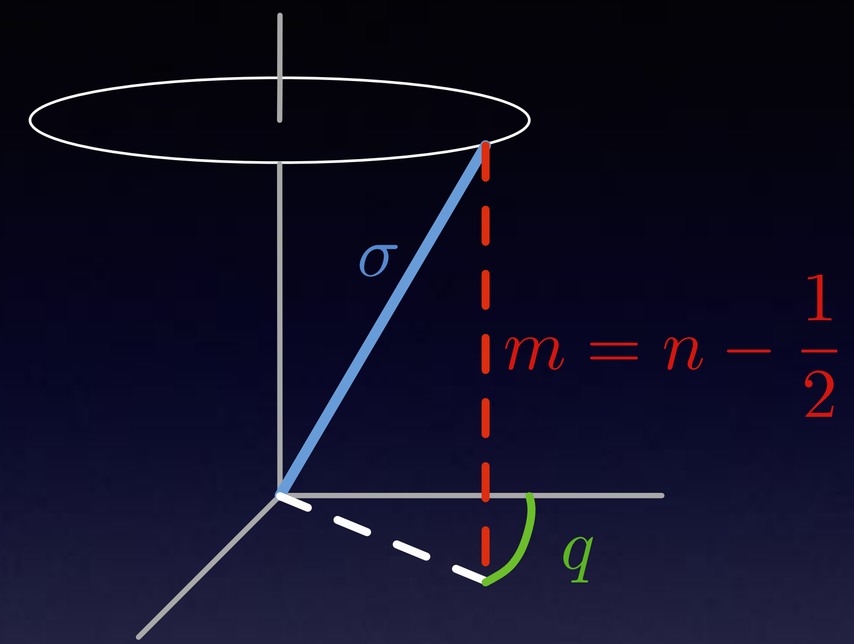
Single State Mapping

spin-½ system



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

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

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

Single State Mapping

$$\begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix} \mapsto 1 - n \qquad \begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix} \mapsto \sqrt{n - n^2 + \lambda}\, e^{-iq}$$

$$\begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix} \mapsto \sqrt{n - n^2 + \lambda}\, e^{iq} \qquad \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix} \mapsto n$$

$$\lambda \equiv \sigma^2 - \frac{1}{4}$$

“Spin Matrix Mapping”: Meyer & Miller, JCP 71, 2156 (1979)

A method for mapping a 2x2 matrix
to action-angle variables