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Erratum: Derivation of transient relativistic fluid dynamics from the Boltzmann equation [Phys. Rev. D 85, 114047 (2012)]

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An error was found in the second line of Eq. (12), first line of Eq. (62), in Eq. (72), in Tables I and V, and in Eq. (C3) of Ref. [1]. The correct thermodynamic relation has a negative sign that was missing in Eq. (12) and, therefore,

$$\beta_0 = \frac{\partial s_0}{\partial \epsilon}\Big|_n , \alpha_0 = -\frac{\partial s_0}{\partial n}\Big|_\epsilon . \tag{12}$$

In the first line of Eq. (62), the sign of the second term, $(\zeta_i - \Omega_{i0}^{(0)}\zeta_0)$, was incorrect. This term should have a positive sign and the corrected equation reads

$$\frac{m^2}{3}\rho_i \simeq -\Omega_{i0}^{(0)}\Pi + (\zeta_i - \Omega_{i0}^{(0)}\zeta_0)\theta = -\Omega_{i0}^{(0)}\Pi + \mathcal{O}(\mathrm{Kn}). \tag{62}$$

The remaining two equations listed as part of Eq. (62) have no mistakes.

In Eq. (72), the term $-n_\mu\omega^{\mu\nu}$ [the first term on the right-hand side of the second equation listed in Eq. (72)] and the term $2\pi_\lambda^{\langle\mu}\omega^{\nu\rangle\lambda}$ [the first term on the right-hand side of the third equation listed in Eq. (72)] should be multiplied by τ_n and τ_π, respectively. The corrected form for Eq. (72) then reads

$$\begin{aligned}\mathcal{J}^\mu &= -\tau_n n_\nu\omega^{\nu\mu} - \delta_{nn}n^\mu\theta - \ell_{n\Pi}\nabla^\mu\Pi + \ell_{n\pi}\Delta^{\mu\nu}\nabla_\lambda\pi_\nu^\lambda + \tau_{n\Pi}\Pi F^\mu - \tau_{n\pi}\pi^{\mu\nu}F_\nu \\ &\quad - \lambda_{nn}n_\nu\sigma^{\mu\nu} + \lambda_{n\Pi}\Pi I^\mu - \lambda_{n\pi}\pi^{\mu\nu}I_\nu, \\ \mathcal{J}^{\mu\nu} &= 2\tau_\pi\pi_\lambda^{\langle\mu}\omega^{\nu\rangle\lambda} - \delta_{\pi\pi}\pi^{\mu\nu}\theta - \tau_{\pi\pi}\pi^{\lambda\langle\mu}\sigma_\lambda^{\nu\rangle} + \lambda_{\pi\Pi}\Pi\sigma^{\mu\nu} - \tau_{\pi n}n^{\langle\mu}F^{\nu\rangle} \\ &\quad + \ell_{\pi n}\nabla^{\langle\mu}n^{\nu\rangle} + \lambda_{\pi n}n^{\langle\mu}I^{\nu\rangle}.\end{aligned} \tag{72}$$

The first equality of Eq. (72) remains unchanged.

In Tables I and V of Ref. [1], the massless limit of the transport coefficient $\tau_{n\pi}$ in the 14-moment approximation was incorrectly listed as being zero. The actual massless limit of the aforementioned transport coefficient is $\beta_0/80\tau_n$. In the following, we list the corrected tables:

For the sake of completeness, we list the complete tables, including the terms that were originally correct.

TABLE I. The coefficients for the particle diffusion for a classical gas with constant cross section in the ultrarelativistic limit, in the 14-moment approximation. The transport coefficient $\tau_{n\pi}$ was incorrectly listed as being zero in Ref. [1]

κ	$\tau_n[\lambda_{\mathrm{mfp}}]$	$\delta_{nn}[\tau_n]$	$\lambda_{nn}[\tau_n]$	$\lambda_{n\pi}[\tau_n]$	$\ell_{n\pi}[\tau_n]$	$\tau_{n\pi}[\tau_n]$
$3/(16\sigma)$	9/4	1	3/5	$\beta_0/20$	$\beta_0/20$	$\beta_0/80$

TABLE V. The coefficients for the particle diffusion for a classical gas with constant cross section in the ultrarelativistic limit, in the 14-, 23-, 32-, and 41-moment approximations. The transport coefficient $\tau_{n\pi}$ was incorrectly listed in Ref. [1] as being zero in the 14-moment approximation.

Number of moments	κ	$\tau_n[\lambda_{\mathrm{mfp}}]$	$\delta_{nn}[\tau_n]$	$\lambda_{nn}[\tau_n]$	$\lambda_{n\pi}[\tau_n]$	$\ell_{n\pi}[\tau_n]$	$\tau_{n\pi}[\tau_n]$
14	$3/(16\sigma)$	9/4	1	3/5	$\beta_0/20$	$\beta_0/20$	$\beta_0/80$
23	$21/(128\sigma)$	2.59	1.0	0.96	$0.054\beta_0$	$0.118\beta_0$	$0.0295\beta_0/P_0$
32	$0.1605/\sigma$	2.57	1.0	0.93	$0.052\beta_0$	$0.119\beta_0$	$0.0297\beta_0/P_0$
41	$0.1596/\sigma$	2.57	1.0	0.92	$0.052\beta_0$	$0.119\beta_0$	$0.0297\beta_0/P_0$

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Finally, Eq. (C3) (for the transport coefficient $\delta_{\Pi\Pi}$) in Appendix C of Ref. [1] has a mistake. The derivatives of Ω_{r0} with respect to α_0 and β_0 should be interchanged. The corrected formula for this transport coefficient is

$$\delta_{\Pi\Pi} = \frac{2}{3}\tau_{00}^{(0)} + \frac{m^2}{3}\gamma_2^{(0)}\tau_{00}^{(0)} - \frac{m^2}{3}\sum_{r=0,\neq 1,2}^{N_0}\tau_{0r}^{(0)}\frac{G_{2r}}{D_{20}} + \frac{1}{3}\sum_{r=0}^{N_0-3}(r+5)\tau_{0,r+3}^{(0)}\Omega_{r+3,0}^{(0)} - \frac{m^2}{3}\sum_{r=0}^{N_0-5}(r+4)\tau_{0,r+5}^{(0)}\Omega_{r+3,0}^{(0)}$$
$$+ \frac{(\varepsilon_0+P_0)J_{20} - n_0 J_{30}}{D_{20}}\sum_{r=3}^{N_0}\tau_{0r}^{(0)}\frac{\partial\Omega_{r0}^{(0)}}{\partial\alpha_0} + \frac{(\varepsilon_0+P_0)J_{10} - n_0 J_{20}}{D_{20}}\sum_{r=3}^{N_0}\tau_{0r}^{(0)}\frac{\partial\Omega_{r0}^{(0)}}{\partial\beta_0}. \quad \text{(C3)}$$

We note that in the publications that followed Ref. [1], the aforementioned mistakes were already corrected.

[1] G. S. Denicol, H. Niemi, E. Molnar, and D. H. Rischke, Phys. Rev. D **85**, 114047 (2012).