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Code Modernization of VPIC[1] ROBERT BIRD, DAVID NYSTROM, BRIAN ALBRIGHT, Los Alamos National Laboratory — The ability of scientific simulations to effectively deliver performant computation is increasingly being challenged by successive generations of high-performance computing architectures. Code development to support efficient computation on these modern architectures is both expensive, and highly complex; if it is approached without due care, it may also not be directly transferable between subsequent hardware generations. Previous works have discussed techniques to support the process of adapting a legacy code for modern hardware generations, but despite the breakthroughs in the areas of mini-app development, portable-performance, and cache oblivious algorithms the problem still remains largely unsolved. In this work we demonstrate how a focus on platform agnostic modern code-development can be applied to Particle-in-Cell (PIC) simulations to facilitate effective scientific delivery. This work builds directly on our previous work optimizing VPIC, in which we replaced intrinsic based vectorisation with compile generated auto-vectorization to improve the performance and portability of VPIC. In this work we present the use of a specialized SIMD queue for processing some particle operations, and also preview a GPU capable OpenMP variant of VPIC. Finally we include a lessons learnt s

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