A novel notation for quantum cryptography

Applications to some recent quantum cryptographic protocols and their equivalences

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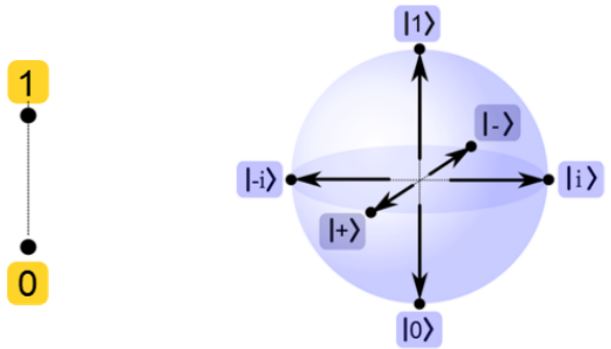
January 9, 2020

Outline

Introduction

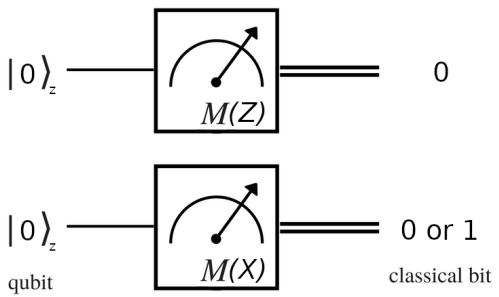
Quantum Information

- The classical bit vs. the qubit



Representation of a classical bit (Left) and a qubit (right) [4].

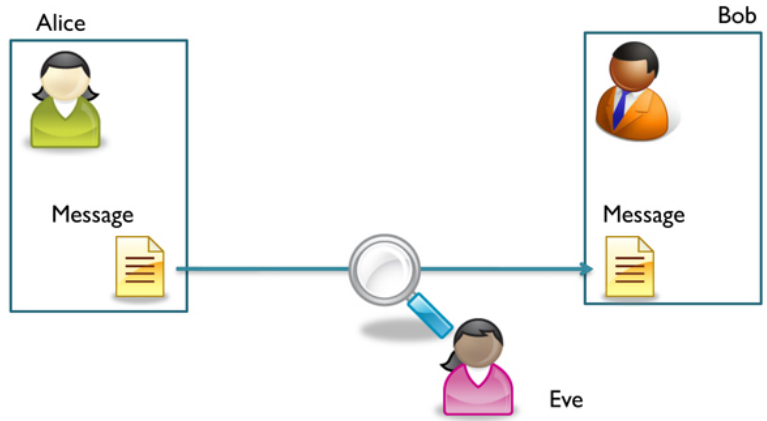
- Mutual unbiasedness



Measuring $|0\rangle_z$ in the Z and X bases [3].

Quantum Cryptography

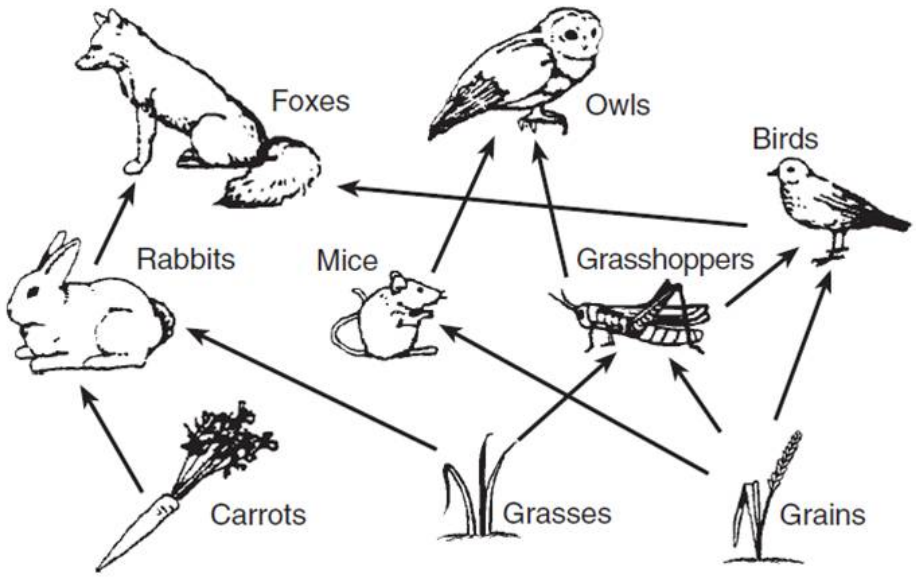
- Quantum cryptographic protocols: Sending a message securely using quantum mechanics



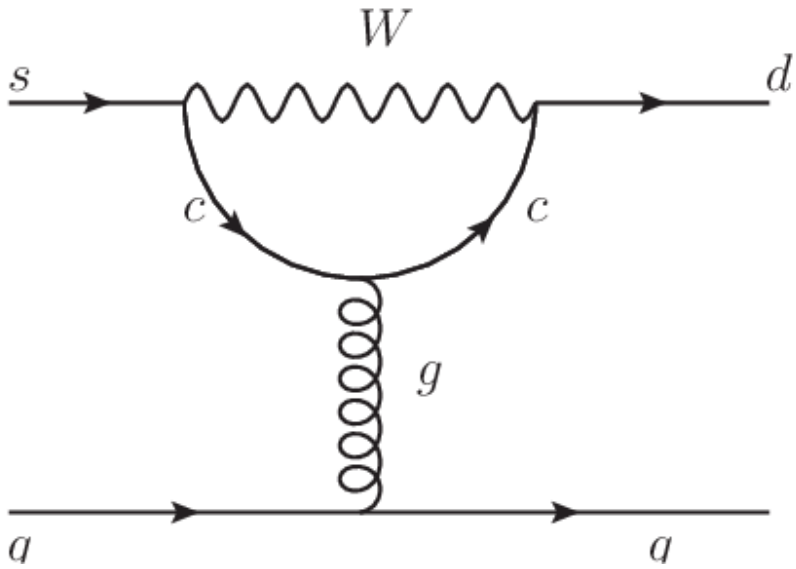
Alice, Bob, and Eve's roles in (quantum) cryptographic protocols [1].

- Dirac notation is not very intuitive

The Diagrammatic Notation



Diagrams in ecology: food webs [2].



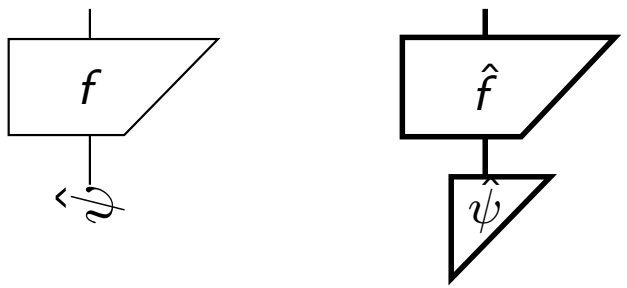
Diagrams in particle physics: Feynman diagrams [5].

The Diagrammatic Notation

- Preparing a **classical bit** ψ and **qubit** $\hat{\psi}$:

(1)

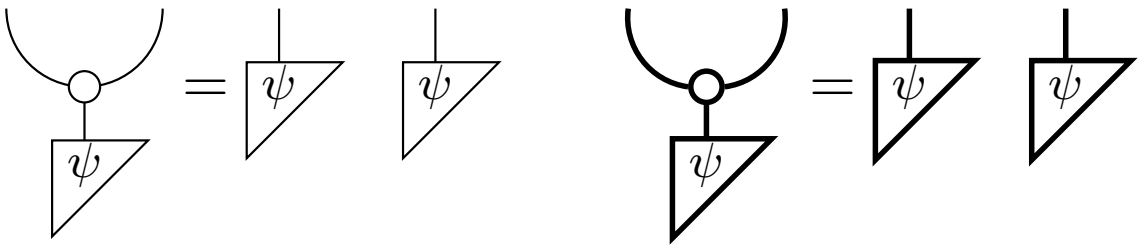
- Applying a **classical map** f and **quantum map** $\hat{f}$ to these states respectively:



(2)

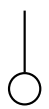
The Diagrammatic Notation

- **Spiders** copy states.



(3)

- Whenever they have no input they create a random bit.



(4)

The Classical One Time Pad

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