Erratum: Interplay of Coulomb interactions and disorder in three-dimensional quadratic band crossings without time-reversal symmetry and with unequal masses for conduction and valence bands [Phys. Rev. B 97, 125121 (2018)]

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(Received 14 December 2021; published 4 January 2022)

DOI: 10.1103/PhysRevB.105.039901

There were errors in Eqs. (A6) and (A7) of the published version of the paper. These should be corrected to

$$\Gamma_{ab}\,\Gamma_f = i(\delta_{af}\Gamma_b - \delta_{bf}\Gamma_a) - \frac{\varepsilon_{abfcd}\Gamma_{cd}}{2}, \quad \Gamma_f\Gamma_{ab} = i(\delta_{bf}\Gamma_a - \delta_{af}\Gamma_b) - \frac{\varepsilon_{abfcd}\Gamma_{cd}}{2}, \tag{A6}$$

and

$$\begin{aligned} \sum_{a<b}\Gamma^i_{ab}\Gamma^i_e\big(\Gamma^j_{ab}\Gamma^j_e + \Gamma^j_e\Gamma^j_{ab}\big) &= 3\sum_{a<b}\Gamma^i_{ab}\Gamma^j_{ab},\\ \sum_{a<b,c,f}\Gamma^i_{ab}\Gamma^i_f\Gamma^i_c\big(\Gamma^j_{ab}\Gamma^j_f\Gamma^j_c + \Gamma^j_c\Gamma^j_f\Gamma^j_{ab}\big) &= 34\sum_{a<b}\Gamma^i_{ab}\Gamma^j_{ab},\\ \sum_{a<b,\,c<d,\,e}\Gamma^i_{ab}\,\Gamma^i_e\,\Gamma^i_{cd}\big(\Gamma^j_{ab}\,\Gamma^j_e\,\Gamma^j_{cd} + \Gamma^j_{cd}\,\Gamma^j_e\,\Gamma^j_{ab}\big) &= 60 + 68\sum_a\Gamma^i_a\,\Gamma^j_a. \end{aligned} \tag{A7}$$

These two errors affect the BCS+ZS′ loop results involving the tensor disorder vertices only, thus changing the corresponding contributions to the RG flow equations in the main text. However, they do not affect our main results and conclusions, which remain that: (1) tensor disorder flows to strong coupling more slowly than time-reversal symmetry preserving disorder, and thus does not affect the fixed point structure; (2) this conclusion remains robust in the presence of unequal band masses. Corrections to the main text are listed below:

(1) Equations (21)–(23), and the lines following them had errors. These should be corrected as follows:

Adding these together, we get

$$\frac{\Pi^{\mathrm{BCS}}_{22}}{(2m)^2} + \frac{\Pi^{\mathrm{ZS'}}_{22}}{(2m)^2} = \frac{W_2^2\ln\left(\frac{\Lambda_{UV}}{\Lambda_{IR}}\right)\Gamma^i_{ab}\Gamma^i_e\Gamma^i_{cd}\big(\Gamma^j_{cd}\Gamma^j_e\Gamma^j_{ab} + \Gamma^j_{ab}\Gamma^j_e\Gamma^j_{cd}\big)}{4N\pi^2} = -\frac{W_2^2\,l\big(3 + \frac{17}{5}\sum_a\Gamma^i_a\Gamma^j_a\big)}{\pi^2}, \tag{21}$$

where we have used Eq. (A7). This corrects both the scalar and the vector disorder terms by $\delta\lambda_0 = 6\,\lambda_2^2\,l$ and $\delta\lambda_1 = \frac{34}{5}\,\lambda_2^2\,l$, respectively,

$$\begin{aligned} \frac{\Pi^{\mathrm{BCS}}_{02}}{(2m)^2} + \frac{\Pi^{\mathrm{ZS'}}_{02}}{(2m)^2} &= 4W_0\,W_2\int\frac{d^dk\,k^{-4}}{(2\pi)^d}\sum_{a<b}\big[\Gamma^i_{ab}(\hat{\mathbf{d}}_{\mathbf{k}}\cdot\mathbf{\Gamma}^i)\big]\big[\Gamma^j_{ab}(\hat{\mathbf{d}}_{\mathbf{k}}\cdot\mathbf{\Gamma}^j) + (\hat{\mathbf{d}}_{\mathbf{k}}\cdot\mathbf{\Gamma}^j)\Gamma^j_{ab}\big]\\ &= \frac{W_0W_2}{2N\pi^2}\ln\left(\frac{\Lambda_{UV}}{\Lambda_{IR}}\right)\sum_{a\neq b,f}\Gamma^i_{ab}\Gamma^i_e\big(\Gamma^j_{ab}\Gamma^j_e + \Gamma^j_e\Gamma^j_{ab}\big)\\ &= -\frac{3W_0W_2l}{10\pi^2}\sum_{a<b}\Gamma^i_{ab}\Gamma^j_{ab}, \end{aligned} \tag{22}$$

where we have used Eq. (A7). This corrects the tensor disorder term by $\delta\lambda_2 = \frac{3}{5}\,\lambda_0\,\lambda_2\,l$.

$$\begin{aligned} \frac{\Pi^{\mathrm{BCS}}_{12}}{(2m)^2} + \frac{\Pi^{\mathrm{ZS'}}_{12}}{(2m)^2} &= 4W_1\,W_2\int\frac{d^dk\,k^{-4}}{(2\pi)^d}\sum_{a<b,c}\big[\Gamma^i_{ab}(\hat{\mathbf{d}}_{\mathbf{k}}\cdot\mathbf{\Gamma}^i)\Gamma^i_c\big]\big[\Gamma^j_{ab}(\hat{\mathbf{d}}_{\mathbf{k}}\cdot\mathbf{\Gamma}^j)\Gamma^j_c + \Gamma^j_c(\hat{\mathbf{d}}_{\mathbf{k}}\cdot\mathbf{\Gamma}^j)\Gamma^j_{ab}\big]\\ &= \frac{W_1W_2\ln\left(\frac{\Lambda_{UV}}{\Lambda_{IR}}\right)\sum_{a\neq b,\,c,\,f}\Gamma^i_{ab}\,\Gamma^i_f\,\Gamma^i_c\big(\Gamma^j_c\Gamma^j_f\Gamma^j_{ab} + \Gamma^j_{ab}\Gamma^j_f\Gamma^j_c\big)}{2N\pi^2} = -\frac{17W_1W_2l}{5\pi^2}\sum_{a<b}\Gamma^i_{ab}\Gamma^j_{ab}, \end{aligned} \tag{23}$$

where we have used Eq. (A7). This corrects the tensor disorder term by $\delta\lambda_2 = \frac{34}{5}\,\lambda_1\,\lambda_2\,l$.

(2) There was a small typo in the cells corresponding to the $(\lambda_0\,\lambda_1)$ and $(\lambda_1\,\lambda_0)$ entries in Table I – the entries were interchanged. Hence, Table I should be corrected to

TABLE I. Contributions to the β-functions from the VC diagrams without the $\frac{k^2}{2m'}$ term. Here, $\lambda_\alpha = \frac{2m^2 W_\alpha}{\pi^2}$, $u = \frac{m e^2}{8\pi^2 c}$, and l is the RG flow parameter. Terms not involving W_2 are taken from Ref. [8].

Coupling	λ_0	λ_1	λ_2	u
λ_0	$\delta\lambda_0 = \lambda_0^2\, l$	$\delta\lambda_0 = N\,\lambda_0\,\lambda_1\, l$	$\delta\lambda_0 = \frac{N(N-1)\lambda_0\,\lambda_2\, l}{2}$	0
λ_1	$\delta\lambda_1 = -\frac{(N-2)\lambda_0\,\lambda_1\, l}{N}$	$\delta\lambda_1 = \frac{(N-2)^2\,\lambda_1^2\, l}{N}$	$\delta\lambda_1 = -\frac{(N-1)(N-2)(N-4)\lambda_1\,\lambda_2\, l}{2N}$	$\delta\lambda_1 = \frac{2(N-1)\lambda_1\, u\, l}{N}$
λ_2	$\delta\lambda_2 = \frac{(N-4)\lambda_0\,\lambda_2\, l}{N}$	$\delta\lambda_2 = \frac{(N-4)^2\lambda_1\,\lambda_2\, l}{N}$	$\delta\lambda_2 = \frac{(N-4)(N^2-9N+16)\lambda_2^2\, l}{2N}$	$d\lambda_2 = \frac{4\,\lambda_2\, u\, l}{N}$
u	$\delta u = \lambda_0\, u\, l$	$\delta u = N\,\lambda_1\, u\, l$	$\delta u = \frac{N(N-1)\lambda_2\, u\, l}{2}$	0

(3) Due to the changes in the results for the BCS+ZS′ diagrams, Table II should be corrected to

TABLE II. Sum of the contributions to the β functions from the BCS and ZS′ diagrams without the $\frac{k^2}{2m'}$ term, using the same conventions as Table I.

Coupling	λ_0	λ_1	λ_2	u
λ_0	$\delta\lambda_1 = \frac{1}{N}\lambda_0^2 l$	$\delta\lambda_0 = 2\lambda_0\lambda_1 l$	$\delta\lambda_2 = \frac{3}{10}\lambda_0\lambda_2 l$	0
λ_1	Included in the (λ_0, λ_1) cell	$\delta\lambda_1 = \frac{3N-2}{N}\lambda_1^2 l$	$\delta\lambda_2 = \frac{34}{5}\lambda_1\lambda_2 l$	0
λ_2	Included in the (λ_0, λ_2) cell	Included in the (λ_1, λ_2) cell	$\delta\lambda_0 = 6\lambda_2^2 l$, $\delta\lambda_1 = \frac{34}{5}\lambda_2^2 l$	0
u	0	0	0	0

(4) Due to the above changes, Eqs. (24)–(26) should be corrected to

$$\frac{d\lambda_0}{dl} = [\varepsilon + 2\lambda_0 + 2(N+1)\lambda_1 + N(N-1)\lambda_2]\lambda_0 + 6\lambda_2^2, \tag{24}$$

$$\frac{d\lambda_1}{dl} = \left[\epsilon + (2N-1)\lambda_1 + (3N-7)\lambda_2 + \frac{2(\lambda_0+\lambda_1+2\lambda_2)}{N}\right]\lambda_1 + \frac{\lambda_0^2}{N} + \frac{34\,\lambda_2^2}{5}, \tag{25}$$

$$\frac{d\lambda_2}{dl} = \left[\epsilon + \frac{13\,\lambda_0 - 6\,\lambda_1}{5} + 2N\lambda_1 + \frac{4(4\lambda_1 - \lambda_0)}{N}\right]\lambda_2 + \left(N^2 - 7N - \frac{32}{N} + 26\right)\lambda_2^2. \tag{26}$$

(5) Due to the changes in Table II, Eqs. (30)–(32) should be corrected to

$$\frac{d\lambda_0}{dl} = \left[\varepsilon - \frac{4\,u}{15}(15N_f + 4) + 2\lambda_0 + 2(N+1)\lambda_1 + N(N-1)\lambda_2\right]\lambda_0 + 6\lambda_2^2, \tag{30}$$

$$\frac{d\lambda_1}{dl} = \left[\epsilon + (2N-1)\lambda_1 + (3N-7)\lambda_2 + \frac{2(\lambda_0+\lambda_1+2\lambda_2)}{N} + \left(\frac{14}{15} - \frac{2}{N}\right)u\right]\lambda_1 + \frac{\lambda_0^2}{N} + \frac{34\,\lambda_2^2}{5}, \tag{31}$$

$$\frac{d\lambda_2}{dl} = \left[\epsilon + \frac{13\,\lambda_0 - 6\,\lambda_1}{5} + 2N\lambda_1 + \frac{4(4\lambda_1 - \lambda_0)}{N} + \frac{(60-16N)u}{15N}\right]\lambda_2 + \left(N^2 - 7N - \frac{32}{N} + 26\right)\lambda_2^2. \tag{32}$$

(6) The three paragraphs below Eq. (33) should be replaced by:

Let us examine these equations. Just as in Ref. [8], the flow $\frac{d\lambda_1}{dl}$ for λ_1 continues to be strictly positive, for a positive initial value of λ_1, and as a result, λ_1 grows under RG for ranges encompassing small values of the coupling constants. Next, note that $\lambda_2 = 0$ is a fixed point - if the action has time-reversal symmetry, the RG flow does not break it. Thus, the flow from Ref. [8] is contained in the $\lambda_2 = 0$ subspace of the above equations. Moreover, if λ_1, λ_2, and u start out from zero values, these are driven to positive values by a positive λ_1, as long as the flowing coupling constants remain small enough to justify a perturbative treatment. We may, therefore, restrict our attention to regions of non-negative λ_0, λ_1, λ_2, and u. Eventually, however, λ_1 must undergo a runaway flow to strong disorder, when the RG framework will break down. Consequently, there is no new fixed point at finite disorder emerging as a result of introducing λ_2, and the result, as in Ref. [8], is a runaway flow to strong disorder.

(7) Due to the above changes, Eqs. (34) and (35) should be corrected to

$$\frac{d\lambda_0}{d\lambda_1} = \left[\varepsilon - \frac{4(15N_f+4)u}{15} + 2\lambda_0 + 2(N+1)\lambda_1 + N(N-1)\lambda_2\right]\frac{\lambda_0}{\frac{d\lambda_1}{dl}} + \frac{6\lambda_2^2}{\frac{d\lambda_1}{dl}}, \tag{34}$$

$$\frac{d\lambda_2}{d\lambda_1} = \left[\epsilon + \frac{13\,\lambda_0 - 6\,\lambda_1}{5} + 2\,N\,\lambda_1 - \frac{4(\lambda_0 - 4\,\lambda_1)}{N} + \frac{(60-16\,N)u}{15\,N}\right]\frac{\lambda_2}{\frac{d\lambda_1}{dl}} + \left(N^2 - 7\,N - \frac{32}{N} + 26\right)\frac{\lambda_2^2}{\frac{d\lambda_1}{dl}}. \tag{35}$$

(8) Due to the above changes, Eqs. (37)–(40) should be corrected to

$$\frac{d\tilde{\lambda}_0}{d\ln\lambda_1} \approx -\tilde{\lambda}_0 + \frac{\left[-\frac{4(15N_f+4)\tilde{u}}{15} + 2\tilde{\lambda}_0 + 2(N+1) + N(N-1)\tilde{\lambda}_2\right]\tilde{\lambda}_0}{den} + \frac{6\tilde{\lambda}_2^2}{den}, \tag{37}$$

$$\frac{d\tilde{\lambda}_2}{d\ln\lambda_1} \approx -\tilde{\lambda}_2 + \frac{\left[\frac{13\,\tilde{\lambda}_0-6}{5} + 2\,N - \frac{4(\tilde{\lambda}_0-4)}{N} + \frac{(60-16\,N)\tilde{u}}{15\,N}\right]\tilde{\lambda}_2}{den} + \frac{\left(N^2-7\,N-\frac{32}{N}+26\right)\tilde{\lambda}_2^2}{den}, \tag{38}$$

$$\frac{d\tilde{u}}{d\ln\lambda_1} \approx -\tilde{u} + \frac{\left[3\frac{\tilde{\lambda}_0+N+\frac{N(N-1)\tilde{\lambda}_2}{2}}{2} - \frac{8\tilde{u}}{15} - 2N_f\tilde{u}\right]\tilde{u}}{den}, \tag{39}$$

where

$$den = \left[-1 - 7\tilde{\lambda}_2 + \frac{2(\tilde{\lambda}_0 + 1 + 2\tilde{\lambda}_2)}{N} + 2N(1+3\tilde{\lambda}_2) + \left(\frac{14}{15} - \frac{2}{N}\right)\tilde{u}\right] + \frac{\tilde{\lambda}_0^2}{N} + \frac{34\tilde{\lambda}_2^2}{5}, \tag{40}$$

and we have set $\frac{\varepsilon}{\lambda_1}$ to zero.

(9) The phrase "for any integer $N_f \leqslant 1$" before Eq. (41) needs to be updated to "for any value of N_f." Hence, we show here the updated paragraph until Eq. (44), which contains the results for generic N_f. Note that $4+\sqrt{29} = 9.385\,16$, and only the (1,3) element of the matrix M for the $\mathcal{F}_1$ case has been rewritten in terms of generic N_f rather than for $N_f = 2$. Also, we have expressed the results now in terms of fractions and square roots, rather than their decimal equivalents:

What about nonzero λ_2? We have verified that there is no new fixed point at nonzero λ_2 for any value of N_f, i.e., the only fixed points are in the $\lambda_2 = 0$ subspace, given by

$$\mathcal{F}_1 = (4+\sqrt{29}, 0, 0), \quad \mathcal{F}_2 = (0,0,0), \tag{41}$$

corresponding to $(\tilde{\lambda}_0^*, \tilde{\lambda}_2^*, \tilde{u}^*)$. The linearized flow equations in the vicinity of a fixed point are given by

$$\frac{d}{d\ln\lambda_1}\begin{pmatrix}\delta\tilde{\lambda}_0\\ \delta\tilde{\lambda}_2\\ \delta\tilde{u}\end{pmatrix}\Bigg|_{(\tilde{\lambda}_0^*,\tilde{\lambda}_2^*,\tilde{u}^*)} \approx M\begin{pmatrix}\delta\tilde{\lambda}_0\\ \delta\tilde{\lambda}_2\\ \delta\tilde{u}\end{pmatrix}, \tag{42}$$

where

$$M = \begin{cases}\begin{pmatrix}-\frac{174+11\sqrt{29}}{355} & \frac{28(11+6\sqrt{29})}{355} & \frac{-2(11+6\sqrt{29})(5N_f+2)}{355}\\ 0 & \frac{13}{47} & 0\\ 0 & 0 & -\frac{19}{94}\end{pmatrix} & \text{for } \mathcal{F}_1\,,\\ \begin{pmatrix}\frac{13}{47} & 0 & 0\\ 0 & \frac{13}{47} & 0\\ 0 & 0 & -\frac{19}{94}\end{pmatrix} & \text{for } \mathcal{F}_2\,.\end{cases} \tag{43}$$

The eigenvalues of M for these two fixed points are given by

$$\left(-\frac{(174+11\sqrt{29})}{355}, \frac{13}{47}, -\frac{19}{94}\right) \text{ and } \left(\frac{13}{47}, \frac{13}{47}, -\frac{19}{94}\right), \tag{44}$$

respectively.

(10) There was a minor typographical error below Eq. (47). The phrase "it becomes irrelevant" should be corrected to "the $\frac{k^2}{2\,m'}$ term becomes irrelevant."

(11) Table V should be corrected to

TABLE V. Sum of contributions to the β functions from the BCS and ZS′ diagrams with the $\frac{k^2}{2m'}$ term, using the same conventions as Table IV.

Coupling	λ_0	λ_1	λ_2	u
λ_0	$\delta\lambda_1 = \frac{1}{N}\,\mu\,\lambda_0^2\,l$	$\delta\lambda_0 = 2\,\mu\,\lambda_0\,\lambda_1\,l$	$\delta\lambda_2 = \frac{3}{5}\,\mu\,\lambda_0\,\lambda_2\,l$	0
λ_1	Included in $(\lambda_0,\ \lambda_1)$ cell	$\delta\lambda_1 = \frac{3N-2}{N}\,\mu\,\lambda_1^2\,l$	$\delta\lambda_2 = \frac{34}{5}\,\mu\,\lambda_1\,\lambda_2\,l$	0
λ_2	Included in $(\lambda_0,\ \lambda_2)$ cell	Included in $(\lambda_1,\ \lambda_2)$ cell	$\delta\lambda_0 = 6\,\mu\,\lambda_2^2\,l$, $\delta\lambda_1 = \frac{34}{5}\,\mu\,\lambda_2^2\,l$	0
u	0	0	0	0

(12) Due to the changes in Table V, Eqs. (61)–(63) should be corrected to

$$\frac{d\lambda_0}{dl} = \left[\varepsilon + 2\big(1+r_m^2\big)\mu\lambda_0 + \big\{2 + N\big(2+r_m^2\big)\big\}\mu\lambda_1 + \frac{N(N-1)\big(2+r_m^2\big)\mu\lambda_2}{2} - \frac{4(4+15N_f)u}{15}\right]\lambda_0 + 6\mu\lambda_2^2, \tag{61}$$

$$\frac{d\lambda_1}{dl} = \left[\varepsilon + \frac{\big(2+Nr_m^2\big)\mu\lambda_0}{N} + \left\{N\big(2+r_m^2\big) + \frac{2}{N} - 1\right\}\mu\lambda_1 + \frac{(N-1)\big(N^2r_m^2+6N-8\big)\mu\lambda_2}{2N} + \left(\frac{14}{15} - \frac{2}{N}\right)u\right]\lambda_1 + \frac{\mu\lambda_0^2}{N} + \frac{34\mu\lambda_2^2}{5}, \tag{62}$$

$$\frac{d\lambda_2}{dl} = \left[\varepsilon + \left(r_m^2 - \frac{4}{N} + \frac{13}{5}\right)\mu\,\lambda_0 + \left\{N\big(2+r_m^2\big) + \frac{16}{N} - \frac{6}{5}\right\}\mu\,\lambda_1 + \frac{52 + N(N-1)r_m^2 + 2\,N(N-7) - \frac{64}{N}}{2}\,\mu\,\lambda_2 + \left(\frac{4}{N} - \frac{16}{15}\right)u\right]\lambda_2. \tag{63}$$

(13) Due to the above changes, Eqs. (66) and (67) should be corrected to

$$\frac{d\lambda_0}{d\lambda_1} = \frac{\left[\varepsilon + 2\big(1+r_m^2\big)\mu\lambda_0 + \big\{2+N\big(2+r_m^2\big)\big\}\mu\lambda_1 + \frac{N(N-1)\left(2+r_m^2\right)\mu\lambda_2}{2} - \frac{4(4+15N_f)u}{15}\right]\lambda_0 + 6\mu\lambda_2^2}{\frac{d\lambda_1}{dl}}, \tag{66}$$

$$\frac{d\lambda_2}{d\lambda_1} = \frac{\left[\varepsilon + \big(r_m^2 - \frac{4}{N} + \frac{13}{5}\big)\mu\,\lambda_0 + \big\{N(2+r_m^2) + \frac{16}{N} - \frac{6}{5}\big\}\mu\,\lambda_1 + \frac{52+N(N-1)r_m^2+2\,N(N-7)-\frac{64}{N}}{2}\,\mu\,\lambda_2 + \big(\frac{4}{N} - \frac{16}{15}\big)u\right]\lambda_2}{\frac{d\lambda_1}{dl}}. \tag{67}$$

(14) Due to the above changes, Eqs. (70)–(74) should be corrected to

$$\frac{d\lambda_0}{d\ln\lambda_1} \approx -\tilde\lambda_0 + \frac{\left[2\big(1+r_m^2\big)\mu\tilde\lambda_0 + \big\{2+N\big(2+r_m^2\big)\big\}\mu + \frac{N(N-1)(2+r_m^2)\mu\,\tilde\lambda_2}{2} - \frac{4(4+15N_f)\tilde u}{15}\right]\tilde\lambda_0}{den'} + \frac{6\,\mu\,\tilde\lambda_2^2}{den'}, \tag{70}$$

$$\frac{d\lambda_2}{d\ln\lambda_1} \approx -\tilde\lambda_2 + \frac{\left[\big(r_m^2 - \frac{4}{N} + \frac{13}{5}\big)\mu\,\tilde\lambda_0 + \big\{N(2+r_m^2) + \frac{16}{N} - \frac{6}{5}\big\}\mu + \frac{52+N(N-1)r_m^2+2\,N(N-7)-\frac{64}{N}}{2}\,\mu\,\tilde\lambda_2 + \big(\frac{4}{N} - \frac{16}{15}\big)\tilde u\right]\tilde\lambda_2}{den'}, \tag{71}$$

$$\frac{du}{d\ln\lambda_1} \approx -\tilde u + \frac{\left[\big(3+r_m^2\big)\frac{\lambda_0+N+\frac{N(N-1)\tilde\lambda_2}{2}}{2}\mu - \frac{8\tilde u}{15} - 2N_f\tilde u\right]\tilde u}{den'}, \tag{72}$$

$$\frac{dr_m}{d\ln\lambda_1} \approx \frac{\left[\frac{(1+r_m^2)\left\{\tilde\lambda_0+N+\frac{N(N-1)\tilde\lambda_2}{2}\right\}\mu}{2} - \frac{8\tilde u}{15}\right]r_m}{den'}, \tag{73}$$

where

$$den' = \frac{\big(2+Nr_m^2\big)\mu\tilde\lambda_0}{N} + \left\{N\big(2+r_m^2\big) + \frac{2}{N} - 1\right\}\mu + \frac{(N-1)\big(N^2r_m^2+6N-8\big)\mu\tilde\lambda_2}{2N} + \left(\frac{14}{15} - \frac{2}{N}\right)\tilde u + \frac{\mu\tilde\lambda_0^2}{N} + \frac{34\mu\tilde\lambda_2^2}{5}, \tag{74}$$

and we have set $\frac{\varepsilon}{\lambda_1}$ to zero.

(15) The phrase "For any integer $N_f \geqslant 1$" before Eq. (75) has been updated to "For any N_f." In Eq. (75), we have also changed the decimal representation to one in terms of square root:

For any N_f, we obtain the following non-negative fixed points,

$$\mathcal{F}_1 = (4 + \sqrt{29}, 0, 0, 0), \quad \mathcal{F}_2 = (0, 0, , 0), \tag{75}$$

corresponding to $(\tilde{\lambda}_0^*, \tilde{\lambda}_2^*, \tilde{u}^*, r_m^*)$.

(16) In another minor correction of phrasing the RG flow technique, the phrase ‘We will employ the momentum-shell RG and take $\Lambda_{\rm UV}/\Lambda_{\rm IR} = e^{-l}$ ” in the second sentence in the paragraph containing Eq. (8), should be updated such that the full sentence reads:

We will employ the momentum-shell RG, and consider the RG flow generated by changing $\Lambda_{\rm UV}/\Lambda_{\rm IR}$ as e^{-l}, where $\Lambda_{\rm UV}$ ($\Lambda_{\rm IR}$) is the UV (IR) cut-off for the energy/momentum integrals and l is the RG flow parameter.