"Measuring More than Physics Content Understanding"

Dr. Brianna Santangelo

North Dakota State University

One of the goals of physics instruction is to help students improve their reasoning. Researchers in cognitive psychology identified a number of factors necessary for productive reasoning, including the presence of relevant content understanding (i.e., mindware), and the ability to identify and apply appropriate reasoning strategies. We built on these findings and results from prior physics education research to develop a multi-tier assessment instrument designed to disentangle and measure student content understanding and reasoning skills. In this talk, I discuss how we use the Dual-process Theories of Reasoning as our theoretical framework and describe the screening-target methodology, together with other qualitative and quantitative methods, used for item development and evaluation. Results from student written work, interviews, and instrument testing data will be presented. I will also discuss implications for instruction and future work.

Thursday, February 2, 2023
4:00 – 5:20PM
MND1015
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