School of Physical Sciences, DCU, Seminar Series

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Thursday 26th June 2014 at 15:30 in Room HG05

Examining student understanding of operational-amplifier circuits in upper-division physics courses on analogue electronics*

Abstract:

While there are many important goals of laboratory instruction, particularly in upper-division courses, relatively little work has been done to assess the impact of such courses on students. As part of an ongoing empirical investigation of student learning in upper-division laboratory courses on analogue electronics, we have been examining the extent to which students enrolled in these courses develop a robust conceptual understanding of operational-amplifier (or op-amp) circuits. The findings from written questions and interviews indicate that many students leave such courses without developing a functional understanding of the behavior of basic op-amp circuits. In this talk, I will describe the most prevalent conceptual and reasoning difficulties identified (after lecture and hands-on laboratory experience) and discuss some of the implications of our findings for electronics instruction.

MacKenzie R. Stetzer has been deeply involved in developing research-based and research-validated instructional materials for undergraduates and K-12 teachers since 2001, when he began working with the Physics Education Group at the University of Washington as a Postdoctoral Research associate and then later as a Research Assistant Professor. He is currently an Assistant Professor of Physics at the University of Maine. Over the past few years, a primary focus of his work has been an in-depth, multi-institutional investigation of student understanding of analog electronics, primarily in the context of upper-division laboratory courses on the topic. He is also leading the collaborative development of research-based instructional materials for use in these courses. Other areas of research interest include student understanding of waves and physical optics as well as the development of methods to assess and promote student metacognition in physics.