

$$\begin{aligned} & \overset{p}{\tilde{\varphi}}(p)=pX\varphi\\ &=p\int xxX\varphi\\ &=\frac{1}{\sqrt{2\pi\hbar}}\int xxe^{-\imath px/\hbar}\varphi(x)\\ &=\imath\hbar\underset{\text{O}}{p}p \end{aligned}$$

$$\begin{aligned} x\imath\hbar t\varphi&=\left\{\frac{p^2}{2m}+V(X)\right\}\varphi\\ \imath\hbar t\varphi(x,t)&=-\frac{\hbar^2}{2m}[2]x\varphi(x,t)+V(x)\varphi(x,t)p\imath\hbar t\varphi=\left\{\frac{p^2}{2m}+V(X)\right\}\varphi\\ \imath\hbar t\tilde{\varphi}(p,t)&=-\frac{\hbar^2}{2m}\tilde{\varphi}(p,t)+V\left(\imath\hbar p\right)\tilde{\varphi}(p,t) \end{aligned}$$

$$AB$$

$$\tilde{B}=B-B_\varphi$$

$$\vec{f}=\tilde{A}\varphi\vec{g}=\tilde{B}\varphi$$

$$\begin{aligned}\tilde{A}\tilde{B}_\varphi^2&=\tfrac{1}{2}\tilde{D}+\tfrac{1}{2}\imath C^2=\tfrac{1}{4}\tilde{D}^2+\tfrac{1}{4}C\\ &\geq \tfrac{1}{4}C^2\end{aligned}$$

$$A=XB=PC=\hbar I$$