

## Kap 40 Kvantefysikk

Tilstandsvektor	$ \Psi\rangle$
Dual tilstandsvektor	$\langle\Psi $
Normalisering	$\langle\Psi \Psi\rangle=1$
Utvikling etter orthonormale basisfunksjoner	$ \Psi\rangle = \sum_n c_n  \varphi_n\rangle = \sum_n \langle\varphi_n \Psi\rangle  \varphi_n\rangle \langle\varphi_m \varphi_n\rangle = \delta_{mn}$
Sannsynlig hetsamplitude $c_n$ , sannsynlig het $c_n^2$	$\sum_n c_n^2 = 1$
Kompleks konjugering	$\langle\varphi_2 \varphi_1\rangle = \langle\varphi_1 \varphi_2\rangle^*$
Operator	$A \Psi_1\rangle =  \Psi_2\rangle$ $\langle\varphi_2 A \varphi_1\rangle = \langle\varphi_1 A\varphi_2\rangle = \langle\varphi_1 A^+ A\varphi_2\rangle$
Projeksjonsoperator	$P_n =  \varphi_n\rangle\langle\varphi_n $ $P_m P_n = \begin{cases} P_n & m = n \\ 0 & m \neq n \end{cases}$
Komplettheit	$\sum_n  \varphi_n\rangle\langle\varphi_n  = I$
Hermitisk operator	$A = A^+$
Unitær operator	$U^+U = I$
Egentilstand	$A \varphi_n\rangle = a_n \varphi_n\rangle$
Operator utviklet etter egenvektorer/egenverdier	$A = \sum_n a_n  \varphi_n\rangle\langle\varphi_n $
Operator - forventningsverdi	$\langle A \rangle = \langle\Psi A \Psi\rangle$
Kommutator	$[A, B] = AB - BA$
Uskarphetsrelasjon	$\Delta A \cdot \Delta B \geq \frac{1}{2}  \langle[A, B]\rangle  \quad \Delta x \cdot \Delta p \geq \frac{\hbar}{2} \quad \Delta E \cdot \Delta t \geq \frac{\hbar}{2}$
Generator for infinitesimale transformasjoner	$U(s) = e^{iKs} \quad K = K^+$
Momentoperator	$p = \frac{\hbar}{i} \nabla$
Hamiltonoperator	$H = \frac{p^2}{2m} + V = -\frac{\hbar^2}{2m} \nabla^2 + V$
Tidsavhengig Schrødingeligning	$i\hbar \frac{\partial}{\partial t}  \Psi(t)\rangle = H  \Psi(t)\rangle$
Tidsuavhengig Schrødingeligning	$H\psi(\vec{r}) = E\psi(\vec{r})$
Partikkel i en boks	$E_n = \frac{p_n^2}{2m} = \frac{n^2 \hbar^2}{8mL^2} = \frac{n^2 \pi^2 \hbar^2}{2mL^2} \quad n = 1, 2, 3, \dots$
Harmonisk oscillator	$E_n = \left(n + \frac{1}{2}\right) \hbar \omega = \left(n + \frac{1}{2}\right) \hbar \sqrt{\frac{k'}{m}} \quad n = 0, 1, 2, 3, \dots$