The Photon Impulse Equation

SERGEJ REISSIG, EFBR — By using of the Newton formula \( F = \frac{dp}{dt} = \frac{d(mc)}{dt} \) (1) together with the Einstein formula \( E = mc^2 \) the following equation can be received:

\[
F = \frac{d}{dt} \left( mc \right) = \frac{1}{c} \cdot \frac{d}{dt} \left( mc^2 \right) = \frac{1}{c} \cdot \frac{dE}{dt} \tag{2}
\]

(2). In [1,2] was shown: \(-dE/dt = P = hf^2\) (3). The solution of the equation system (2,3) delivers the expression for the photon force:

\[
F = -\frac{1}{c} \cdot hf^2 = -\frac{hc^2}{c^2} = -\frac{hc}{c} = -hf \tag{3}
\]

(3). With Eq. (2) and (3) the following relationship can be presented:

\[
\frac{dE}{dt} = P = hf \tag{4}
\]

(4). The Eq. (4) let us to derive the photon impulse equation finally:

\[
\frac{dp}{dt} = \frac{d(mc)}{dt} = -f \cdot dt \tag{5}
\]
