Answer on Question #70694, Physics / Quantum Mechanics

Question The wave function of a certain particle is $\phi = A\cos^2 x$ for $-\pi 2$ to $\pi 2$ find the value of A find the PROBABILITY THAT PARTICLE BE FOUND between O AND /4?

Solution We find from normalization condition:

$$\int_{-\pi/2}^{\pi/2} (A\cos^2 x)^2 dx = 1$$

$$\frac{3}{8}A^2\pi = 1$$

$$A = \sqrt{\frac{8}{3\pi}}$$

The probability is

$$P = \frac{8}{3\pi}\int_{\pi/4}^{0} (A\cos^2 x)^2 x dx = \frac{1}{12\pi}(8 + 3\pi)$$