APPLIED QUANTUM MECHANICS

Unit 1 *Week 1*

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INADEQUACIES OF CLASSICAL PHYSICS

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- Atomic Spectra.

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- The collision is elastic i.e., energy and momentum is conserved.

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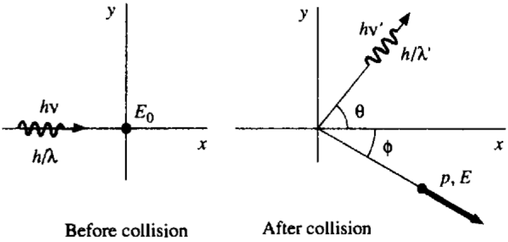

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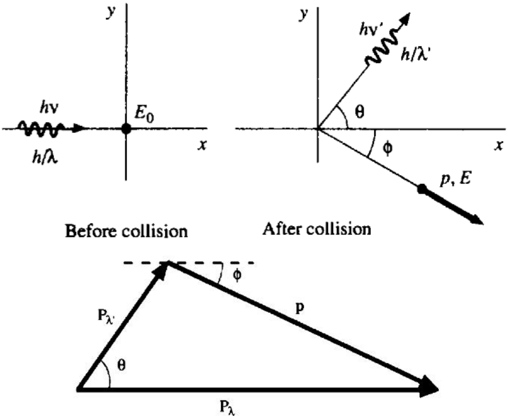

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$$\left(\frac{c}{\nu'} - \frac{c}{\nu}\right) = \Delta\lambda = \frac{h}{m_ec}(1 - \cos\theta)$$

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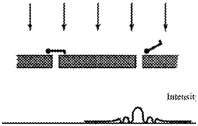

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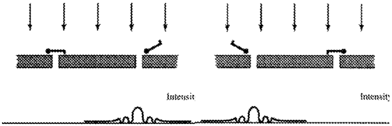

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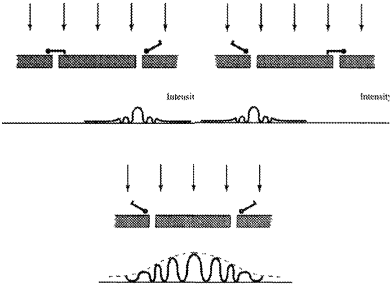

Dual Nature of light

- Suppose that the beam of light consisted of a stream of pointlike classical particles. We note that each one must pass through either one of lhe slits. Therefore, the pattern obtained when the two slits are open must be the overlapping of the patterns obtained when each of the slits is open separately.

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- Yet, if the light intensity is very weak, the photons will reach the screen at a low rate. The pattern will be formed slowly, a point at a time, indicating the arrival of separate photons to the screen.
- It is impossible to determine which slit each of these photons passes through; such a measurement would destroy the interference pattern.

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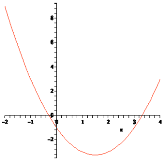

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The energy is

$$E_n = -\frac{2\pi^2}{n^2} \frac{me^4}{h^2}$$