

## **Bethany R. Wilcox (UC Boulder)**

Title: Measuring student learning in physics: When, where, and how

Abstract: One of the key challenges to physics education is the fact that the thing physics education aims to improve - students' understanding of physics - is inherently difficult to measure. How do we determine what an individual student knows? How do we measure what they can do with that knowledge? How do we measure what a group of students know or what they can do with that knowledge? How do we use information on student understanding (as individuals or groups) to improve our instruction so that our students learn more? All of these questions touch on the issue of how, when, and where we try to produce measures of students' understanding, as well as what we do with those measures. Moreover, in answering each of these questions, we might well arrive at inherently conflicting approaches (e.g., if my goal is to measure an individual student, I would suggest very different approaches than if my goal is to measure a group of students). In this talk, I will discuss: some of the key goals, challenges, and approaches that have been used within physics education research to address these questions; the inherent tensions between them; and examples of key insights that have been produced through careful assessment of student learning.

Bio: Bethany Wilcox is a member of the Physics Education Research group. Her research interests include understanding and addressing students' difficulties utilizing sophisticated mathematical tools and techniques in the context of physics problem solving. In addition to investigating students' difficulties in the context of a single course, she is also interested in understanding how these difficulties change longitudinally as students advance through the curriculum and encounter these mathematical tools in multiple contexts. She is also interested in the development of research-based and validated assessments of student learning that can be used to measure the impact of curricular changes or compare student learning across courses and institutions. In particular, she is utilizing advanced testing theories to explore viable options for creating modular assessments that can address variations in content coverage in across courses.