Prof. Eric Pop

1. Estimate how many modern transistors can fit within the period at the end of this sentence.

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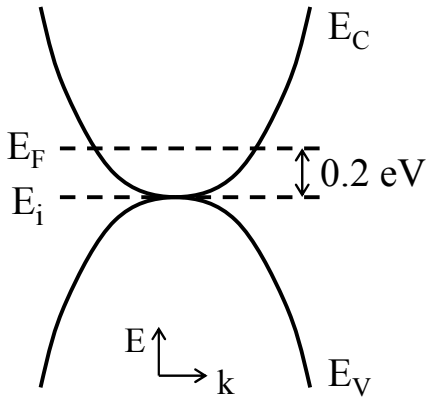
2. Consider a semimetal with the band diagram shown in the figure. The band gap is zero ($E_G = 0$) and the conduction and valence bands "touch" at a point with zero density of states. The semimetal has electron affinity $\chi = 4.5$ eV and it is *n*-doped, resulting in the Fermi level E_F.



a) The semimetal is brought in contact with a metal of workfunction $\Phi_M = 5$ eV. Draw and numerically label (where possible) the energy vs. position (E vs. x) band diagram of this junction.

b) We shine infrared light of 4 μm wavelength on the junction. Please explain where absorption happens (or does not happen) and why.