LArSoft - Task #14048

Milestone # 14047 (Closed): Data product review ("phase II")

Provide a uniform recommendation for physic vector data structures in LArSoft data products

10/04/2016 11:29 AM - Gianluca Petrillo

Status:	Closed	**Start date:**	10/04/2016
Priority:	Normal	**Due date:**	
Assignee:	Gianluca Petrillo	**% Done:**	100%
Category:	Architecture	**Estimated time:**	80.00 hours
Target version:	2017-1-quarter	**Spent time:**	64.00 hours

Description

LArSoft currently uses a wide number of representations for the same concepts of Euclidean 2D and 3D vectors.
The most popular one, TVector3 from ROOT, is feature-rich but affected by numerous design flaws. TLorentzVector also suffers from the same flaws (doubled).
Candidates have already been identified for a recommendation:

- ROOT vectors from GenVector library
- CLHEP vectors (CLHEP::Hep2Vector, Hep3Vector, HEPLorentzVector)

The purpose is to identify which is best suited for LArSoft use in data products.

Related issues:

Blocks LArSoft - Support #11257: recob::PCAxis uses nested vector to represen...	**Assigned**	**12/18/2015**

History

#1 - 10/04/2016 12:02 PM - Gianluca Petrillo

- Tracker changed from Feature to Task

#2 - 10/04/2016 02:16 PM - Gianluca Petrillo

- Blocks Support #11257: recob::PCAxis uses nested vector to represent 3x3 matrix added

#3 - 10/05/2016 02:55 PM - Gianluca Petrillo

Today a discussion with Kazuhiro Terao reminded me that a very desirable feature is to be able to use different base types for the representation of the coordinates.
This allows to halve the space of vectors when single precision is enough, which is typically the case for measured momenta.
CHHEP does *not* support this feature, while ROOT does.
This leaves us only one full-featured candidate.

#4 - 12/08/2016 11:12 AM - Katherine Lato

- % Done changed from 0 to 80

- Estimated time set to 80.00 h

#5 - 12/08/2016 11:15 AM - Gianluca Petrillo

- Status changed from Assigned to Work in progress

Tests with ROOT libraries (GenVector) is done.
I received the request to test also alternative libraries (Blaze, Eigen, Armadillo).

#6 - 08/02/2017 04:33 PM - Katherine Lato

- Due date deleted (11/15/2016)

#7 - 09/26/2017 05:28 PM - Gianluca Petrillo

- Status changed from Work in progress to Resolved

- % Done changed from 80 to 100

Physics vectors (2D, 3D and 4D) from ROOT GenVector library and matrices from ROOT SMatrix libraries have been adopted in the implementation of recob::Track and a tracking algorithm[1], and in some internals of LArSoft geometry description, with satisfactory results.

These are now offered as the recommended data structures to represent vector and linear algebra quantities.
Hints on the newly recommended structures are in LArSoft wiki page From ROOT vectors (TVector3) to ROOT GenVector.

[1] A new version of Kalman fitter by Giuseppe Cerati.

#8 - 10/11/2017 02:20 PM - Gianluca Petrillo

- Status changed from Resolved to Closed