Contribution ID: **1** Type: **Short Talk**

Investigating Portable Heterogeneous Solutions with Fast Calorimeter Simulation

Tuesday 24 November 2020 18:36 (10 minutes)

Physicists at the Large Hadron Collider (LHC), near Geneva, Switzerland, are preparing their experiments for the high luminosity (HL) era of proton-proton collision data-taking. In addition to detector hardware research and development for upgrades necessary to cope with the more than two-fold increase in instantaneous luminosity, physicists are investigating potential heterogeneous computing solutions to address CPU limitations that could be detrimental to an otherwise successful physics program.

At the dawn of supercomputers employing a wide range of architectures and specifications, it is crucial that experiments' software be much as possible abstracted away from the underlying hardware implementation in order to utilize the vast array of these machines. New developments in application programming interfaces (APIs) aim to be architecture-independent, providing the ability to write single-source codes that can be compiled for virtually any hardware. In this talk, we present the details of our work on a cross-platform software prototyping with Kokkos, a single source, performant parallel C++ API that provides hardware backends for wide range of parallel architectures, including NVIDIA, AMD, Intel, OpenMP and pThreads, and SYCL, an abstraction layer whose specification is defined by the Khronos Group and members from industry-leading entities such as Intel. Using ATLAS's new fast calorimeter simulations codes, FastCaloSim, as a testbed, we evaluate Kokkos and SYCL in terms of its heterogeneity and its performance with respect to other parallel computing APIs.

Primary author: PASCUZZI, Vincent (Lawrence Berkeley National Lab. (US))

Co-author: Dr LEGGETT, Charles (Lawrence Berkeley National Lab (US))

Presenters: PASCUZZI, Vincent (Lawrence Berkeley National Lab. (US)); Dr LEGGETT, Charles (Lawrence Berkeley National Lab (US))

Session Classification: Software