Fundamentals of Nanoelectronics, Basic Concepts Unit 3

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L3.6 Quiz

Answers

3.6. What a Probe Measures

3.6a We have seen that the potential measured by a weakly coupled non-invasive probe is equal to a weighted average of the quasi-Fermi levels μ^+ and μ^-. The weighting

(a) is equal for μ^+ and μ^-

(b) depends on the construction of the probe which can be modeled in terms of conductances

(c) is always much greater for μ^+ than for μ^-

(d) is always much less for μ^+ than for μ^-

(e) None of the above statements are true

3.6b The Buttiker equations for a four probe conductor

$$\begin{Bmatrix} I_1 \\ I_2 \\ I_3 \\ I_4 \end{Bmatrix} = \frac{1}{q} \begin{bmatrix} G_{11} & G_{12} & G_{13} & G_{14} \\ G_{21} & G_{22} & G_{23} & G_{24} \\ G_{31} & G_{32} & G_{33} & G_{34} \\ G_{41} & G_{42} & G_{43} & G_{44} \end{bmatrix} \begin{Bmatrix} m_1 \\ m_2 \\ m_3 \\ m_4 \end{Bmatrix}$$

involve a 4x4 G-matrix. Regardless of the detailed nature of the structure,

(a) each row *must sum to zero, but the columns can sum to anything*

(b) each column *must sum to zero, but the rowss can sum to anything*

(c) each row and each column *must sum to zero*

(d) all rows and columns can sum to anything, there is no restriction

(e) None of the above