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Developing Learning Resources for Honours-Level Atomic Physics Courses

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Although students are expected to begin fourth-year atomic physics with a strong understanding of quantum mechanics (QM) developed in second and third year, it has been identified that students often struggle to link theoretical QM concepts with real-world atomic phenomena and applications.

We have developed a series of computational workbooks that are self-directed, interactive and have been designed to bridge the gap between the theory and application of core atomic physics concepts introduced in lectures. The workbooks are designed in such a way as to target key graduate attributes and learning outcomes including: competently using computing technology for the simulation of physical systems, presenting and interpreting information graphically, undertaking numerical manipulation as needed, and producing self-directed and motivated learners.

Each workbook walks students through chosen topics in atomic physics and has been built using a combination of markdown (to present the theory and a series of questions/prompts), modifiable code, graphs, visuals, and animation. These workbooks have been developed alongside additional questions that can be integrated directly into tutorial problem sets and written assessment. In addition to deepening understanding of atomic physics, the aim of these workbooks is to improve student engagement with the atomic physics course content as well as increase student satisfaction.

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