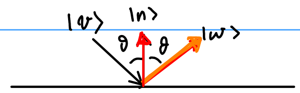
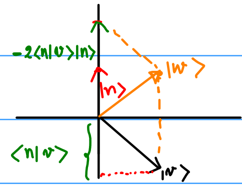
Representació matricial de plànols de reflexió

$$|w\rangle = \left(1 - 2|n\rangle\langle n|\right)|v\rangle = |v\rangle - 2\langle n|v\rangle|n\rangle$$

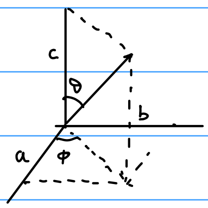




Per tant l'aplicació σ és

$$\boxed{\sigma = 1 - 2|n\rangle\langle n|}$$

L'equació del plànol que passa per l'origen $\pi: ax + by + cz = 0$, el vector normal $|n\rangle = \begin{pmatrix} a \\ b \\ c \end{pmatrix}$



El vector normal de longitud unitat : $\begin{cases} a = \sin\theta\cos\phi \\ b = \sin\theta\sin\phi \\ c = \cos\theta \end{cases}$; efectivament: $a^2 + b^2 + c^2 = 1$

La matriu $\sigma = \mathbb{1} - 2\begin{pmatrix} a \\ b \\ c \end{pmatrix}(a\ b\ c) = \mathbb{1} - 2\begin{pmatrix} a^2 & ab & ac \\ ab & b^2 & bc \\ ac & bc & b^2 \end{pmatrix} = \begin{bmatrix} 1-2\sin^2\theta\cos^2\phi & -\sin^2\theta\sin 2\phi & -\sin 2\theta\cos\phi \\ -\sin^2\theta\sin 2\phi & 1-2\sin^2\theta\sin^2\phi & -\sin 2\theta\sin\phi \\ -\sin 2\theta\cos\phi & -\sin 2\theta\sin\phi & 1-2\cos^2\theta \end{bmatrix}$

$\sigma(\theta,\phi)$

e.g. $\sigma_{xz} = \sigma\left(\theta = \frac{\pi}{2}, \phi = \frac{\pi}{2}\right) = \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$; $\sigma_{xy} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$ etc