General Physics Notes (0901026):

We'll look at a radial integral to study scattering. In momentum space we start.

$$f^{(1)}(\vec{k}-\vec{k'}) = \frac{-2\lambda}{q\hbar^2}\int_0^\infty r\partial r \sin(qr)W(r) \tag{1}$$

Study momentum transfer too.

$$q = |\vec{k}-\vec{k'}| \tag{2}$$

If we have short range nucleon interaction, we'll investigate the Yukawa potential.

$$W(r) = \lambda e^{-\frac{r}{R}} \tag{3}$$

Scattering generastes a Yukawa relation.

$$\frac{-2\lambda}{q\hbar^2}\int_0^\infty r\partial r \sin(qr)\lambda e^{-\frac{r}{R}} \tag{4}$$

We integrate by parts. Higher born approximation calculates out to infinity, then we sum the average.

$$f'(k\to k') = \frac{2\lambda u R^2}{\hbar^2(1+R^2q^2)} \tag{5}$$

Useful is the Green's function calculation.

$$G(\vec{r},\vec{r'},E) = \langle\vec{r}|\frac{1}{E-H^{(0)}}|\vec{r}\rangle \tag{6}$$

If you would like to know more, please look at my handwritten notes.