4.2. Seebeck Coefficient

We have seen that the current can be written in terms of voltage and temperature differences in the form

\[ I = G_0 V + G_S T \]

Where

\[ G_0 = \int_{-\infty}^{+\infty} dE \left( \frac{\partial f_0}{\partial E} \right) G(E) \]

\[ G_S = \int_{-\infty}^{+\infty} dE \left( \frac{\partial f_0}{\partial E} \right) \frac{E - m_0}{qT_0} G(E) \]

4.2a A device with the source hotter than the drain is left open-circuited so that current is zero. Relative to the source, the drain will become

(a) Negative, always
(b) Positive, always
(c) Positive, if \( G(E) \) increases with increasing \( E \) around \( E = \mu \)
(d) Negative, if \( G(E) \) increases with increasing \( E \) around \( E = \mu \)
(e) none of the above, drain and source have the same potential.

4.2b The magnitude of the Seebeck coefficient \( S \) is given by

(a) \( |S| = \frac{G_S}{G_0} \)

(b) \( |S| = G + G_S \)

(c) \( |S| = G - G_S \)

(d) \( |S| = G \ast G_S \)

(e) S is unrelated to G and GS