Erratum to

Comment on "The Mössbauer rotor experiment and the general theory of relativity"

[Ann. Physics 368 (2016) 258-266]

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Abstract

Here we want to report an unfortunate misprint in our paper Comment on "The Mössbauer rotor experiment and the general theory of relativity" [Ann. Physics 368 (2016) 258-266], which was published in Annals of Physics [1].

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(1) Page 4. The text below Eq. (16) should be corrected.

We rewrite Eq. (16) in the form

$c_R(t_1 - t_2) = R, c_R = c(1 + X^2/6)^{-1} \quad (16.a)$

Note that the photodetection probability per unit time in inertial frame (3) is [2]

$\frac{dP}{dt} = \Gamma H\left(t - \frac{u \cdot r}{c}\right) \exp\left[-\Gamma\left(t - \frac{u \cdot r}{c}\right)\right], \quad (16.b)$

where $H(\tau), \tau = t - u \cdot r/c$ is the Heaviside step function, equal to 0 if $\tau < 0$ and 1 if $\tau \geq 0$, and $\Gamma \gg 1$. Thus the photodetection signal propagates without a distortion with the speed c in the direction specified by $\mathbf{u}$. Note that in the inertial frame the photodetection probability depends on space and time only through the quantity

$\tau = t - \|r\| \cos(u, r) / c$.

In the rotating frame the photodetection probability depends only on space and time through the quantity $\tau = t - \|r\| \cos[(u, r) + \omega t] / c_{\|r\|}$, since the photodetection probability per unit time in the rotating frame (5) is

$\frac{dP}{dt} = \Gamma H\left(t - \frac{\|r\| \cos[(u,r)+\omega t]}{c_{\|r\|}}\right) \exp\left[-\Gamma\left(t - \frac{\|r\| \cos[(u,r)+\omega t]}{c_{\|r\|}}\right)\right]. \quad (16.c)$

Under conditions of the canonical Kündig experiment $\cos[(u, r) + \omega t] \simeq 1$ and finally one obtains

$\frac{dP}{dt} \simeq \Gamma H\left(t - \frac{\|r\|}{c_{\|r\|}}\right) \exp\left[-\Gamma\left(t - \frac{\|r\|}{c_{\|r\|}}\right)\right]. \quad (16.d)$

It follows from Eq. (16.d) that the Eq. (16.a) holds with a probability 1.

(2) Page 4-5. The text below Eq. (18).

Instead of

"Let the radiator in the center of the disk, where the metric is flat, produce two flashes with the interval δt. As both pulses in the tube pass a similar path and the metric (5) is stationary, then the path difference between two pulses will be similar. This results in the similar value δt in accordance with the IRF clock between radiated pulses at the input of the tube and at the output of it. This can be expressed in the form"

it should be corrected

"Let the radiator in the center of the disk, where the metric is flat, produce two wave packets with the interval δt. Thus from Eq.(18) one obtains (19)...

(3) Page 5. The text below Eq. (19).

Instead of

"In (19) δt is the specified difference of the intervals between flashes, and $\delta \tau_1$ is the sought value. Subtracting (18) from (19) and transmitting from the pulse repetition period to

corresponding frequencies $1/\delta t = \nu_0, \quad 1/\delta\tau_1 = \nu_R$ we have"
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"In (19) δt is the specified difference of the intervals between produced flashes, and $\delta\tau_1$ is the sought value. Subtracting (18) from (19) and transmitting from the signal repetition period to corresponding frequencies $1/\delta t = \nu_0, \quad 1/\delta\tau_1 = \nu_R$ we have"
No formal calculation is affected.

Note that: (1) the paper [4] contains a wrong clime. The Eq. (1) in [4] is wrong since it contradicts both the general relativity and the equation of conservation of energy-momentum [5]-[6].

(2) In paper [4] the authors argued that: “The same blue shift of the frequency of the resonant γ-quanta has been obtained in all other Mössbauer rotor experiments [1-6] in the configuration where the source of resonant radiation was located on the rotational axis, and the resonant absorber was mounted on the rotor rim”. However it is well known that a red shift has been obtained in all Mossbauer rotor experiments [1-6] in accordance with the general relativity prediction but not a blue shift.

(3) In paper [4] the authors argued that: “The constraint (8a) used in Ref. [26] implies that the resonant γ-quanta will propagate along the radial coordinate r of the rotating system, and hence, a laboratory observer would see the propagation of such γ-quanta along a curved path”. This statement is wrong and based on mistaken concept meaning since such γ-quanta are well localized in k space and are not well localized in x space [7]-[8].Thus a laboratory observer would see nothing since there is no any curved path mentioned in their completely mistaken paper [4].

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