

Abstract for an Invited Paper  
for the APR06 Meeting of  
The American Physical Society

**Research-based modifications to traditional introductory laboratories<sup>1</sup>**

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We are developing a set of laboratories based on research into student understanding of various topics in introductory mechanics. While intended for students in the algebra-based introductory course, many of these labs will also be suitable for students in calculus-based courses. To facilitate adoption, where possible we are using equipment that is commonly used in traditional introductory labs. We have found that in many cases, student difficulties with underlying concepts call into question the assumptions underlying the design of standard labs. These difficulties hinder student understanding of the intended purpose and results. We will give examples of these difficulties, of the exercises we have developed intended to address them, and of preliminary assessments of student performance. In addition, we describe some preliminary research into some differences between students in the algebra- and calculus-based courses, and the instructional implications of these differences. In collaboration with Luanna Ortiz, Arizona State University, and Michael Loverude, California State University Fullerton.

<sup>1</sup>Supported by NSF grants DUE-0341333, DUE-0341289, and DUE-0341350