THE PHOTON IMPULSE EQUATION

Dr. Sergej Reissig, EFBR

By using of the Newton formula
\[ F = \frac{dp}{dt} = \frac{d(mc)}{dt} \]  \hspace{1cm} (1)

together with the Einstein formula \( E = mc^2 \) the following equation can be received:
\[ F = \frac{d(mc)}{dt} = \frac{1}{c} \cdot \frac{d(mc^2)}{dt} = \frac{1}{c} \cdot \frac{dE}{dt} \]  \hspace{1cm} (2)

In [1,2] was shown: \(- \frac{dE}{dt} = P = hf^2\) (3). The solution of the equation system (2,3) delivers the expression for the photon force:
\[ F = -\frac{1}{c} \cdot hf^2 = -\frac{hc^2}{c\lambda^2} = -\frac{hc}{\lambda^2} = -\frac{hf}{\lambda} \]  \hspace{1cm} (4)

With Eq. (2) and (4) the following relationship can be presented:
\[ \frac{d(mc)}{dt} = -\frac{E}{\lambda} = -mc \cdot \frac{c}{\lambda} \]  \hspace{1cm} (5)

The Eq. (5) let us to derive the photon impulse equation finally:
\[ \frac{dp}{p} = \frac{d(mc)}{mc} = -f \cdot dt \]  \hspace{1cm} (6)

References


Erlangen, 23.11.2004