

# Porting the CMS pixel reconstruction to Julia: final results

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The Patatrack pixel track reconstruction is a stand-alone project originally extracted from the CMS reconstruction software, and has long served as a testing ground for evaluating heterogeneous computing frameworks such as OpenMP, TBB, CUDA, HIP, SYCL, Kokkos, and Alpaka.

To assess the Julia programming language within a realistic High Energy Physics software context, the full Patatrack pixel track reconstruction has now been successfully rewritten in Julia. As of this year, 100% of the serial C++ code has been ported, validated, and is now operational using both Ahead-of-Time (AOT) and Just-In-Time (JIT) compilation.

The Julia implementation is also being integrated into the official Patatrack standalone application. Runtime and memory optimizations are ongoing and expected to be finalized shortly. In parallel, the Julia port of the GPU framework and its initial modules is underway in preparation for multi-threaded and heterogeneous computing evaluations.

This contribution will provide an updated overview of the project, report on the completion of the serial port and automation infrastructure, discuss the optimization strategies adopted, and highlight the ongoing efforts toward GPU support using Julia.

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