Drehimpulsoperator $J = \begin{pmatrix} J_x \\ J_y \\ J_z \end{pmatrix}$

$$[J_x, J_y] = i\hbar\epsilon_{xyz}J_z \quad [H, J^2] = [H, J_z] = [J^2, J_z] = 0$$

$$J^2 \left| jm \right\rangle = \hbar^2 j(j+1) \left| jm \right\rangle$$
$$J_z \left| jm \right\rangle = \hbar m \left| jm \right\rangle$$
mit $J_\pm = J_x \pm iJ_y$
$$J_\pm \left| j, m \right\rangle = \hbar\sqrt{(j \mp m)(j \pm m + 1)} \left| j, m \pm 1 \right\rangle$$

$$\sigma_x = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \quad \sigma_y = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix} \quad \sigma_z = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$