



WORKING IN DIFFERENT BASES

2. 간편한 방법

최만수 (고려대 물리학과)

MATRIX REPRESENTATION OF OPERATORS

- Let $\{|v_1\rangle, |v_2\rangle, \dots, |v_n\rangle\}$ be the basis.

$$\hat{A} = \sum_{ij} |v_i\rangle A_{ij} \langle v_j|, \quad A_{ij} = \langle v_i | \hat{A} | v_j \rangle$$

9편 참조

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$$\hat{A} = \sum_{ij} |v_i\rangle A_{ij} \langle v_j|, \quad A_{ij} = \langle v_i | \hat{A} | v_j \rangle$$

$$\hat{A} \doteq \begin{bmatrix} A_{11} & A_{12} & \cdots & A_{1n} \\ A_{21} & A_{22} & \cdots & A_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ A_{n1} & A_{n2} & \cdots & A_{nn} \end{bmatrix}$$

9편 참조

MATRIX REPRESENTATION OF OPERATORS

- Let $\{|w_1\rangle, |w_2\rangle, \dots, |w_n\rangle\}$ be the basis.

$$\hat{A} = \sum_{ij} |w_i\rangle A'_{ij} \langle w_j|, \quad A'_{ij} = \langle w_i | \hat{A} | w_j \rangle$$

$$\hat{A} \doteq \begin{bmatrix} A'_{11} & A'_{12} & \cdots & A'_{1n} \\ A'_{21} & A'_{22} & \cdots & A'_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ A'_{n1} & A'_{n2} & \cdots & A'_{nn} \end{bmatrix}$$

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$$\sum_k |v_k\rangle \langle v_k| = \hat{I}$$

$$\langle w_i | \hat{A} | w_j \rangle = \sum_{kl} \underbrace{\langle w_i | v_k \rangle}_{U_{ik}} \underbrace{\langle v_k | \hat{A} | v_l \rangle}_{A_{kl}} \underbrace{\langle v_l | w_j \rangle}_{U_{lj}^\dagger}$$

$$A' = U A U^\dagger$$

감사합니다!