

Status of the LAr OO Reconstruction

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LAr Reconstruction

- What exists now?
 - A well-tested FORTRAN based version in ATRECON (J. Schwindling)
 - This code has been documented to some extent
 - A first set of use-cases has been written and is being reworked
 - Work on an OO version of the reconstruction program has started.
- Who?
 - Arizona: P. Loch
 - Brookhaven: H. Ma, S. Rajagopalan
 - Saclay: J. Schwindling
 - Lot of interaction with other people
 - We also expect many more people to join in the effort.

LAr Reconstruction

- How?
 - Documentation of the existing Fortran based software
 - First pass of an OO design with P. Loch, H. Ma
 - Implementation of this design within the PASO framework
 - (Documentation, Tutorials on PASO by Candlin's available)
 - Establish an infrastructure for the LAr reconstruction that will easily allow us to implement, test and optimize the reconstruction algorithms
 - Most of the effort has gone here
 - Implement some basic clustering algorithm to test the structure
 - Implement an Analysis package for generating histograms
 - Our next step is to implement the features of the ATRECON algorithms

LAr OO Reconstruction

- What does it do?
 - Read events from GEANT3, based on TestEvent package by RD
 - Unpack and create LAr Cell Objects
 - Implement simple clustering algorithm: Generate LAr Clusters
 - Sum of cells in a cone of $\Delta\eta, \Delta\phi = 0.1 \times 0.1$ around the hottest cell
 - Apply sampling weights, No other calibration/corrections applied
 - Histogramming of Results (LArAnalysis package)
- What does it NOT do?
 - No interface to any geometry or calibration information
 - Clustering Algorithms have not been optimized. No corrections.
 - No user interface exists : Hence some of the run time parameters are temporarily hard wired in the code
 - But we are now in a position to start implementing some of these

Features Summarized

- The ability to plug in any Cell or Cluster Algorithms without effecting the structure or other users/developers of the code.
- The Cell (Cluster) Builder creates the Cell (Cluster) object which is 'managed' by a Cell (Cluster) Manager.
- The Clusters also maintain pointers to the cell objects that were used to create them.
- Separation of Data objects and Algorithm Objects:
 - The data objects are deleted and instantiated at the beginning of every Event : The LAr Manager is responsible for these.
 - The Algorithm Objects reside for the duration of the processing
- The LAr Analysis package has been implemented which shows how to build simple histograms.
- All these classes are expected to evolve as we continue to develop them.

Testing

- The code exists in a private area and has been tested on the Linux platforms at CERN and BNL.
- We hope it will be released soon into the repository as it will allow many people to access and work with the code.
- The code was tested on two samples of data:
 - A sample of single photon events (20 GeV) generated at fixed eta points
 - $H \rightarrow \gamma\gamma$ ($m_H = 100$ GeV) $\{E_T(\gamma) > 15$ GeV}
- We have not yet compared these results against the standard ATRECON since the emphasis has been to test the structure rather than the algorithm itself.

Conclusion

- Our next step is to implement more of the features from ATRECON including implementing the sliding window algorithm and the corrections.
- Setup testing methods to test the new code against ATRECON to ensure that results are same as we continue development.
- Pay closer attention to performance issues: memory usage and CPU.
- Establish external interfaces to have access to Detector Description parameters and Calibration constants. Some discussions with Stefan Simion has started in this area.
- Implement additional use-cases
- Try to have more people looking at the code -- including input to the design from OO experts.
- Collaborate with Tile Calorimeter.
- Documentation will be available soon for any users

Conclusion ..(2)

- We are all learning the new language and hence must not be surprised if we discover mistakes or implement poor design choices. It is trying that will make us better.
- Though the ATF has come out with its report, the A Team has yet to establish a design and implement a solution for the overall framework. This will have an impact on some of our design choices.
- Hence, the LAr reconstruction software - including the design choices that we make now may well have to change. We will continue to evolve as we learn more.