

Observable		Operator	
Name	Symbol	Symbol	Operation
Ortskoordinate	x, y, z	$\hat{x}, \hat{y}, \hat{z}$	Multiplikation mit x, y, z
Ortsvektor	$\mathbf{r} = \begin{pmatrix} x \\ y \\ z \end{pmatrix}$	$\hat{\mathbf{r}} = \begin{pmatrix} \hat{x} \\ \hat{y} \\ \hat{z} \end{pmatrix}$	Multiplikation mit \mathbf{r}
Abstand	$\sqrt{x^2 + y^2 + z^2}$	$\sqrt{\hat{x}^2 + \hat{y}^2 + \hat{z}^2}$	Multiplikation mit $\sqrt{x^2 + y^2 + z^2}$
Impulskomponente	p_x, p_y, p_z	$\hat{p}_x, \hat{p}_y, \hat{p}_z$	$-i\hbar \frac{\partial}{\partial x}, -i\hbar \frac{\partial}{\partial y}, -i\hbar \frac{\partial}{\partial z}$
Impulsquadrat	$p_x^2 + p_y^2 + p_z^2$	$\hat{p}_x^2 + \hat{p}_y^2 + \hat{p}_z^2$	$-\hbar^2 \left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} \right) = -\hbar^2 \Delta$
Impulsvektor	$\mathbf{p} = \begin{pmatrix} p_x \\ p_y \\ p_z \end{pmatrix}$	$\hat{\mathbf{p}} = \begin{pmatrix} \hat{p}_x \\ \hat{p}_y \\ \hat{p}_z \end{pmatrix}$	$-i\hbar \begin{pmatrix} \frac{\partial}{\partial x} \\ \frac{\partial}{\partial y} \\ \frac{\partial}{\partial z} \end{pmatrix} = -i\hbar \nabla$
kinetische Energie	$T = \frac{\mathbf{p}^2}{2m}$	$\hat{T} = \frac{\hat{\mathbf{p}}^2}{2m}$	$-\frac{\hbar^2}{2m} \left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} \right) =$ $= -\frac{\hbar^2}{2m} \nabla^2 = -\frac{\hbar^2}{2m} \Delta$
potentielle Energie	$V(x, y, z)$	$\hat{V}(x, y, z)$	Multiplikation mit $V(x, y, z)$
Gesamtenergie	$E = T + V$	\hat{H}	$-\frac{\hbar^2}{2m} \nabla^2 + V(x, y, z)$
Drehimpulskomponente	$L_x = yp_z - zp_y$ $L_y = zp_x - xp_z$ $L_z = xp_y - yp_x$	\hat{L}_x \hat{L}_y \hat{L}_z	$-i\hbar \left(y \frac{\partial}{\partial z} - z \frac{\partial}{\partial y} \right)$ $-i\hbar \left(z \frac{\partial}{\partial x} - x \frac{\partial}{\partial z} \right)$ $-i\hbar \left(x \frac{\partial}{\partial y} - y \frac{\partial}{\partial x} \right)$