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Title:

Pursuing the reasoning resources about quantum physics accessible at pre-university level

Abstract:

Quantum physics has historically been discussed through several different lenses and models. From the old theory of quanta, characterized by atomic energy levels, the photoelectric effect and sometimes Compton scattering and black body radiation, through the Schrödinger equation and the wave function, all the way up to quantum field theory. With the advent of quantum technologies, spotlighted by large multi-stakeholder projects in the later years, two state systems came into prominence and more engineering-oriented approaches started to emerge. In such a vast landscape, various initiatives wondered what would be the fundamental concepts that a secondary-level, generally educated citizen should know in order to be able to navigate in the quantum world. The consensus so far achieved among various stakeholders identifies a small number of fundamental concepts, such as quantization, indeterminism, complementarity, superposition and the effect of measurement. In the talk, I will present a research-based approach to teaching quantum physics in high school that is able to develop the concepts listed above in six school periods using student-centred methods and which can be adapted to different two-state contexts.