Erratum to: Strong Gravitational Lensing in the Einstein-Proca Theory

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Published online: 5 August 2015
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Erratum to: Int J Theor Phys (2015) 54:1245–1252
DOI 10.1007/s10773-014-2321-4

In this erratum, we correct and clarify some of statements in our published paper. A few equations given in our paper were actually obtained and published many years ago by Virbhadrar's research group of strong field gravitational lensing. We clarify that those equations were neither obtained by us nor by others cited in our paper.

(A) In section.2 on page number 1247 of our paper, we correct our statement:

According to the geometric principle, the relationship between the image and the source angular positions is described by the famous Virbhadrar-Ellis lens equation [1]. This equation is written in our paper as Eq. (7).

$$\tan \theta - \tan \beta = D_{LS} / [\tan \theta + \tan(\alpha - \alpha)] \times D_{OS}. \quad (1)$$

This equation resurrected the dormant field of black hole gravitational lensing.

(B) See the paragraph below the Eq. (7) in section 2 of our paper. There is an equation in this paragraph which is not numbered. This equation was obtained by Virbhadrar and Ellis [2] and Claudel, Virbhadrar, and Ellis [3] with the help of 2 different formalisms which gave the same result. This is a photon sphere equation for a general static and spherically symmetric. We wrote and used their equation [2, 3] in our paper for our calculation.

$$C'(r)/C(r) = A'(r)/A(r) \quad (2)$$

The online version of the original article can be found at <http://dx.doi.org/10.1007/s10773-014-2321-4>.

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(C) Equations (9) with (10) in our paper which represent light deflection angle and Eq. (8) which is for the impact parameter both were derived by Virbhadra *et al* [4] in the year 1998 and is also discussed in [5].

The deflection angle is $\alpha(r_0)$ is

$$\alpha(r_0) = I(r_0) - \pi, \quad I(r_0) = \int_{r_0}^{\infty} \frac{2\sqrt{B}}{\sqrt{C} \sqrt{\frac{C}{C_0} \frac{A_0}{A} - 1}} dr \quad (3)$$

The impact parameter

$$u = r_0 \sqrt{C(r_0)/A(r_0)} \quad (4)$$

All these equations played very important role when we computed the strong gravitational lensing effects in the Einstein-Proca theory. In view of this, we clarify that it is necessary for us to state an erratum, because we ignored stating the provenance of those equations in the published paper.

We are indebted to Dr. K. S. Virbhadra for illuminating correspondence.

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