Quantum Information

MIT Lecture

§0 Outline

1. Classical game
2. Simple quantum system
3. Beating the game
4. Quantum computing today[1]

§1 Classical game

§1.1 The game

Alice and Bob receive, respectly, a and b randomly chosen in $\mathbb{F}_2$ (Alice does not know b and Bob does not know a) and they choose, respectly, p and q (without talking to each other).

Their goal is to make $p + q = a \cdot b$ true.

§1.2 Solution

A strategy is for both Alice and Bob always pick 0. The probability of them winning is $\frac{3}{4}$.

No determinant strategy was a probability higher than $\frac{3}{4}$.

§2 Simple quantum system

Definition 1 (Qubit) 2 *linearly indemendent* states.

$$|0\rangle = (1, 0)$$

$$|1\rangle = (0, 1)$$

[1] If the time permits