SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

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COIMBATORE-641 035, TAMIL NADU

Department of Biomedical Engineering

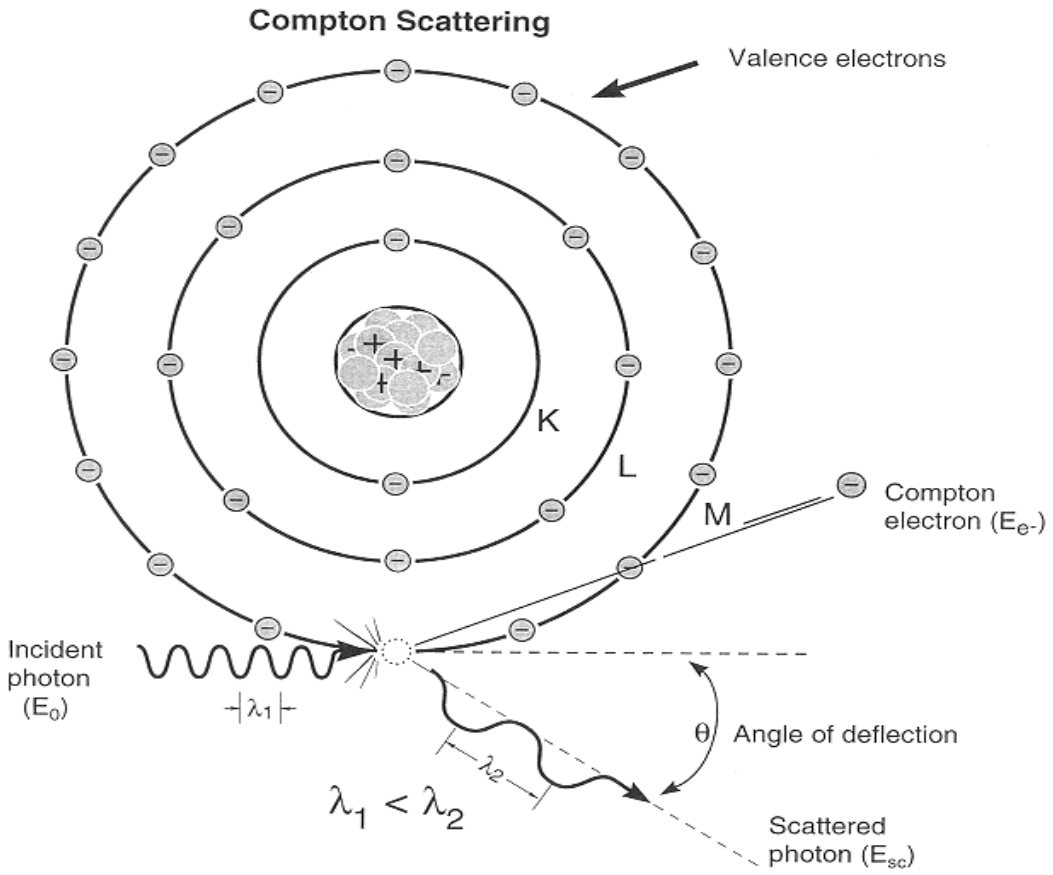
Course Code & Name: 19BME301 & Medical Physics

III Year : V Semester

Unit II – INTERACTION OF RADIATION WITH MATTER

Compton Scattering

- An incoming photon is partially absorbed in an outer shell electron
- The electron absorbs enough energy to break the binding energy, and is ejected
- The ejected electron is now a Compton electron
- Not much energy is needed to eject an electron from an outer shell
- The incoming photon, continues on a different path with less energy as scattered radiation


Compton Scattering
Valence electrons
K
L
M
Compton electron (E_{e^-})
Incident photon (E_0)
λ_1
θ
Angle of deflection
λ_2
$\lambda_1 < \lambda_2$
Scattered photon (E_{sc})

Byproducts of Compton Scatter

- Compton scattered electron
  - Possesses kinetic energy and is capable of ionizing atoms
  - Finally recombines with an atom that has an electron deficiency
- Scattered x-ray photon with lower energy
  - Continues on its way, but in a different direction
  - It can interact with other atoms, either by photoelectric or Compton scattering

Probability of Compton Scatter Occurring

- Increases as the incoming photon energy increases up to certain limit then decreases as the photon energy increases.
- Independent on Z of the absorber.
- The Compton process is most important for energy absorption for soft tissues in the range from 100 keV to 2MeV.