Quantum Computing and Cryptography - 13: General Single-Qubit Measurement

Length	Nanomodule
Collection	NSA NCCP
Updated	March 14, 2019
Contributors	Abhishek Parakh
Academic Levels	Undergraduate, Graduate
Topics	Cryptography, Quantum Computing
Link	https://clark.center/details/aparakh/072259ec-48c4-4c2b-a379-aaa2ad8c277a

Description

This nanomodule discusses the theory behind single qubit measurements, in particular projective measurements. Upon completion the students will have an understanding of the measurement postulate of quantum mechanics, will be able to compute the projection operators for a basis, calculate the probabilities of outcomes for a given basis using projection operator and determine the final state of the qubit.

Email Dr. Abhishek Parakh at aparakh@unomaha.edu for solutions to the problems.

Note: To get started with Jupyter notebooks please follow the userguide available at: https://sites.google.com/unomaha.edu/userguideqcl/

Outcomes

- Apply the measurement postulate in quantum mechanics for projective measurements.
- Restate the theory behind projective measurements.
- Apply the density matrix formulation and will be able to apply it for projective measurements.
- Calculate the probabilities of outcomes for a given basis using projection operator and determine the final state of the qubit.
- Calculate the projection operators for a basis.

Alignment

The standards and guidelines this learning object is mapped to

- NICE Workforce Knowledge (2017) - K0052: Knowledge of mathematics (e.g. logarithms, trigonometry, linear algebra, calculus, statistics, and operational analysis).

Links

External links that are associated with this learning object

- User guide