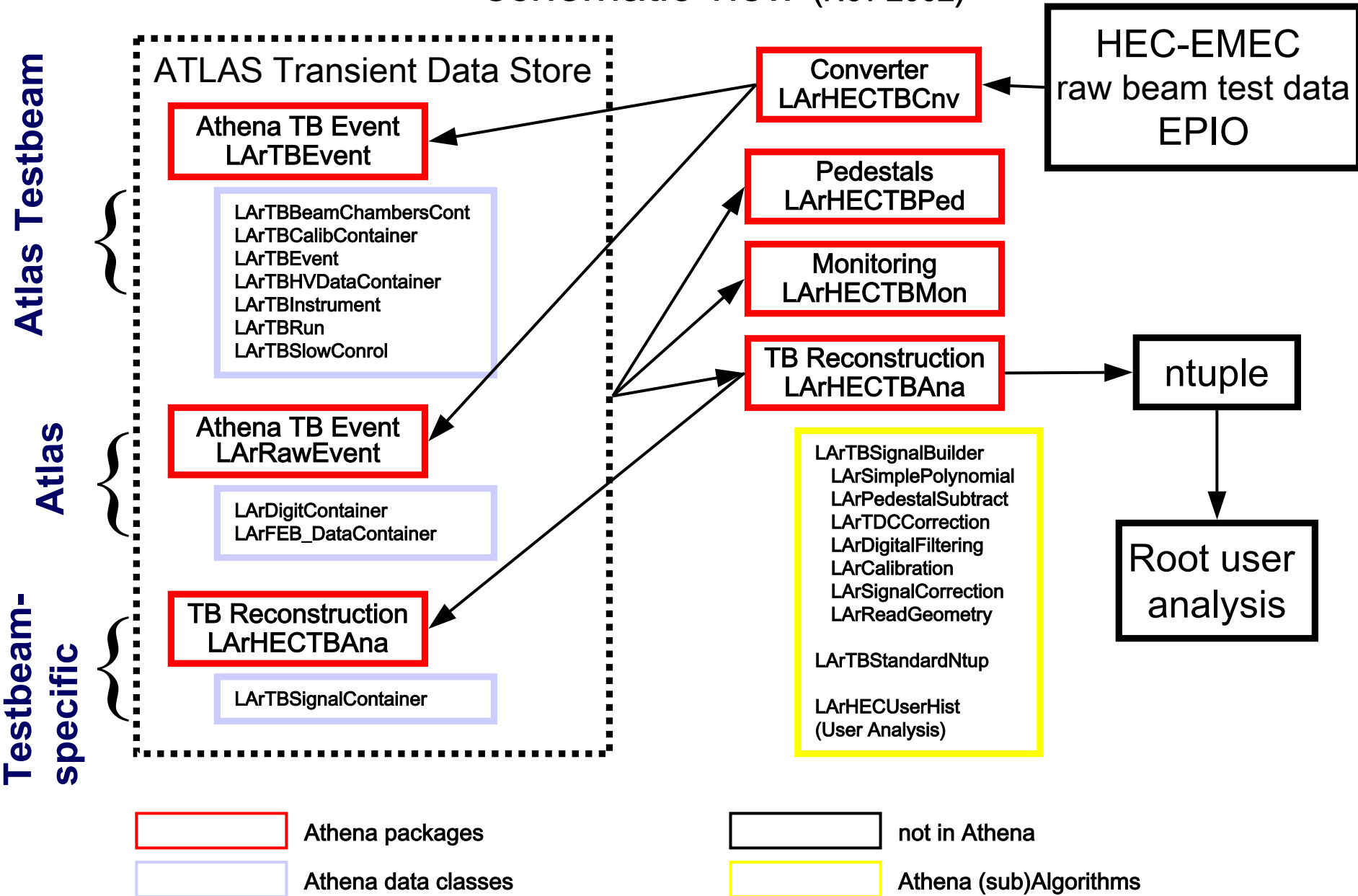Margret Fincke-Keeler   Univ. of Victoria   LArg Week   Nov.19, 2002

- **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)

Atlas Testbeam

Atlas

Testbeam-specific

ATLAS Transient Data Store

Athena TB Event LArTBEvent

LArTBBeamChambersCont
LArTBCalibContainer
LArTBEvent
LArTBHVDataContainer
LArTBInstrument
LArTBRun
LArTBSlowConrol

Athena TB Event LArRawEvent

LArDigitContainer
LArFEB_DataContainer

TB Reconstruction LArHECTBAna

LArTBSignalContainer

Converter LArHECTBCnv

HEC-EMEC raw beam test data EPIO

Pedestals LArHECTBPed

Monitoring LArHECTBMon

TB Reconstruction LArHECTBAna

ntuple

LArTBSignalBuilder
LArSimplePolynomial
LArPedestalSubtract
LArTDCCorrection
LArDigitalFiltering
LArCalibration
LArSignalCorrection
LArReadGeometry

LArTBStandardNtup

LArHECUserHist
(User Analysis)

Root user analysis

Athena packages	not in Athena
Athena data classes	Athena (sub)Algorithms

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

<u>Example:</u>

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();
}
```

Testbeam Analysis Package

TB Reconstruction LArHECTBAna

LArTBSignalBuilder
  LArSimplePolynomial
  LArPedestalSubtract
  LArTDCCorrection
  LArDigitalFiltering
  LArCalibration
  LArSignalCorrection
  LArReadGeometry

LArTBStandardNtup

LArTBExampleROOT
LArHECUserHist

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.

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".