



Determination of Probabilities and Expectation Values of Particle in 3D Box

• Stuti Pathak • Swati Shankar • Sneha Kiran • Rohit Singh

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Corresponding Author : **Rohit Singh**

Abstract : Particle in a 3 D box also known as infinite potential well or infinite square well is a defined space in which the particle is trapped inside and cannot be found outside because of impenetrable potential. The particle cannot be in rest as in the case of a classical one which is trapped in a box. It possesses certain minimum energy and can never stay still inside the box.

In this paper we have gone through the basics of quantum mechanics, the description and interpretation of wave function and further determining the probability and expectation value of finding the particle (electron) inside the box for $n < 3$ at various varied length of the box 'L' ($= 0.5 \text{ \AA}$) in a sequential manner by obtaining the energy eigenvalues of the particle after solving

the time independent Schrödinger equation. This paper is basically a review of the previous research work.

Keywords: Complex conjugate, Schrodinger equation, Probability amplitude, Expectation value, 3D box.

Introduction:

In order to explain the black body radiation many scientists gave theories having classical concept but the observed experimental results matched with the theories only when quantum aspects were taken into consideration (Verma 2009). Max Planck not only suggested that the spectra of black body radiation can be explained by considering quantized oscillators ($E=h\nu$) but also led the very first foundation of quantum mechanics. Albert Einstein famous photoelectric effect was the experimental evidence of quantization of energy (Verma, 2009). Neil Bohr's atomic model came out with the conclusion that electrons revolve around the nucleus in certain allowed orbits and have wave properties as they do not radiate energy just like standing waves. Later de-Broglie suggested that matter can also behave like waves. Davisson-Germer experiment supported the wave character

Stuti Pathak

B.Sc. III Year, Physics (Hons.),
Session : 2018 – 2021, Patna Women's College
Patna University, Patna, Bihar, India

Swati Shankar

B.Sc. III Year, Physics (Hons.),
Session : 2018 – 2021, Patna Women's College
Patna University, Patna, Bihar, India

Sneha Kiran

B.Sc. III Year, Physics (Hons.),
Session : 2018 – 2021, Patna Women's College
Patna University, Patna, Bihar, India

Rohit Singh

Assistant Professor, Department of Physics
Patna Women's College, Bailey Road,
Patna – 800 001, Bihar, India
E-mail : rohit.phy@patnawomenscollege.in