Erratum: The β -function for Yukawa theory at large N_f

Tommi Alanne, Simone Blasi

*Max-Planck-Institut für Kernphysik,
Saupfercheckweg 1, 69117 Heidelberg, Germany*

E-mail: tommi.alanne@mpi-hd.mpg.de, simone.blasi@mpi-hd.mpg.de

ERRATUM TO: [JHEP08\(2018\)081](#)

ARXIV EPRINT: [1806.06954](#)

There was an error in the computation of the n -loop part of the scalar self-energy in our paper [1]. The mistake was in the computation of $G(1, 1, 1, 1, (n-2)\epsilon/2)$, which we now have evaluated recursively using eqs. (2.19) and (2.21) in ref. [2]. This resulted unfortunately in wrong expression of the function $\xi_0(\epsilon)$ in eq. (4.20). The equation should instead read

$$\xi_0(\epsilon) = -\frac{(1-\epsilon)\Gamma(4-\epsilon)}{\Gamma(2-\frac{\epsilon}{2})\Gamma(3-\frac{\epsilon}{2})\pi\epsilon} \sin\left(\frac{\pi\epsilon}{2}\right) = (1-\epsilon)\xi(\epsilon, 1). \quad (1)$$

Consequently, the expression of $I_1(t)$ in eq. (5.5) becomes

$$I_1(t) = \frac{\xi(t, 1) - \xi_0(t)}{t} = \xi(t, 1) = -\frac{\Gamma(4-t)}{\Gamma(2-\frac{t}{2})\Gamma(3-\frac{t}{2})\pi t} \sin\left(\frac{\pi t}{2}\right), \quad (2)$$

and it is shown in figure 1.

As a consequence, the first singularity of the β -function appears at $K = 5$ instead of $K = 3$. Qualitatively the analysis of the singularity structure remains the same.

We have checked that the corrected result agrees completely with the perturbative four-loop result [3] at the leading order in N_f , and with the result extracted from the critical exponents in Gross-Neveu-Yukawa model computed using a different technique [4].

Figure 1. The function $I_1(t)$.

Open Access. This article is distributed under the terms of the Creative Commons Attribution License ([CC-BY 4.0](https://creativecommons.org/licenses/by/4.0/)), which permits any use, distribution and reproduction in any medium, provided the original author(s) and source are credited.

References

- [1] T. Alanne and S. Blasi, *The β -function for Yukawa theory at large N_f* , *JHEP* **08** (2018) 081 [[arXiv:1806.06954](https://arxiv.org/abs/1806.06954)] [[INSPIRE](#)].
- [2] A.G. Grozin, *Lectures on multiloop calculations*, *Int. J. Mod. Phys. A* **19** (2004) 473 [[hep-ph/0307297](https://arxiv.org/abs/hep-ph/0307297)] [[INSPIRE](#)].
- [3] N. Zerf, L.N. Mihaila, P. Marquard, I.F. Herbut and M.M. Scherer, *Four-loop critical exponents for the Gross-Neveu-Yukawa models*, *Phys. Rev. D* **96** (2017) 096010 [[arXiv:1709.05057](https://arxiv.org/abs/1709.05057)] [[INSPIRE](#)].
- [4] J.A. Gracey, *Critical exponent ω in the Gross-Neveu-Yukawa model at $O(1/N)$* , *Phys. Rev. D* **96** (2017) 065015 [[arXiv:1707.05275](https://arxiv.org/abs/1707.05275)] [[INSPIRE](#)].