

Answer on Question #60055-Physics-Atomic and Nuclear Physics

Give expressions which define the quantities kerma, exposure and dose in terms of energy fluence and appropriate interaction coefficients. Define each of the terms.

Answer

Kerma

Kerma is usually expressed in terms of the uncharged energy fluence with respect to energy. Kerma K is then given by

$$K = \Psi \left(\frac{\overline{\mu_{tr}}}{\rho} \right)$$

Where $\left(\frac{\overline{\mu_{tr}}}{\rho} \right)$ is the mass energy transfer coefficient of the material for uncharged particles of energy E
Unit: $m^2 kg^{-1}$.

Dose

For energy fluence of identical charged particles in a medium, the absorbed dose D_{med} is given by:

$$D_{med} = \Psi_{med} \left(\frac{\overline{\mu_{en}}}{\rho} \right)_{med}$$

Where $\left(\frac{\overline{\mu_{en}}}{\rho} \right)_{med}$ is the mass energy absorption coefficient of the material.

Exposure

$$X = \Psi \left(\frac{\overline{\mu_{en}}}{\rho} \right)_{air} \left(\frac{e}{W} \right)_{air},$$