Physics 4410
Quantum Mechanics 2

Lecture 13

Bloch's Theorem

September 23, 2020

1. Review the diagonalization of

$$H = \sum_{n=-\infty}^{\infty} \left[\alpha |n\rangle \langle n| - \beta |n\rangle \langle n+1| - \beta |n+1\rangle \langle n| \right].$$

2. Describe the Brillouin zone.

3. Diagonalize the ℓ-site translation operator

$$T_\ell = \sum_{n=-\infty}^{\infty} |n + \ell\rangle\langle n|.$$

4. Explain Bloch's Theorem (on a 1d lattice).

5. Describe the effective mass and velocity of an electron moving in a solid.