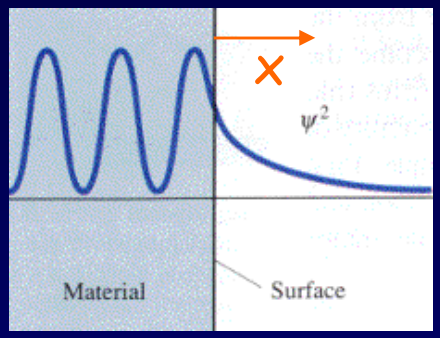
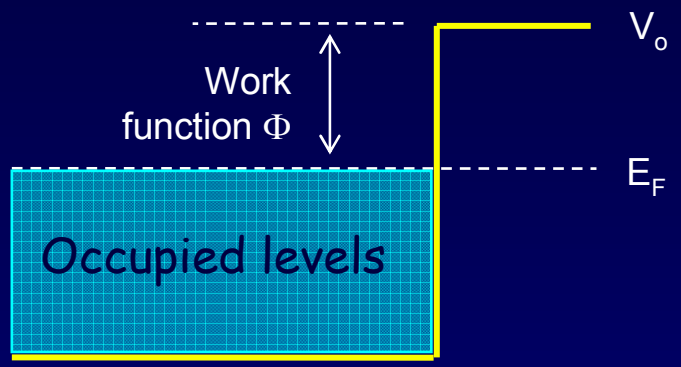
"Leaky" Particles

Due to "barrier penetration", the electron density of a metal actually extends outside the surface of the metal!



x = 0



Assume that the work function (i.e., the energy difference between the most energetic conduction electrons and the potential barrier at the surface) of a certain metal is Φ = 5 eV. Estimate the distance x outside the surface of the metal at which the electron probability density drops to 1/1000 of that just inside the metal.