양자측정

최만수 (고려대 물리학과)

(측정 가능한) 물리량

$$\hat{A}^\dagger = \hat{A}$$

$$\{a \mid a \in \mathbb{R}\}$$

$$\{|a\rangle \mid \langle a|a'\rangle = \delta_{aa'}\}$$

Spectral Decomposition Theorem

$$\hat{A} = \sum_a |a\rangle\, a\, \langle a|$$

측정과 파동함수의 붕괴

$$|\psi\rangle = \sum_a |a\rangle\, c_a$$

$$|\psi\rangle \xrightarrow{\hat{A}} \begin{cases} |a\rangle\,, & a, \quad P_a = |c_a|^2 = |\langle a|\psi\rangle|^2 \\ |a'\rangle\,, & a', \quad P_{a'} = |c_a|^2 = |\langle a'|\psi\rangle|^2 \\ \vdots \end{cases}$$

Measurements on Quantum Computers

- It is allowed to measure only Pauli Z operators on individual qubits.
- Other measurements require additional processing.

Measurement in Q3

- Q3 supports measurement of all Pauli X, Y, Z operators.
- Q3 supports measurement of any product of Pauli operators.

Simple Theorem

- Any product of Pauli operators have eigenvalues of only ± 1.
- Q3 interpretes +1 as 0 and -1 as 1.

감사합니다!