Session A01: PER: Problem Solving

Location: Bronze 1 **Sponsor:** AAPT
Time: 2–3 p.m. **Date:** Saturday, Jan. 17 **Moderator:** Sarah McKagan

(2–2:12 pm): What makes a physics problem hard? Research on problem difficulty

Presenting Author: David E. Meltzer, Arizona State Univ At the Polytechnic Campus

Physics problems that are intended to assess students' understanding of specific concepts can, from the students' standpoint, vary greatly in difficulty even in cases where an expert might see little difference. Although it may be obvious that longer problems with additional contextual features or which test multiple concepts will be harder, research has shown that there are numerous more subtle cases in which minor changes in problem properties can strongly impact students' correct-response rate. As examples, I will present data reflecting large differences in problem difficulty associated with use of symbols, minor changes in diagrams or in wording, multiplicity of relevant variables, inclusion of irrelevant information, need for spatial reasoning, dependence on subtle assumptions or terminology, use of quantities with different defining equations in different contexts, and reliance on unfamiliar or infrequently practiced mathematical skills.