

Erratum and Addendum: Mass spectra of meson molecular states for heavy and light sectors (S. Rahmani and H. Hassanabadi, Chin. Phys. C, 41 (9): 093105 (2017))

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In the presence of the Coulomb potential, the quantum number n in Eqs. (9), (10) in the paper should start from $n=0$ in the case of the ground state [1]. Thus, Eqs. (11), (12), (16), (17) and Tables 3-7 should be corrected as follows:

$$N_{0,0} = \sqrt{\frac{(\beta^2 \mu^2)^{\frac{3}{2}}}{\pi}} \tag{1}$$

$$\psi(0) = \frac{\sqrt{-\beta^3 \mu^3}}{\sqrt{\pi}} \tag{2}$$

$$M = m_a + m_b + \gamma - \frac{\mu \beta^2}{2} + \langle \psi_{0,0}(r) | V_{SD} | \psi_{0,0}(r) \rangle + \langle \psi_{0,0}(r) | V_{\pi} | \psi_{0,0}(r) \rangle, \tag{3}$$

$$B.E. = E_{0,0} + \langle V_{SD} \rangle_{0,0} + \langle V_{\pi} \rangle_{0,0} \tag{4}$$

By this point (taking $n=0$) and because of a few changes in the obtained values, some of the sentences in the paper should be changed as follows:

After Eqs. (11), (15) and (17) “for the $n=0$ and S-wave state”.

After Eq. (16) of page 3, “... excited mass spectra in the case of $n=1,2$...”.

In the second paragraph of Section 3, “the uncertainty ... is 0.3% and 1.71% in comparison with Exp.”.

In the 8th paragraph of page 6, “... $B_s^* - \bar{B}_s^*$ in different states in Table 4 are 0.019 MeV, 0.002 MeV, 0.022 MeV.”

By considering $n=1$, the first excited states (Table 8) should be corrected as here. We have also taken $n_f = 3$ for the light sector, $n_f = 4$ for the charm sector, $n_f = 5$ for the bottom sector and $\Lambda_0 = 0.565$ (GeV). It should be mentioned that in the spin-isospin factor the sentence should be corrected as follows:

After Eq. (5), “... are taken as zero in PV states.”, “... $(\tau_a \cdot \tau_b)(\sigma_a \cdot \sigma_b) = 24, 12, -12$ when $I=0$ and spin $S=0, 1, 2$ respectively while when $I=1$ and $S=0, 1, 2$, we have $(\tau_a \cdot \tau_b)(\sigma_a \cdot \sigma_b) = -8, -4, 4$ in the case of $B^* B^*$ and $D^* D^*$ states. For $\rho\rho$, we take $(\tau_a \cdot \tau_b)(\sigma_a \cdot \sigma_b) = 64, 32, -32$ when $I=0$ and $S=0, 1, 2$ and also when $I=1$ and $S=0, 1, 2$ we have $(\tau_a \cdot \tau_b)(\sigma_a \cdot \sigma_b) = 32, 16, -16$ respectively.

Furthermore, combinations of D_s^* , and some of the states of B_s^* and ω should be removed from the manuscript.

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References

- 1 S. Rahmani and H. Hassanabadi, Chin. Phys. C, **41** (9): 093105 (2017)

Table 3. Masses of heavy charmed meson-antimeson states in GeV ($\gamma=0.09$ GeV).

system	$I^G(J^{PC})$	ours/GeV	Exp. [28]	others/GeV	$\psi(0)/(GeV^{\frac{3}{2}})$	B. E./MeV	B. E./MeV [30]	$\langle V_{SD} \rangle_{0,0}/MeV$	$\langle V_{\pi} \rangle_{0,0}/MeV$
D- \bar{D}	$0^+(0^{++})$	3.729	-	3.733 [30], 3.738 [29]	0.159	-9.295	-5.776	0	0
D- \bar{D}_s	$\frac{1}{2}(0^{++})$	3.828	-	3.832 [30]	0.162	-9.421	-15.95	0	0
D- \bar{D}^*	$0^-(1^{+-})$	3.867	-	3.876 [31], 3.871 [30]	0.163	-9.468	-5.6	0	0
D- \bar{D}^*	$1^+(1^{+-})$	3.867	-	3.871 [30]	0.163	-9.468	-5.6	0	0
D* - \bar{D}^*	$1^-(2^{++})$	4.003	-	4.062 [29]	0.168	-10.18	-4.47	2.8	-3.326
D* - \bar{D}^*	$0^-(1^{+-})$	3.991	$\psi(4.040)$	4.0089 [30]	0.168	-22.433	-5.06	-2.8	-9.978
D* - \bar{D}^*	$0^+(0^{++})$	3.978	-	4.0083 [30]	0.168	-35.212	-5.658	-5.6	-19.957
D* - \bar{D}^*	$1^-(0^{++})$	4.005	-	4.0083 [30]	0.168	-8.602	-5.658	-5.6	6.652
D* - \bar{D}^*	$1^+(1^{+-})$	4.004	-	4.0089 [30]	0.168	-9.128	-5.06	-2.8	3.326
D* - \bar{D}^*	$0^+(2^{++})$	4.016	-	4.0094 [30]	0.168	3.124	-4.47	2.8	9.978
D _s - \bar{D}_s^*	$0^+(0^{++})$	3.927	-	3.931 [30]	0.166	-9.553	-5.692	0	0

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Table 4. Masses of heavy bottom meson-antimeson states in GeV ($\gamma=0.08$ GeV).

system	$I^G(J^{PC})$	ours	[32]	$\psi(0)/(\text{GeV}^{\frac{3}{2}})$	B. E./MeV	B. E./MeV/ [32]	$\langle V_{SD} \rangle_{0,0}/\text{MeV}$	$\langle V_{\pi} \rangle_{0,0}/\text{MeV}$
B- \bar{B}	$0^+(0^{++})$	10.504	10.516	0.436	-54.662	-43.06	0	0
B- \bar{B}_s	$\frac{1}{2}(0^{++})$	10.591	10.594	0.44	-54.935	-51.44	0	0
B- \bar{B}^*	$0^-(1^{+-})$	10.549	10.542	0.438	-54.806	-62.54	0	0
B_s - \bar{B}^*	$\frac{1}{2}(1^{+-})$	10.636	-	0.441	-55.081	-	0	0
B^* - \bar{B}^*	$1^+(1^{+-})$	10.595	10.586	0.44	-55.436	-58.27	-1.935	1.449
B^* - \bar{B}^*	$0^+(0^{++})$	10.582	10.542	0.44	-67.519	-88.68	-3.87	-8.698
B^* - \bar{B}^*	$0^-(1^{+-})$	10.589	10.567	0.44	-61.235	-74.84	-1.935	-4.349
B^* - \bar{B}^*	$1^-(0^{++})$	10.594	10.585	0.44	-55.922	-54.45	-3.87	2.899
B^* - \bar{B}^*	$1^-(2^{++})$	10.595	10.59	0.44	-54.465	-66.29	1.935	-1.449
B_s - \bar{B}_s^*	$0^-(1^{+-})$	10.726	10.727	0.445	-55.367	-54.27	0	0
B_s - \bar{B}_s	$0^+(0^{++})$	10.678	10.69	0.443	-55.213	-43.46	0	0
B_s^* - \bar{B}_s^*	$0^+(0^{++})$	10.771	10.752	0.447	-59.36	-66.59	-3.838	0
B_s^* - \bar{B}_s^*	$0^-(1^{+-})$	10.773	10.771	0.447	-57.441	-54.53	-1.919	0
B_s^* - \bar{B}_s^*	$0^+(2^{++})$	10.777	10.799	0.447	-53.603	-34.02	1.919	0
B- \bar{B}_s^*	$\frac{1}{2}(1^{+-})$	10.639	-	0.442	-55.086	-	0	0

Table 5. Masses of light meson-antimeson sector for PP states in GeV ($\gamma=0.04$ GeV).

PP states	$I^G(J^{PC})$	ours	Exp. [28]	others	$\psi(0)/(\text{GeV}^{\frac{3}{2}})$	B. E./MeV	B. E. (other)	$\langle V_{SD} \rangle_{0,0}/\text{MeV}$	$\langle V_{\pi} \rangle_{0,0}/\text{MeV}$	$\Gamma_{\gamma\gamma}/\text{keV}$
π^0 - $\bar{\pi}^0$	$0^+(0^{++})$	0.287	-	0.2703 [33]	0.006	19.534	0.3931 [33]	0	0	0.0925
η - $\bar{\pi}^0$	$1^-(0^{++})$	0.689	-	0.6829 [33]	0.013	8.104	0.1107 [33]	0	0	0.0637
K^+ - \bar{K}^+	$0^+(0^{++})$	0.966	-	0.9692 [33]	0.04	-20.954	-18.09 [33]	0	0	0.2978
K - \bar{K}	$0^+(0^{++})$	0.973	0.990	0.9768 [33]	0.041	-21.251	-20.87 [16]	0	0	0.2988
η - \bar{K}	$\frac{1}{2}(0^{++})$	1.022	-	1.0294 [33]	0.043	-22.963	-16.01 [33]	0	0	0.3032
η - $\bar{\eta}$	$0^+(0^{++})$	1.07	-	1.0789 [33]	0.046	-24.722	-26.24 [16]	0	0	0.3101
η - $\bar{\eta}'$	$0^+(0^{++})$	1.473	-	1.458 [16]	0.06	-32.501	-46.75 [16]	0	0	0.2789

Table 6. Masses of light meson-antimeson sector for PV states in GeV ($\gamma=0.06$ GeV).

PV states	$I^G(J^{PC})$	ours	Exp. [28]	[others]	$\psi(0)/(\text{GeV}^{\frac{3}{2}})$	B. E./MeV	B. E. (other)	$\langle V_{SD} \rangle_{0,0}/\text{MeV}$	$\langle V_{\pi} \rangle_{0,0}/\text{MeV}$	$\Gamma_{\gamma\gamma}/\text{keV}$
η - $\bar{\omega}$	$0^-(1^{+-})$	1.32	-	1.330 [33]	0.055	-10.154	-63.22 [16], 0.0504 [33]	0	0	0.2938
η - $\bar{\rho}$	$1^+(1^{+-})$	1.313	-	1.259 [16], 1.323 [33]	0.055	-10.035	-63.82 [16], 0.0504 [33]	0	0	0.2945
K - \bar{K}^*	$0^-(1^{+-})$	1.383	1.386	1.330 [16], 1.383 [33]	0.054	-9.927	-13.60 [33]	0	0	0.2634
K - \bar{K}^*	$1^+(1^{+-})$	1.383	-	1.330 [16]	0.054	-9.927	-13.60 [33]	0	0	0.2634
η' - $\bar{\omega}$	$0^-(1^{+-})$	1.722	1.594	1.646 [16]	0.074	-17.755	-93.45 [16]	0	0	0.3112
η - $\bar{\phi}$	$0^-(1^{+-})$	1.554	-	1.493 [16]	0.061	-13.132	-73.50 [16]	0	0	0.2624
η' - $\bar{\rho}$	$1^+(1^{+-})$	1.715	-	1.639 [16]	0.073	-17.648	-94.25 [16]	0	0	0.3107

Table 7. Masses of light meson-antimeson sector for VV states in GeV ($\gamma=0.05$ GeV).

VV states	$I^G(J^{PC})$	ours	Exp. [28]	[16]	$\psi(0)/(\text{GeV}^{\frac{3}{2}})$	B. E./MeV	B. E. [16]	$\langle V_{SD} \rangle_{0,0}/\text{MeV}$	$\langle V_{\pi} \rangle_{0,0}/\text{MeV}$	$\Gamma_{\gamma\gamma}/\text{keV}$
$\rho-\bar{\rho}$	$0^+(0^{++})$	1.419	1.505	1.489	0.067	-131.687	-55.39	-8.289	-98.038	0.3736
$\rho-\bar{\rho}$	$0^-(1^{+-})$	1.472	-	1.492	0.067	-78.523	-55.00	-4.144	-49.019	0.3471
$\rho-\bar{\rho}$	$0^+(2^{++})$	1.578	-	1.5	0.067	27.804	-54.10	4.144	49.019	0.302
$\rho-\bar{\rho}$	$1^+(1^{+-})$	1.496	-	1.493	0.067	-54.013	-54.40	-4.144	-24.509	0.3359
$\rho-\bar{\rho}$	$1^-(2^{++})$	1.554	-	1.499	0.067	3.294	-54.70	4.144	24.509	0.3116
$\rho-\bar{\rho}$	$1^-(0^{++})$	1.468	-	1.49	0.067	-82.668	-54.25	-8.289	-49.019	0.3491
$\omega-\bar{\omega}$	$0^+(0^{++})$	1.531	-	1.502	0.067	-33.849	-55.77	-8.262	0	0.3268
$\omega-\bar{\omega}$	$0^-(1^{+-})$	1.535	-	1.506	0.067	-29.718	-55.31	-4.131	0	0.3251
$\omega-\bar{\omega}$	$0^+(2^{++})$	1.543	-	1.514	0.067	-21.456	-54.40	4.131	0	0.3216
$\rho-\bar{\omega}$	$1^-(0^{++})$	1.524	1.474	1.497	0.067	-33.749	-54.40	-8.275	0	0.3269
$\rho-\bar{\omega}$	$1^-(2^{++})$	1.536	-	1.506	0.067	-21.335	-54.85	4.137	0	0.3216
$\rho-\bar{\omega}$	$1^+(1^{+-})$	1.528	-	-	0.067	-29.611	-	-4.137	0	0.3251

Table 8. Excited spectra of heavy charmed meson-antimeson states for $n=1$ in GeV ($\gamma=0.09$ GeV).

system	$I^G(J^{PC})$	ours/GeV	$\psi(0)/(\text{GeV}^{\frac{3}{2}})$	B. E./MeV	$\langle V_{SD} \rangle_{1,0}/\text{MeV}$	$\langle V_{\pi} \rangle_{1,0}/\text{MeV}$
$D-\bar{D}$	$0^+(0^{++})$	3.804	0.056	65.176	0	0
$D-\bar{D}_s$	$\frac{1}{2}(0^{++})$	3.903	0.057	65.144	0	0
$D-\bar{D}^*$	$0^-(1^{+-})$	3.941	0.057	65.132	0	0
$D-\bar{D}^*$	$1^+(1^{+-})$	3.941	0.057	65.132	0	0
$D^*-\bar{D}^*$	$1^-(2^{++})$	4.078	0.059	65.087	0.35	-0.349
$D^*-\bar{D}^*$	$0^-(1^{+-})$	4.077	0.059	63.689	-0.35	-1.047
$D^*-\bar{D}^*$	$0^+(0^{++})$	4.076	0.059	62.292	-0.7	-2.094
$D^*-\bar{D}^*$	$1^-(0^{++})$	4.078	0.059	65.084	-0.7	0.698
$D^*-\bar{D}^*$	$1^+(1^{+-})$	4.078	0.059	65.085	-0.35	0.349
$D^*-\bar{D}^*$	$0^+(2^{++})$	4.08	0.059	66.483	0.35	1.047
$D_s-\bar{D}_s$	$0^+(0^{++})$	4.001	0.058	65.111	0	0