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Preparing teachers for the challenges of physics education in the 21st century: Turning K-20 students into collaborative participants in the practice of physics
EUGENIA ETKINA, Rutgers University

Scientists, and especially physicists, have their own, unique ways of developing new knowledge, solving new problems, and communicating about what they do. These form a set of cultural norms, practices, and products that we call physics. Can students become enculturated into physics in a one-year introductory course, or does doing physics remain the exclusive purview of professionals who have acquired their skills through years of training? Development of the Next Generation Science Standards and revisions to AP courses suggest that these aspects of physics (and other sciences) are as valuable as the final product of scientific labor—concepts and mathematical representations that traditionally have been the sole focus of science courses. Science practices are the central elements of all these innovations. How do we prepare physics teachers who can help their students develop these physics-specific practices? In my talk I will describe Investigative Science Learning Environment (ISLE) - an instructional philosophy that not only allows us to make these practices a centerpiece of learning physics without losing conceptual and mathematical focus but can also serve as a framework for teacher preparation.