

# Improving Student Understanding of Physics Through Research

Physical intuition is an elusive state, hard to instill, harder to explain, and crucial in providing insight into problems. Learning quantum mechanics can be especially challenging, in part due to the non-intuitive nature of the subject matter. I will describe the role that physical intuition plays in teaching and learning of physics at all levels. In select cases it is possible to find test cases--introductory problems--that are equally challenging (at first) for both introductory students and experts. The study provides insight into the nature of intuition and its connection to expertise. We have also been conducting investigations of the difficulties that students have in learning quantum mechanics. We find that the patterns of reasoning difficulties in learning quantum mechanics are often universal similar to the universal nature of reasoning difficulties found in introductory physics. Moreover, students often fail to monitor their learning while learning quantum mechanics. To help improve student understanding of quantum concepts, we are developing quantum interactive learning tutorials (QILTs) as well as tools for peer-instruction. The goal of QILTs and peer-instruction tools is to actively engage students in the learning process and to help them build links between the formalism and the conceptual aspects of quantum physics without compromising the technical content.



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Hayes Hall 211/213

*Lunch will be served from 11:50 am to 12:10 pm.*

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