

Quiz 9b

Wednesday, April 26, 2017 12:54 PM

Integrating density of states

For a 1d monatomic chain with 1 atomic orbital per atom

$$D_{1d}(E) = \frac{2}{\pi a} \frac{1}{\sqrt{4\beta^2 - (E - \alpha)^2}}$$

where $\alpha - 2|\beta| < E < \alpha + 2|\beta|$, and "a" is the distance between atoms.

Integrate the $D_{1d}(E)$ to find the total number of states per unit length with energy in the range $\alpha - 2|\beta| < E < \alpha + 2|\beta|$

$$\left[\begin{array}{l} \text{The definite integral} \\ \int_0^{x_0} \frac{1}{\sqrt{x_0^2 - x^2}} = \frac{\pi}{2} \\ \text{is useful for this question} \end{array} \right]$$