Compton's equation for scattering

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Abstract

Generated by the Physics Derivation Graph.

Eq. 1 is an initial equation.

$$\vec{p}_{\text{before}} = \vec{p}_{\text{after}} \tag{1}$$

Eq. 2 is an initial equation.

$$\vec{p}_{\text{before}} = \vec{p}_1 \tag{2}$$

Eq. 3 is an initial equation.

$$\vec{p}_{\text{after}} = \vec{p}_2 + \vec{p}_{electron} \tag{3}$$

Substitute LHS of Eq. 1 into Eq. 2; yields Eq. 4.

$$\vec{p}_{\text{after}} = \vec{p}_1 \tag{4}$$

Substitute LHS of Eq. 3 into Eq. 4; yields Eq. 5.

$$\vec{p}_1 = \vec{p}_2 + \vec{p}_{electron} \tag{5}$$

Subtract $\vec{p}_2$ from both sides of Eq. 5; yields Eq. 6.

$$\vec{p}_1 - \vec{p}_2 = \vec{p}_{electron} \tag{6}$$

Swap LHS of Eq. 6 with RHS; yields Eq. 7.

$$\vec{p}_{electron} = \vec{p}_1 - \vec{p}_2 \tag{7}$$

Multiply Eq. 7 by Eq. 7; yields Eq. 8.

$$\vec{p}_{electron} \cdot \vec{p}_{electron} = (\vec{p}_1 \cdot \vec{p}_1) + (\vec{p}_2 \cdot \vec{p}_2) - 2(\vec{p}_1 \cdot \vec{p}_2) \tag{8}$$

References