Erratum: Universal Relations for a Fermi Gas Close to a p -Wave Interaction Resonance [Phys. Rev. Lett. 115, 135304 (2015)]

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1. *Factor of 2 arising from the form of the interaction potential.*—In the text above Eq. (8), the interaction energy of a single-component Fermi gas should be $\langle \mathcal{U} \rangle = \frac{1}{2} \int U(|\mathbf{r}_1 - \mathbf{r}_2|) \rho_2(\mathbf{r}_1, \mathbf{r}_2) d^3\mathbf{r}_1 d^3\mathbf{r}_2$; a crucial factor of 1/2 is missing. Consequently, $C_v^{(m)}$ and $C_R^{(m)}$ should be replaced by $C_v^{(m)}/2$ and $C_R^{(m)}/2$, respectively, in Eqs. (8), (12), (13), (14), and (19). This correction brings the adiabatic expression involving $C_v^{(m)}$ into agreement with Ref. [1]. In the text below Eq. (12), for a p -wave two-body bound state, the correlation function should be $\rho_2(\mathbf{r}/2, -\mathbf{r}/2) = 2(R/r^4 - R^2/vr^2)|Y_{1m}(\hat{r})|^2/\Omega$, and the contacts are $C_v^{(m)} = 2R$ and $C_R^{(m)} = -2R^2/v$. The values of $k_F C_v/N$ and $C_R/k_F/N$ in Fig. 1 should be multiplied by a factor of 2. In the text below Fig. 1, in the temperature regime $T_F \lesssim T \ll \hbar^2/2MR^2$, when $v^{-1} = 0$, it should be $C_v \approx 12\sqrt{2}Nn\lambda^3 R \sim T^{-3/2}$ and $C_R \approx 24\pi NnR^2(1 - 3R^2 M k_B T/2\hbar^2)$; when v is small, it should be $C_v = 72\pi^2 Nn v^2/\lambda^2$ and $C_R = 360\pi^3 Nn v^2/\lambda^4$. The expressions in the second paragraph of the Discussion should be $dE/d(1/v^{(m)}) = -\hbar^2 C_v^{(m)}/2M$ and $dE/d(1/R^{(m)}) = -\hbar^2 C_R^{(m)}/2M$.

The factor of 1/2 in $\langle \mathcal{U} \rangle$ is not necessary if the p -wave resonance occurs between two different spin states. We can thus generalize our results, denoting species type by σ , such that the two-body correlation function is $\rho_2(\mathbf{r}_1, \sigma; \mathbf{r}_2, \sigma') = \langle \psi_\sigma^\dagger(\mathbf{r}_1) \psi_\sigma^\dagger(\mathbf{r}_2) \psi_{\sigma'}(\mathbf{r}_2) \psi_{\sigma'}(\mathbf{r}_1) \rangle$. The interaction energy becomes $\langle \mathcal{U} \rangle = (1 + \delta_{\sigma\sigma'})^{-1} \int U(|\mathbf{r}_1 - \mathbf{r}_2|) \times \rho_2(\mathbf{r}_1, \sigma; \mathbf{r}_2, \sigma') d^3\mathbf{r}_1 d^3\mathbf{r}_2$, where the prefactor $(1 + \delta_{\sigma\sigma'})^{-1}$ now accounts for statistics. The new adiabatic theorems can be obtained from those for the one-component Fermi gas via replacing $C_{v,R}^{(m)}/2$ by $(1 + \delta_{\sigma\sigma'})^{-1} C_{v,R}^{(m)}$, and the rest of the universal relations will be modified accordingly.

2. *Corrections to momentum distribution.*—In the original manuscript, we have neglected the center-of-mass contribution of the pairs to the momentum distribution. Equation (15) should be, assuming isotropic center-of-mass momentum distribution for pairs ($\langle P_x^2 \rangle = \langle \mathbf{P}^2 \rangle/3$, etc.),

$$n_{\mathbf{k}} = \sum_m \left[\frac{16\pi^2 C_v^{(m)}}{\Omega k^2} + \frac{32\pi^2 C_R^{(m)}}{\Omega k^4} - \frac{8\pi^2 \sum_{\mathbf{P}, j, m} n_{\mathbf{P}, j, m} (\int dq a_{jq})^2 P^2}{\Omega k^4} \right] |Y_{1m}(\hat{k})|^2 + \frac{4\pi^2 \sum_{m, \mathbf{P}, j} n_{\mathbf{P}, j, m} (\int dq a_{jq})^2 P^2}{\Omega k^4}. \quad (15)$$

Note that the leading term ($1/k^2$) is not modified. The derivation of $n_{\mathbf{k}}$ is given by the equations starting from Eq. (38) in the Supplemental Material, which should be

$$\rho_2(\mathbf{r}, \mathbf{r}'; \mathbf{r}_1) = \frac{1}{\Omega} \sum_{\mathbf{P}, j, m} n_{\mathbf{P}, j, m} e^{i\mathbf{P} \cdot (\mathbf{r}' - \mathbf{r})/2} \int dk \int dk' a_{jk} a_{jk'} \left[\frac{1}{|\mathbf{r} - \mathbf{r}_1|^2 |\mathbf{r}_1 - \mathbf{r}'|^2} + \frac{k^2}{2} \frac{1}{|\mathbf{r}' - \mathbf{r}_1|^2} + \frac{k'^2}{2} \frac{1}{|\mathbf{r} - \mathbf{r}_1|^2} \right] Y_{1m}^*(\theta, \varphi) Y_{1m}(\theta', \varphi'), \quad (38)$$

where θ (θ') and φ (φ') now refer to the vector $\mathbf{r} - \mathbf{r}_1$ ($\mathbf{r}' - \mathbf{r}_1$). Including the center-of-mass correction leads to an additional term with p -wave symmetry [third term in Eq. (1)] and an additional term with s -wave symmetry [the fourth term in Eq. (1)]. For a low-temperature Fermi gas, these terms are of order 1/6 the magnitude of the $C_R^{(m)}$ term. To avoid these complications in extracting $C_R^{(m)}$ from momentum distribution, one can instead use spectroscopy: Equation (16) is unchanged by these corrections.

[1] S. M. Yoshida and M. Ueda, Phys. Rev. Lett. 115, 135303 (2015).