**Issues and challenges in teaching secondary school quantum physics with integrated STEM education in Malaysia**


## ABSTRACT

The emphasis on STEM education in the physics curriculum moves toward addressing the 21st-century demands, but its implementation is fraught with issues and challenges. This paper exposes teachers' and students' concerns and problems with integrated STEM education implementation and relates them to the anticipated problem in quantum physics (QP) learning and facilitation (L&F) in secondary school. The QP L&F challenges include the odd ontological worldview and abstractness of concepts, which have created serious misconceptions among teachers and students. A solution is proposed to address this difficulty, including applying an interactive simulation and a hands-on experiment. This paper also proposes a theoretical framework for developing an instructional module to cater to meaningful QP learning with integrated STEM elements. The proposed theoretical framework has several advantages, including guidance in planning an instructional module applicable to classroom activities and explaining the topic using an inquiry-based learning (IBL) approach with learning activities coordinated using the 5E Instructional Model. Nonetheless, further research is necessary to study the instructional module's development, usability, and L&F effectiveness in the classroom.