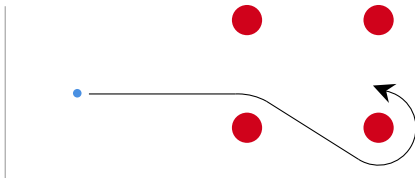
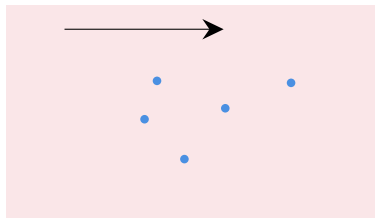
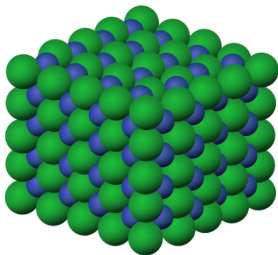


# Band theory

Jinyuan Wu

February 11, 2023

# Matter = Nuclei + electrons

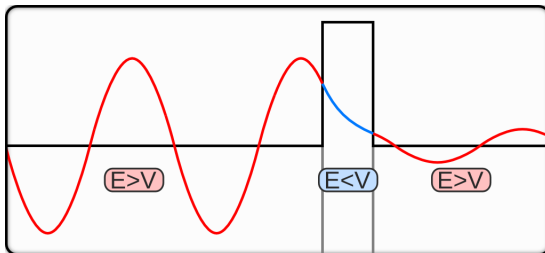


Paradox!

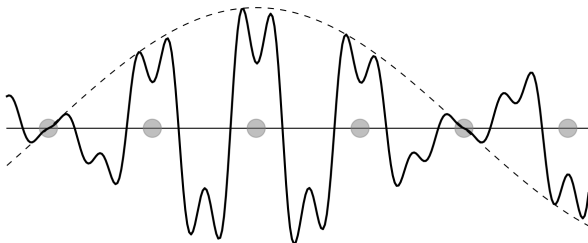
# Electrons as waves

Quantum case:  $p = -i\hbar \frac{\partial}{\partial x}$

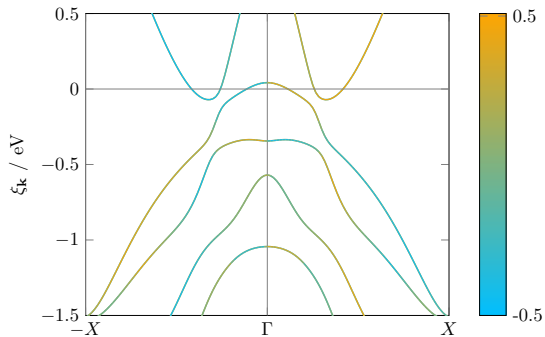
$$-\frac{\nabla^2}{2m}\psi(x) + V(x)\psi(x) = E\psi(x) \quad (1)$$



# Periodic potential in crystals



# Band structure



# In external field