

Quiz 14

Friday, May 12, 2017 9:51 PM

Starting from

$$E(\vec{k}) = \sum_{\vec{R}} \frac{e^{i\vec{k} \cdot (\vec{R} - \vec{R}')}}{\sqrt{N}} \langle \vec{R}' | \hat{H}_{\text{crystal}} | \vec{R} \rangle$$

Find the dispersion relationship for a rectangular lattice in which the matrix element for nearest neighbor hopping is β_1 and the matrix element for next-nearest neighbor hopping is β_2 . The vector to the nearest neighbor is $\pm a_1 \hat{x}$. The vector to the next-nearest neighbor is $\pm a_2 \hat{y}$.