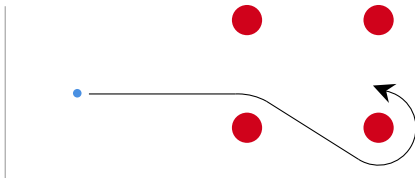
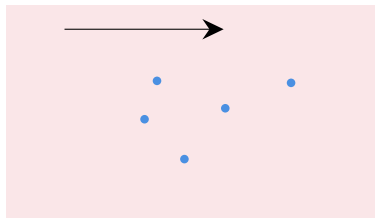
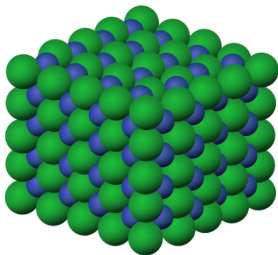


Band theory

Jinyuan Wu

February 6, 2023

Matter = Nuclei + electrons

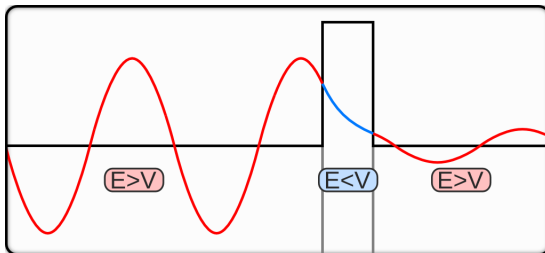


Paradox!

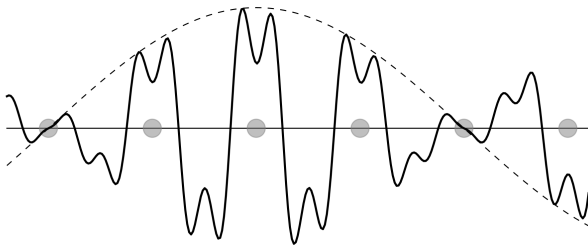
Electrons as waves

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

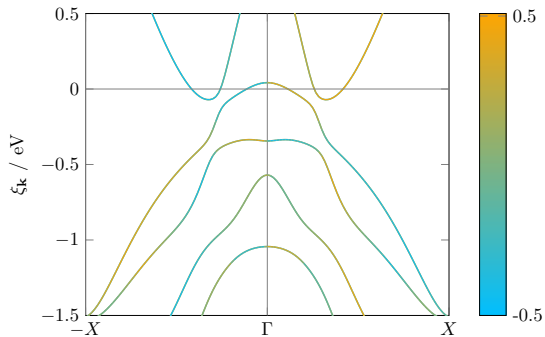
$$-\frac{\nabla^2}{2m}\psi(x) + V(x)\psi(x) = E\psi(x) \quad (1)$$



Periodic potential in crystals



Band structure



In external field