

Some formulas in quantum mechanics *

October 13, 2018

Matrix elements:

$$\begin{aligned}\langle l-1, m | \cos \theta | l, m \rangle &= \langle l, m | \cos \theta | l-1, m \rangle = \sqrt{\frac{l^2 - m^2}{4l^2 - 1}}, \\ \langle l, m | \sin \theta e^{i\phi} | l-1, m-1 \rangle &= \langle l-1, m-1 | \sin \theta e^{-i\phi} | l, m \rangle = \sqrt{\frac{(l+m)(l+m-1)}{4l^2 - 1}}, \\ \langle l-1, m | \sin \theta e^{i\phi} | l, m-1 \rangle &= \langle l, m-1 | \sin \theta e^{-i\phi} | l-1, m \rangle = -\sqrt{\frac{(l-m)(l-m+1)}{4l^2 - 1}}.\end{aligned}$$

*Andriy Zhugayevych, www.uninet.kiev.ua/~azh/QM/Formulas.xxx