

OSS17-2017-000024

Abstract for an Invited Paper
for the OSS17 Meeting of
the American Physical Society

How might Physics Education Research facilitate the coming computational revolution?¹

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Computation has revolutionized how modern science is done. Modern scientists use computational techniques to reduce mountains of data, to simulate impossible experiments, and to develop intuition about the behavior of complex systems. Much of the research completed by modern scientists would be impossible without the use of computation. And yet, while computation is a crucial tool of practicing scientists, most modern science curricula do not reflect its importance and utility. In this talk, I will discuss the urgent need to construct such curricula in physics and present research that investigates the challenges at a variety of all scales – from the largest (institutional structures) to the smallest (student understanding of a concept). I will discuss how the results of this research can be leveraged to facilitate the computational revolution. This research will help us understand and develop institutional/departmental incentives, effective teaching practices, evidence-based course activities, and valid assessment tools.

¹The work has been supported by the National Science Foundation Division of Undergraduate Education