A.V. Education Society's

DEGLOOR COLLEGE,DEGLOOR

UNIT –I

PARTICLE PROPERTIES OF WAVES

CLASS: B.Sc. T Y.

by :

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OUTLINES:

INTRODUCTION

PHOTOELECTRIC EFFECT

INTRODUCTION:

Quantum Mechanics: Study of microscopic word

BRIEF HISTORY:

1900 (PLANCK): Light with frequency υ emitted in quantized lumps of energy and that come in integral multiple $E = h\upsilon$

1905(EINSTEIN): Quantization was in fact inherent to light that lumps and interpreted as particle called photon Photoelectric effect $E = pc$

1913(BOHR): Electron has wave like properties ,Quantization of energy

1924 (de-BROGLIE): Particles associated with wave, Wave particle duality,matter waves

1925 (HEISENBERG):Uncertainty principle

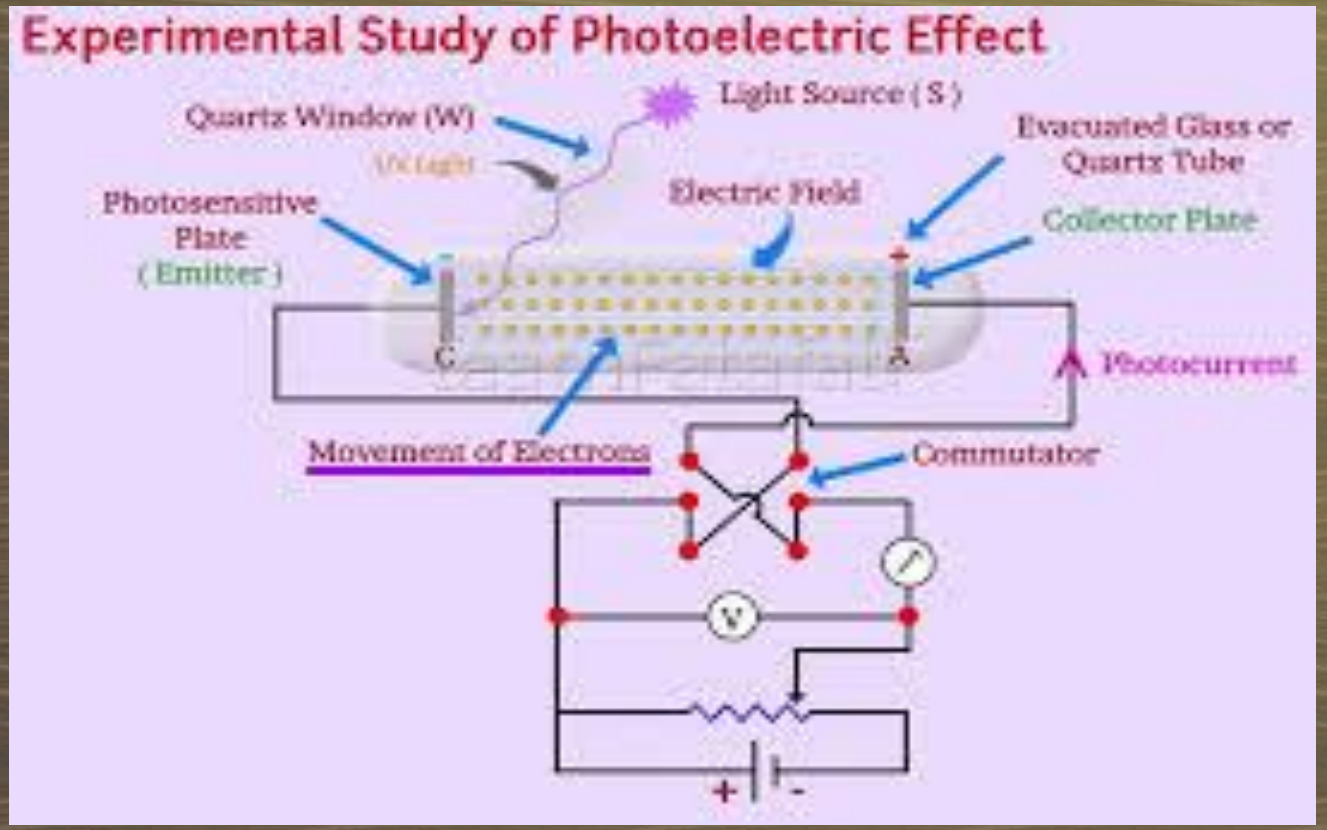
1926 (SCHRONDINGER): Wave equation that governs matter waves

1926 (BORN):Interpreted Schrondingers equation as probability amplitude

PHOTOELECTRIC EFFECT:

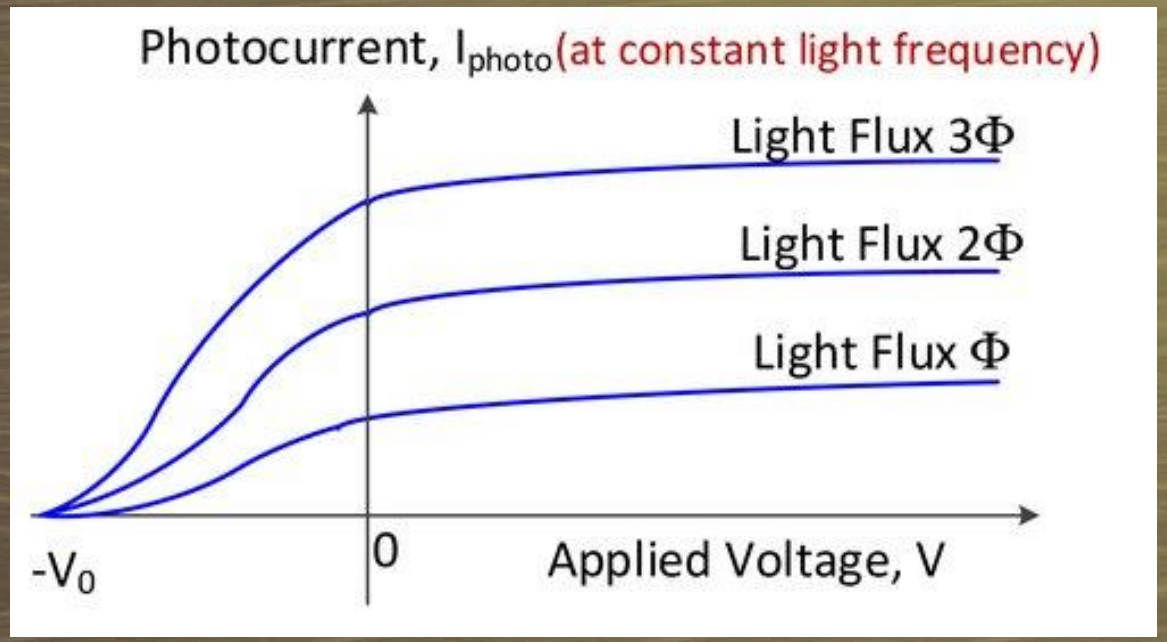
Statement: The phenomenon of ejection of electrons from metal surface when light of suitable wavelength falls on it

Experimental Arrangement:



OBSERVATIONS:

1. Variation of photoelectric current with P.D. at constant light frequency

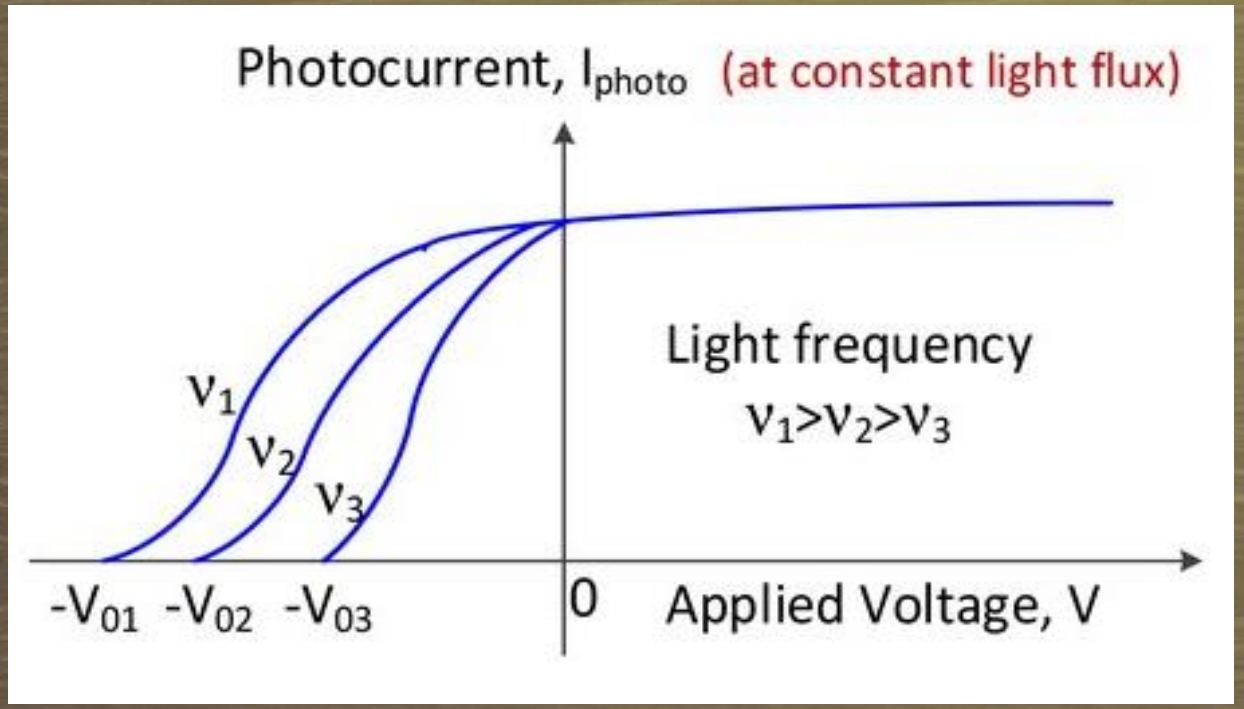


Conclusion:

1. Max. photoelectric current is directly proportional to intensity of incident light
2. Stopping potential is independent of intensity of light
3. Bright light yields more photoelectrons.

OBSERVATIONS:

2. Variation of photoelectric current with P.D. at constant light intensity (flux)

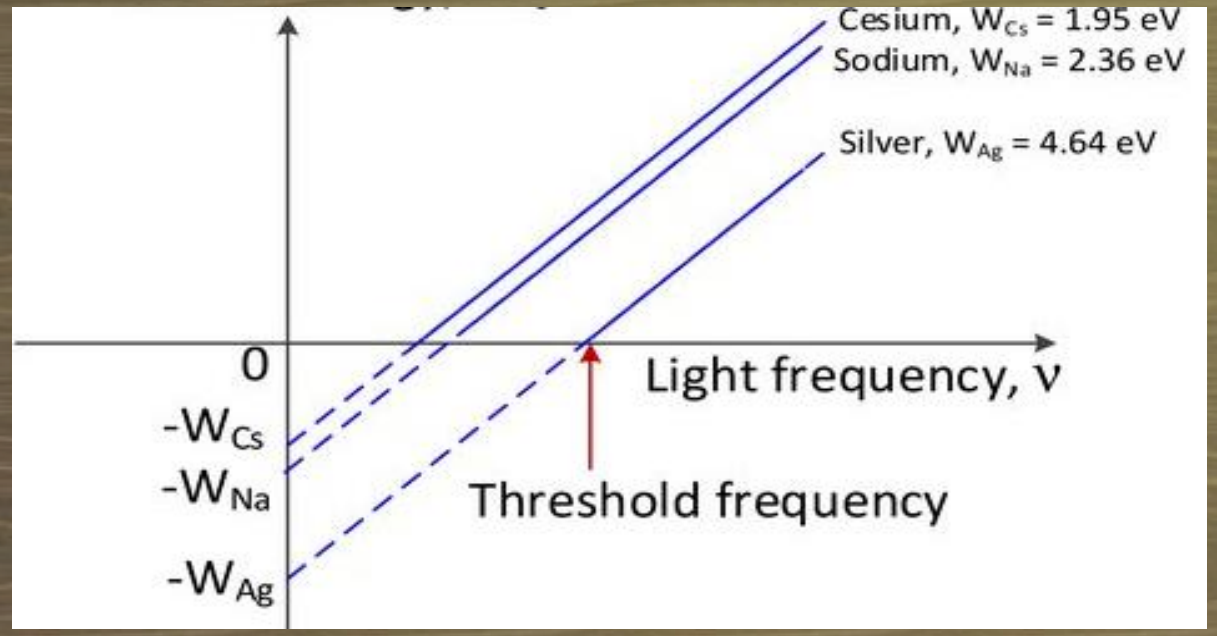


Conclusion:

1. Frequency changes , stopping potential changes
2. Higher the frequency, more energy the photoelectrons.
3. Blue light result in faster electrons than red light.

OBSERVATIONS:

3. Variation of max.KE of photoelectron with frequency of incident light



Conclusion:

1. Threshold frequency (υo) below which no photoelectric effect
2. Minimum energy for electron to escape is work function (φ)
3. Greater the (φ) more energy is needed for ejection of electron and higher the threshold frequency for photoelectric emission to occur.
4. Photoelectric effect: $h\upsilon = KE_{max} + \varphi$

SUMMARY:

Quantum mechanics is the branch of modern physics deals with study of microscopic world

The phenomenon of ejection of electrons from metal surface when light of suitable wavelength falls on it is photoelectric effect.

Bright light yields more photoelectrons than dim of same frequency.

Blue light result in faster electrons than red light.

Stopping potential is independent of intensity of light

Threshold frequency (υ_0) below which no photoelectric effect

QUESTIONS:

1. State photoelectric effect

2. Draw well labelled diagram of experimental set up of photoelectric effect

3. Explain the construction and working of photoelectric effect

QUESTIONS

4.Write the conclusions of Following graph