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Erratum: Anomalous non-conservation of fermion/chiral number in Abelian gauge theories at finite temperature

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To confront the numerical results of $\Gamma_{\rm diff}$ with the analytical results from section 2.3, we originally considered the theoretical prediction for the diffusion rate given by eq. (2.17), which we re-wrote in eq. (4.25). However, we have more recently found in ref. [1] that eq. (2.17), based on eq. (2.16), has an extra factor 2. The correct expression for eq. (2.16) should rather read $\Gamma_5 = 6\frac{\Gamma}{T^3}$ (instead of $\Gamma_5 = 12\frac{\Gamma}{T^3}$), see appendix B in ref. [1] for details. Furthermore, to make the comparison between the theoretical rate and our lattice prediction, we also used eq. (1.11) for the MHD conductivity. The conductivity prediction has been however refined in refs. [2, 3]. Putting all together, we conclude in ref. [1] that the effective diffusion rate expected in MHD, can be written as

$$\Gamma_{\rm diff}^{\rm (th)} \simeq 4.1 \cdot 10^{-5} \log(17.6/e^2)\, e^6 B^2 \,. \tag{1}$$

Comparing the theoretical prediction eq. (1) [say for $e^2 = 1$] with a re-analysis of the numerical diffusion rate $\Gamma_{\rm diff}$ (by weighting the mean values of our data with the error $\Delta\Gamma_{\rm diff}$, cf. eq. (4.8), and without assuming an enforcement of a fixed exponent in the scaling of Γ with e^2), we obtain now in ref. [1]

$$\left.\frac{\Gamma_{\rm diff}^{\rm (num)}}{\Gamma_{\rm diff}^{\rm (th)}}\right|_{e^2=1} = 11.2^{+6.9}_{-4.3}\,. \tag{2}$$

This computation reduces by a factor $\sim 5-6$ our original claim in the discrepancy between theory and numerics: we still obtain that the numerically extracted rates are larger than the MHD counterpart by a factor $\mathcal{O}(10)$, but this factor is rather ~ 11, instead of the originally claimed factor ~ 58. The reduction from a factor ~ 58 down to ~ 11 is a combined effect of correcting a factor 2 in eq. (2.16) [this leads to a ratio ~ 29] and a factor ~ 2.6 when comparing the numerical result against the theoretical prediction eq. (1), instead of eq. (1.11) [this leads to the final ratio ~ 11]. The errors in the new ratio are also larger, as we do not fix the scaling power of $\Gamma_{\rm diff}$ with e^2, and hence the numerical fit we use now exhibits larger errors. If we enforce a scaling $\Gamma_{\rm diff} \propto e^6$, as we did originally in the main text of the article, we still obtain a similar ratio $11.4^{+3.0}_{-2.4}$, albeit with smaller errors.

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