## **5** Principles of Quantum Mechanics

- (1) **States** are represented by vectors of length 1.
- (2) **Properties** are represented by Hermitian operators.

## Eigenvector/Eigenvalue Rule:

A state possesses the value  $\lambda$  of a property represented by operator *O if and only if* that state is an eigenvector of *O* with eigenvalue  $\lambda$ .

(3) **Dynamics** is given by the linear Schrödinger equation.

 $|\psi(t_1)
angle \xrightarrow{Schrödinger}_{evolution} |\psi(t_2)
angle$ 

## (4) Born Rule.

 $\Pr(\text{value of } B \text{ is } b_i \text{ in state } |\psi\rangle) \equiv |\langle \psi | b_i \rangle|^2$ 

where  $|b_i\rangle$  is an eigenvector of *B* with eigenvalue  $b_i$ 

## (5) **Projection Postulate**.

When a measurement of a property *B* is made on a system in the state  $|\psi\rangle = a_1|b_1\rangle + \cdots + a_N|b_N\rangle$  expanded in the eigenvector basis of *B*, and the result is the value  $b_i$ , then  $|\psi\rangle$  collapses to the state  $|b_i\rangle$ :

$$|\psi\rangle \xrightarrow[collapse]{} |b_i\rangle$$