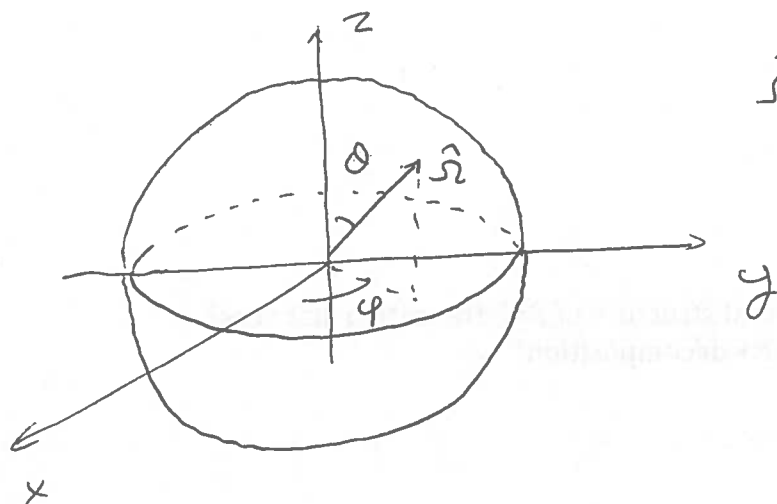


Spin Map - Bloch Sphere

* Each Unit vector represent a state $|\hat{n}\rangle$ so that

$$\vec{S} \cdot \hat{n} |\hat{n}\rangle = +\frac{\hbar}{2} |\hat{n}\rangle$$



$$\hat{n} = \begin{pmatrix} \Omega_x \\ \Omega_y \\ \Omega_z \end{pmatrix} = \begin{pmatrix} \sin\theta \cos\phi \\ \sin\theta \sin\phi \\ \cos\theta \end{pmatrix}$$

* $SU(2)$ Rotation along direction \hat{n} with angle χ
(Right hand Rule here)

$$U(\hat{n}, \chi) = e^{-i \frac{\vec{\sigma} \cdot \hat{n} \chi}{2}}$$



$$= \cos\frac{\chi}{2} - i \sin\frac{\chi}{2} \vec{\sigma} \cdot \hat{n}$$

(Was missing during my lecture but shall be there for "right hand rule")