

量子力学与统计物理

Quantum mechanics and statistical physics

李小飞

光电科学与工程学院

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第十一讲、对称与守恒量



前情回顾

- 希尔伯特空间的态矢量描述体系状态
- 希尔伯特空间的算符给出体系的物理量
- 算符的本征函数系构成正交归一完全基
- 常见算符本征方程求解
- 算符对易关系及其物理含义

守恒量定义

① 经典物理中的守恒量与对称条件

守恒量：力学量的值不随时间变化

- 机械能空间平移不变 \rightarrow 动量守恒
- 机械能空间转动不变 \rightarrow 角动量守恒
- 机械能时间平移不变 \rightarrow 能量守恒

② 量子力学中的守恒量

守恒量：在任意态下力学量的平均值不随时间变化

$$\bar{A}(t) = (\Psi(t), A\Psi(t)) = c.$$

守恒量及守恒条件...

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