

Collision Scattering of Neutrons with Protons

May 14, 1937

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$$\begin{aligned}
 | \quad |^2 &= 2 - 2 \cos 2\delta_0 + 3 \xi \cos \theta \left\{ (e^{2i\delta_0} - 1) (e^{-2i\delta_1} - 1) \right. \\
 &+ \left. (e^{-2i\delta_0} - 1) (e^{2i\delta_1} - 1) \right\} + 9 \xi^2 \cos^2 \theta (2 - 2 \cos 2\delta_1) \\
 &= 4 \sin^2 \delta_0 + 3 \xi \cos \theta \left\{ e^{2i(\delta_0 - \delta_1)} - e^{2i\delta_0} - e^{-2i\delta_1} + 1 \right. \\
 &+ \left. e^{-2i(\delta_0 - \delta_1)} - e^{-2i\delta_0} - e^{2i\delta_1} + 1 \right\} + 9 \xi^2 \cos^2 \theta \times 4 \sin^2 \delta_1 \\
 &= 4 \left\{ \sin^2 \delta_0 + 3 \xi \cos \theta \left(\sin^2 \delta_0 \overset{\text{cancel}}{\cancel{-}} + \sin^2 \delta_1 - \sin^2(\delta_0 - \delta_1) \right) \right. \\
 &+ \left. 9 \xi^2 \cos^2 \theta \sin^2 \delta_1 \right\} \\
 &= 4 \left\{ \sin^2 \delta_0 + 3 \xi \cos \theta \left(\sin^2 \delta_0 \overset{\text{cancel}}{\cancel{-}} + \sin^2 \delta_1 - \sin^2(\delta_0 - \delta_1) \right) \right. \\
 &+ \left. 9 \xi^2 \cos^2 \theta \sin^2 \delta_1 \right\}
 \end{aligned}$$

$\sin^2 \delta_0 \sin^2 \delta_1 + \sin^2 \delta_1 \sin^2 \delta_0$
 $+ 2 \sin \delta_0 \sin \delta_1 \cos \delta_0 \cos \delta_1$

$-(\sin \delta_0 \cos \delta_1 - \cos \delta_0 \sin \delta_1)^2$