# 18.5: Correspondence Principle

The Correspondence Principle implies that any new theory in physics must reduce to preceding theories that have been proven to be valid. For example, Einstein's Special Theory of Relativity satisfies the Correspondence Principle since it reduces to classical mechanics for velocities small compared with the velocity of light. Similarly, the General Theory of Relativity reduces to Newton's Law of Gravitation in the limit of weak gravitational fields. Bohr's Correspondence Principle requires that the predictions of quantum mechanics must reproduce the predictions of classical physics in the limit of large quantum numbers. Bohr's Correspondence Principle played a pivotal role in the development of the old quantum theory, from it's inception in 1912, until 1925 when the old quantum theory was superseded by the current matrix and wave mechanics representations of quantum mechanics.

Quantum theory now is a well-established field of physics that is equally as fundamental as is classical mechanics. The Correspondence Principle now is used to project out the analogous classical-mechanics phenomena that underlie the observed properties of quantal systems. For example, this book has studied the classical-mechanics analogs of the observed behavior for typical quantal systems, such as the vibrational and rotational modes of the molecule, and the vibrational modes of the crystalline lattice. The nucleus is the epitome of a many-body, strongly-interacting, quantal system. Example $14.12.1$ showed that there is a close correspondence between classical-mechanics predictions, and quantal predictions, for both the rotational and vibrational collective modes of the nucleus, as well as for the single-particle motion of the nucleons in the nuclear mean field, such as the onset of Coriolis-induced alignment. This use of the Correspondence Principle can provide considerable insight into the underlying classical physics embedded in quantal systems.