

HW 13-4 Soln)

L_z is the component of L in the z -direction, and as such, it equals $L \cos\theta$. So,

$$\theta = \arccos\left(\frac{L_z}{L}\right) = \arccos\left(\frac{m_l \hbar}{\sqrt{l(l+1)}\hbar}\right) = \arccos\left(\frac{m_l}{\sqrt{l(l+1)}}\right).$$

Program into Excel:

n	l	ml	Theta
4	0	0	#DIV/0!
4	1	-1	135
4	1	0	90
4	1	1	45
4	2	-2	144.7356
4	2	-1	114.0948
4	2	0	90
4	2	1	65.90516
4	2	2	35.26439
4	3	-3	150
4	3	-2	125.2644
4	3	-1	106.7787
4	3	0	90
4	3	1	73.22135
4	3	2	54.73561
4	3	3	30