LArSoft Steering Group Meeting Notes

Attendees: Adam Lyon, Angela Fava, Steven Gardiner, Tingjun Yang, Erica Snider, Katherine Lato

This meeting is to approve the work plan for the next calendar year which is available at: https://indico.fnal.gov/event/56868/attachments/162185/214284/2023%20LArSoft%20Work%20Plan.pdf We obtained approval of those at the meeting. **If anyone has any objections to approving the work plan for 2023, please let us know by December 19th.** Thank you.

Base priorities haven't changed from last year, with the main focus being on modernizing the LArSoft code base. LArSoft will continue to put in a lot of work to ensure the code is thread-safe and able to run in a multi-threaded mode, which is needed to better utilize our currently available resources. Increasingly, we will work toward enabling or simplifying running LArSoft on various high performance computing (HPC) platforms. GPUs in particular are well suited to accelerating calculations that have become CPU bottlenecks for the SBN and DUNE programs, such as signal processing of raw data, and photon transport within LArTPCs. In support of this area of work, we will be organizing a multi-threading workshop early in 2023. One of the topics will include addressing photon transport with GPUs within LArSoft.

Another area of code modernization involves the tools we use to build programs from source. The existing systems are based on infrastructure code written about 30 years ago by Fermilab. The new system is based on community-supported software that is used extensively in industry and the HPC community. This item has been in progress for several years now, but has reached important milestones within the past six months. We hope that the project will reach completion early in the coming year.

A final area of code modernization is supporting the continued migration from the legacy simulation framework to the new framework. The SBN experiments are nearly finished, while DUNE is in a hybrid state.

Support for pixel detectors, and more generally for LArTPCs with arbitrary readout systems, has been a goal of the project for several years. The development of a new simulation framework several years ago was a major step in achieving this goal, leaving only the geometry system within LArSoft. The project has made significant progress over the past few months in realizing a re-designed geometry system that will support arbitrary readout geometries in general, and pixel detectors in particular. We expect this effort to be completed early in 2023.

There has been a long-standing need to simplify the support for neutrino generators other than GENIE, so recent work plans have included an item to pursue this, starting with decoupling the version of GENIE that can be run within any given version of LArSoft. That work then creates a model for integrating other generators into LArSoft, with NuWro and ACHILLES being the first major targets. We completed a plan for this work last year, but have not had the developer effort needed to implement it. The project plans to complete this as soon as effort is available.

One new addition to the work plan this year is an item directed at a renewed effort to support a LArSoft event display. The legacy display, while still useful, has become difficult to maintain, while other community developed displays are usually directed toward highly specific tasks and lack support for LArSoft integration. The project will need additional effort in order to work on this goal.

Maintaining the documentation will remain an important task in the coming year.

We should note that some of the work discussed above cannot be completed with the current level of effort within the project team. Work to simplify running LArSoft on HPC resources, for instance, has repeatedly been deferred due to limited effort. There is now a renewed interest from management in expanding the effort available to work on LArSoft, which we hope will enable the project team to address all of the priority items in the work plan.

Finally, people should take note of Appendix B in the work plan. This section includes summaries from the individual discussions with the experiment offline teams that were used to inform the current plan, so is a good reference for understanding the content of the plan.

Please let us know if you have any questions or comments!

Erica and Katherine