

SMM: Spin Matrix Mapping

$$\mathbf{S}_x/\hbar = \frac{1}{2} \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \mapsto \sqrt{\sigma^2 - \left(n - \frac{1}{2}\right)^2} \cos(q)$$

$$\mathbf{S}_y/\hbar = \frac{1}{2} \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix} \mapsto \sqrt{\sigma^2 - \left(n - \frac{1}{2}\right)^2} \sin(q)$$

$$\mathbf{S}_z/\hbar = \frac{1}{2} \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \mapsto n - \frac{1}{2}$$

$$\frac{1}{2}\mathbf{I}_2 = \frac{1}{2} \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \mapsto \frac{1}{2}$$

$$m \in \left\{ \pm \frac{1}{2} \right\} \rightarrow n \in \{0, 1\}$$