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NSF Support for Physics at the Undergraduate Level: A View from Inside¹

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NSF has supported a wide range of projects in physics that involve undergraduate students. These projects include NSF research grants in which undergraduates participate; Research Experiences for Undergraduates (REU) centers and supplements; and education grants that range from upper-division labs that may include research, to curriculum development for upper- and lower-level courses and labs, to courses for non-majors, to Physics Education Research (PER). The NSF Divisions of Physics, Materials Research, and Astronomy provide most of the disciplinary research support, with some from other parts of NSF. I recently retired as the permanent physicist in NSF's Division of Undergraduate Education (DUE), which supports the education grants. I was responsible for a majority of DUE's physics grants and was involved with others overseen by a series of physics rotators. There I worked in programs entitled Instrumentation and Laboratory Improvement (ILI); Course and Curriculum Development (CCD); Course, Curriculum, and Laboratory Improvement (CCLI); Transforming Undergraduate STEM Education (TUES); and Improving Undergraduate STEM Education (IUSE). NSF support has enabled physics Principal Investigators to change and improve substantially the way physics is taught and the way students learn physics. The most important changes are increased undergraduate participation in physics research; more teaching using interactive engagement methods in classes; and growth of PER as a legitimate field of physics research as well as outcomes from PER that guide physics teaching. In turn these have led, along with other factors, to students who are better-prepared for graduate school and work, and to increases in the number of undergraduate physics majors. In addition, students in disciplines that physics directly supports, notably engineering and chemistry, and increasingly biology, are better and more broadly prepared to use their physics education in these fields. I will describe NSF support for undergraduate physics with both statistics and examples. In addition I will talk about trends in support for undergraduate physics at NSF and speculate about directions such support might go.

¹Contents of this paper reflect the opinions of the author and do not necessarily reflect those of the National Science Foundation