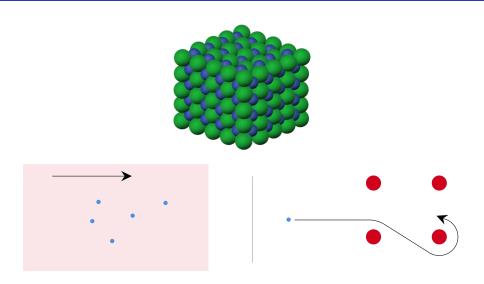
Band theory

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Matter = Nuclei + electrons

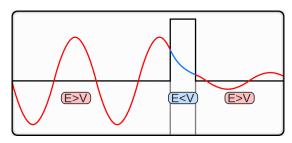


Paradox!

Electrons as waves

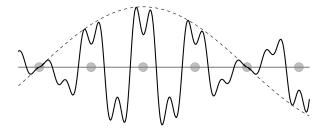
Quantum case: $p = -i\hbar \frac{\partial}{\partial x}$

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

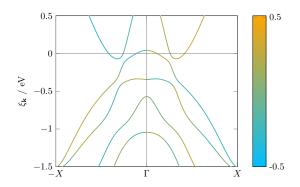


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Periodic potential in crystals



Band structure



In external field

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