Nanoelectronics Workshop 2

15:00-16:00 on Friday, 03/02/2023 (LFA 204X)

Handed in by 12:00 on Thursday, 23/02/2023 via VLE

Note: 12.5% of Final Mark (50% from Workshops and 50% from Final Examination)

Feedback:

Question 1 is answered well. Please make sure to consider the definition of the momentum and energy using $\hbar$.

Question 2 is also answered well. As I explained in the workshop, you need to plot the probability at the beginning and the wave function at the end. Some of you seem to struggle to rearrange the integral to

$$\psi(x,t) = \int_{-\infty}^{+\infty} \frac{dk}{2\pi} A(k) e^{ikx}$$

$$= \frac{1}{2\pi} \exp\left(-\frac{x^2}{2\alpha} + ikx\right) \int_{-\infty}^{+\infty} \exp\left\{-\frac{\alpha}{2}\left(k - k_0 - i\frac{x}{\alpha}\right)^2\right\} dk$$

which allows you to use $\int_{-\infty}^{+\infty} \exp(-ax^2)dx = \sqrt{\frac{\pi}{a}} \quad (a > 0)$.

There are some minor mistakes in Questions 3. Please note that the last question asks you to sketch the lowest and the second lowest energy levels.