TODO C++ Papas Code. July 2016

**Main.cpp**

Tidy up, make examples folder

Throw out several unused headers

Separate out into example(s)

Make it write results out to Pythia

Use command line arguments to feed in parameters (filename, initialevent, #No events)

Work out how to stop the display/run without  ctrl-C.

**Examples**

Document and test Mac and lxplus.

Make example use papas library rather than compiling all together

make example suitable for Nicolo to try out.

Make example close down properly at end (understand what to do with graphics window better)

**FCCSW Guidelines & Code Formatting**

Files which start with lower case letter are in the queue & need to be reformatted according to FCCSW guidelines

Several files contain more than one class and will need to be split into separate files

Rename class variables and functions where needed

Have just run a global reformat using FCCSW Clang format file through all code. Need to check for any glitches in this.

Address remaining code warnings

Revisit use of && in code and whether this is a good idea

Clear out debugging stuff and commented out section

**Commenting**

Commenting is very variable. Try CMS.h, detector.h, PFBlock for examples of more complete commenting

Reinstate Doxygen documentation again on Max

Add doxygen comments to header files which have not yet been done

Update existing comments which are outdated.

**Makefiles**

Embarrassingly horrible at present. Completely Revamp the CMakefiles using PODIO make file as example.

Figure out how to get DYLD\_LIBRARY\_PATH properly sorted for Mac - need advise.

Make the Makefiles use package structure more formally

Take advice about how to separate out library, examples etc

Looks like am building library twice (slow).

**Package Structure**

Review package structure as some parts are not quite right. PFEventdisplay may need to be moved.

Change Makefile and Headers to match the finalised package structure eg “datatypes/Cluster.h” not “Cluster.h"

**Top-level-structure**

Still needs work on where everything should “live”  & ownership. This needs to take into account Python calls and future use in Gaudi. Its not quite right as yet.

PfEvent, PapasManager, Simulator and Reconstructor all own some key parts and some jiggling is needed, esp for  where C++ is to be used as a library.

Still not sure about Path and how it is used.

**C++ library:**

Tidy the selections.xml file.

Add suitable additional functions & remove redundant ones

**Timings/Profiling**

Timings on linux

Time pythia on Mac

Profiling and memory leaks

**History:** make a  class to provide user friendly front end

**Display**: display reconstucted particles somehow

        Revisit the display code and have more concrete objects and less shared\_ptrs

investigate oddities that have observed and understand what is happening (occurs Python and C++)

Check the other viewpanes

make map of views use enum not string

**Logging etc**

Add in error handling

Implement logging messages. Logging structure is available but not used except for PDebug which handles the physics debug output).

Separate out PDebug from Logging. Make PDebug more configurable.

**Bug fix**

There is a bug somewhere that comes into play when I use the papasmamanger.clear( ). Needs careful investigation.

**Unit testing**

Probably convert to Catch (check)

Implement the rest of the python tests

Sort out where to store the tests and set up a separate test build

Gtest is not working on lxplus and has been commented out of cmake for now.

**Physics**

Check with Colin about smeared electrons and muons and their duplicate particles in python

Take a look at some of the particle reconstructions to understand differences relative to raw particles.

**Python matching**

Adjust particles in Python to match latest C++ modifications and get matching working once more

Add sorting routine to reinstate matching with Python

**Others**

Attend to TODOs and comments in the existing code

Add in new Id for simulated particle

Header file for constants

Work on sorting

Consider making helper classes for outputs??

remove attempts to reserve for vectors (Stroustrup says its not worthwhile)

Revisit edges, distance, blocks and recheck ownership

Issue with naming of Track.h and ParticleData.h and clashing with PODIO header files. Adjusted names for time being to allow compilation. Need advice!