On the energy shell (on-shell) and off the energy shell (off-shell)

The Lippmann-Schwinger equation reads

$$T(q,q) = V(q,q) + \int d^3k\, V(q,k) \frac{1}{e} T(k,q)$$

where q is a relativistic center-of-mass momentum related to a lab energy by

$$T_{\text{lab}} = \frac{2q^2}{M}$$

Define two momenta:

$q \equiv$ On-the-shell energy (on-shell momentum), this conserves energy.

$k \equiv$ Off-the-shell energy (off-shell momentum), when $k \neq q$, this prevents from conservation of energy.