香港城市大學
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Achieving Discovery-Enriched Curriculum in Quantum Physics Teaching With the Aids of Computer Demonstrations and Simulations

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Abstract:

Quantum physics is a subject difficult for teaching and learning but is extremely important for physics students, because it forms the basis for learning most other modern physics related subjects. Quantum physics is also an area rich for discovery and thus students could have high potential to achieve discovery if they could be equipped with the needed tools and knowledge for quantum problem solving. This project will develop a method to make the teaching and learning of quantum physics more effective and easier so as to equip students with strong capability of discovery, by integrating computer-aided demonstrations and simulations into an existing course entitled “Quantum Physics” (AP3251).

The advanced computer-aided demonstrations and simulations intended to be integrated with the teaching of “Quantum Physics” course in the Department of Physics (PHY) will cover wave-particle duality of matter, application of Schrödinger equation to simple 1D, 2D and 3D systems, quantization of orbital and spin angular momentum, fine structure and Zeeman effect, Heisenburg matrix representation, etc. We aim at facilitating students to learn the abstract concepts, theories and methods in this course and do discovery oriented demonstrations and simulations. We hope that the revised course teaching material will be found suitable not only for students studying physics but also for students from wide disciplines such as materials engineering, math, chemistry and biology to study quantum physics.