SYMPAB - (16151) - STUDENT CONCEPTIONS OF THE ELECTRON AFTER A GUIDED INQUIRY-BASED LESSON USING A COMPUTER SIMULATION

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Short Abstract

The use of computer simulations in Quantum Physics (QP) education is frequent and recommended by researchers. However, little is known about how such simulations influence students' conceptions and depictions of quantum entities. This study conducts a preliminary analysis of students' conceptions about the electron during a guided inquiry-based lesson about the wave-particle duality. 84 Dutch upper-secondary students from four different classrooms participated in this study. Data collection was done through the online platform in which the lesson is embedded and consisted of open-ended questions posed throughout the lesson. Analysis was done by coding the answers and analyzing the different levels of quantum or classical thinking they pertained to. The classical idea of electrons as deterministic particles was present in students' answers on the questions throughout the whole lesson even after students investigated the phenomenon of multiple-electron interference with the simulation. Nonetheless, quantum ideas such as the depiction of the probability distribution in the single-electron interference simulation were present at the end of the lesson. Overall, our study not only underlines the educational potential of simulations for QP teaching, but also highlights the need to improve such simulations so as to facilitate the transition from classical to quantum thinking.