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Prize for a Faculty Member for Research in an Undergraduate Institution Lecture: Research (Teaching) with Bose-Einstein Condensates[1]

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Bose-Einstein condensation in dilute gases, with its myriad ramifications in fields as diverse as atomic, condensed-matter, cosmological, fluid, quantum, and statistical physics, offers unique possibilities for the synthesis of research and pedagogy. The highly visual nature of the experiments can make Bose-Einstein condensates a particularly compelling teaching instrument, particularly for those encountering these topics for the first time. The associated technological challenges provide copious opportunities for development of fundamental research skills while retaining the intimate context of tabletop research. Our program at Amherst College pursues studies of multicomponent condensates, tunable ultracold collisions (i.e., Feshbach resonances), and topological defects (e.g., vortices). In this talk I will describe our experimental efforts in these three principal directions, taken singly and in combination, with a nod to the peculiarities and opportunities inherent to an essentially undergraduate research program.

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