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Project title: Designing a digital learning environment for learning and teaching quantum mechanics at upper secondary school level
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PhD Research: ESoE
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In 2013-2014 a new curriculum for Physics at secondary school level was introduced in the Netherlands. An important part of the new curriculum is quantum mechanics. Quantum mechanics is considered to be one of the most difficult parts of physics because of the abstract and counter-intuitive nature. The complexity of quantum mechanics gives rise to misconceptions among students when they study quantum mechanics. Research shows that these misconceptions can be tackled by using digital materials that visualize important aspects of quantum mechanical behavior. Other research shows that students hardly use computers in physics classrooms, although the new physics curriculum emphasizes ICT-skills. The goal of this research is to develop an interactive, digital learning environment for education in quantum mechanics for secondary school students. The main research question is: How can digital materials support learning and teaching of QM at upper secondary school level in the Netherlands?

An educational design research will be used to develop the digital learning environment. In the first year the learning and teaching of quantum mechanics will be researched. This will be done, among other things, by interviewing experts. The last three years of the research will investigate student and teacher interactions with the digital learning environment. This will help optimize the digital learning environment.