PC3130 Project Scope (Due date: Thurs 7 November 2024)

Either elaborate more on use of QM in an application (in nature or man-made), or perform a theoretical study of a QM topic related to PC3130 (see examples below). A written report (abstract (200 words) and main text (maximum 3 pages). The main document should be self-contained and contain the key ideas, including figures, if any. You may refer to an appendix for a list of references.

You are encouraged to work in pairs, but you can work individually if you prefer. If you work in pairs, the additional section below on ChatGPT (research and critique) is required.

ChatGPT (research and critique) (Optional for individual work; Compulsory for pair work):

Attach the input and output from ChatGPT, and provide ~2 paragraphs of critique on the output from ChatGPT (e.g. Are the facts accurate? Is the discussion appropriate? How did you expand on, or change the output from ChatGPT?). These paragraphs are separate from your written report. Make sure that your own written report does not plagiarize the ChatGPT output.

All submissions are to be made through Turnitin. Please do not plagiarize, intentionally or unintentionally. Please refer to:

https://www.nus.edu.sg/celc/statements-and-e-resources-on-plagiarism/

https://libguides.nus.edu.sg/copyright_essentials_teaching_learning_research/plagiarism

https://myportal.nus.edu.sg/studentportal/student-discipline/all/docs/NUS-Plagiarism-Policy.pdf

Examples of Applications

Bird navigation

Quantum information

Atomic clocks

Solar hot spots

Electron paramagnetic resonance spectroscopy

Positron imaging technology

Magnetic resonance imaging

Magnetic tunnel junctions and applications

Magnetic skyrmions and applications

Examples of topics for theoretical study:

Dirac Equation

Entanglement (e.g. conditions for entanglement?)

Hartree-Fock equations

Hyperfine structure of atoms

Semi-classical and WKB approximation

Scattering

Applications of the variational principle

Anyons