NWS19-2019-000021

Abstract for an Invited Paper for the NWS19 Meeting of the American Physical Society

## **PIQL: A new assessment of mathematical reasoning development in physics instruction**<sup>1</sup> SUZANNE WHITE BRAHMIA, University of Washington

In today's global and technological society, facility with understanding quantitative situations is essential. Taking a physics course should improve one's *quantitative literacy*. Physics Quantitative Literacy (PQL), i.e. effective quantitative reasoning about the physical world, is a desirable learning outcome of physics courses for all students, regardless of major. Yet, there is no validated instrument for assessing to what extent physics courses actually develop PQL. In this talk I will present the PIQL, Physics Inventory of Quantitative Literacy, which is under development and targets introductory physics - where the "math world" and "physical world" meet. Unlike *concept* inventories, which assess conceptual mastery of specific physics ideas, PIQL is a *reasoning* inventory that can provide snapshots of student ideas that are continuously developing. Item distractors are constructed based on the different established natures of the mathematical objects in physics contexts (e.g. the negative sign as a descriptor of charge type and the negative sign as indicator of opposition in Hooke's law). I will show how PIQL can help researchers better understand the development of mathematical reasoning, and how it can help instructors better assess the development of PQL in their courses.

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<sup>1</sup>This work is supported by the National Science Foundation DUE-IUSE 1832836, 1832880, and 1833050