

CHAPTER OVERVIEW

14: Multidimensional Quantum Mechanics and Rotation

We have focused on single dimensional systems thus far in our discussion of quantum mechanics. However, the Universe is three-dimensional, and as such we need to study 3D quantum mechanics. To begin this chapter we will show that the inclusion of extra dimensionality causes an unfortunate increase in complexity of the kinetic energy operator. And while this is not terribly difficult for a particle in a box problem (or we should rather say particle in a cube), it can become onerous once we start to work with spherical objects such as atoms. You will see when we start describing rotating quantum particles in the 2nd half of this chapter. Regardless of the nature of our model problems, one of the most important results is the fact that multidimensionality introduces energetic degeneracy (two or more quantum states with the same energy). Degeneracies have significant impact on many areas of science as they have a substantial effect on the physical properties of chemicals and materials.

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[14.2: Rotational Quantum Mechanics- Introduction](#)

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