The 3 Distribution Functions

- Classical particles:
  - Maxwell-Boltzmann: $f_{MB}(n,T) = \exp(-E(n)/k_B T)$

- Fermions (half-integer spins, e.g. electrons)
  - Fermi-Dirac: $f_{FD}(n,T) = \frac{1}{\exp([E(n) - E_F]/k_B T) + 1}$

- Bosons (integer spins, e.g. photons, phonons)
  - Bose-Einstein: $f_{BE}(n,T) = \frac{1}{\exp(E(n)/k_B T) - 1}$

Classical vibrations of atoms in a crystal	**Quantum wavefunctions of e electrons in a crystal**
Normal modes involve ***every*** atom is the crystal	eigenstate wavefunctions spread the probability density over the entire crystal
One natural frequency is associated with each normal mode	Each normal mode has a discrete electronic frequency
each $k=2\pi/\lambda$ describes the normal mode	each k describes the eigenstate wavefunction