

Erratum: High statistics measurement of K_{e4} decay properties [Phys. Rev. D **67**, 072004 (2003)]

S. Pislak, R. Appel, G. S. Atoyan, B. Bassalleck, D. R. Bergman, N. Cheung, S. Dhawan, H. Do, J. Egger, S. Eilerts, H. Fischer, W. Herold, V. V. Issakov, H. Kaspar, D. E. Kraus, D. M. Lazarus, P. Lichard, J. Lowe, J. Lozano, H. Ma, W. Majid, A. A. Poblaguev, P. Rehak, A. Sher, Aleksey Sher, J. A. Thompson, P. Truöl, and M. E. Zeller

(E865 Collaboration)

(Received 31 May 2010; published 18 June 2010)

DOI: [10.1103/PhysRevD.81.119903](https://doi.org/10.1103/PhysRevD.81.119903)

PACS numbers: 13.20.Eb, 13.75.Lb, 99.10.Cd

An apparent disagreement of the measured s -wave $\pi\pi$ -phase shifts with those obtained by the NA48/2 Collaboration [1] also from an analysis of K_{e4} -decay [$K^\pm \rightarrow \pi^\pm \pi^\pm e^\mp \bar{\nu}_e(\nu_e)$] has led us to reconsider where the data points had to be placed within the bins of $\pi\pi$ -invariant mass. In our publication we followed the recipes outlined in Ref. [2], namely, choosing the point which corresponds to the expectation value of the $\pi\pi$ mass distribution in the bins [Eq. (5) of Ref. [2]], while the correct position would have been the barycenter of the bin [Eq. (11) of Ref. [2]]. This correction shifts the position in the highest mass bin downward by 11.4 MeV, in the second highest bin downward by 0.8 MeV, and in the lowest mass bin upward by 2.4 MeV. The other three (narrow) bins are unaffected. The corrected version of Table V is reproduced as Table I below.

Except for this shift, all results remain unchanged, in particular, those for the parametrization of the form factors and the s -wave $\pi\pi$ -scattering length listed in Tables VI, VII, and VIII [3] which are based on a global fit to all events independent of binning. We obtained (in units of m_π^{-1}) $a_0^0 = 0.203 \pm 0.033$ (stat.) ± 0.004 (syst.) and $a_0^2 = -0.055 \pm 0.023$ (stat.) ± 0.003 (syst.) if both a_0^0 and a_0^2 are varied independently, or $a_0^0 = 0.216 \pm 0.013$ (stat.) ± 0.004 (syst.) ± 0.002 (theor.) and $a_0^2 = -0.0454 \pm 0.0031$ (stat.) ± 0.0010 (syst.) ± 0.0008 (theor.) if an additional constraint from chiral perturbation theory [Eq. (15)] [4,5] is applied, too. If we repeat the fits now to the phase shifts with the data points shifted, we obtain $a_0^0 = 0.205 \pm 0.033$ and $a_0^2 = -0.064 \pm 0.023$, or $a_0^0 = 0.235 \pm 0.013$ and $a_0^2 = -0.0410 \pm 0.0027$, respectively, in good agreement. For completeness, we list also the result from the global analysis for the center of the *universal band* [Eq. (14)] [6], correcting typographical errors in Eq. (26), $a_0^0 = 0.228 \pm 0.012$ (stat.) ± 0.004 (syst.) $^{+0.012}_{-0.016}$ (theor.) and $a_0^2 = -0.0365 \pm 0.0023$ (stat.) ± 0.0008 (syst.) $^{+0.0031}_{-0.0026}$ (theor.). These results do not include the corrections for isospin breaking recently evaluated in Ref. [7]. Good agreement with minor shifts of the parameters within the errors is also observed if the fits to the form factors are repeated with data points shifted.

TABLE I. Form factors and phase shifts for the six bins in dipion invariant mass $M_{\pi\pi}$ (in units of 10^{-3}). $\langle M_{\pi\pi} \rangle$ refers to the barycenter of the bin. The number of degrees of freedom for each fit is 4796. The first errors are statistical; the second is systematic. The fourth quantity, which is in parentheses, indicates the shift of the central value of the parameter which resulted from the application of the radiative corrections. F , G , and H given here are the moduli of the complex form factors defined in Eq. (12) of our publication.

$M_{\pi\pi}, \langle M_{\pi\pi} \rangle$ (MeV)	280–294, 287.6	294–305, 299.5	305–317, 311.2
F	$5832 \pm 13 \pm 80$ (– 26)	$5875 \pm 14 \pm 83$ (+ 34)	$5963 \pm 14 \pm 90$ (+ 44)
G	$4703 \pm 89 \pm 69$ (+ 22)	$4694 \pm 62 \pm 67$ (+ 27)	$4772 \pm 54 \pm 70$ (+ 34)
H	$-3740 \pm 800 \pm 180$ (– 59)	$-3500 \pm 520 \pm 190$ (– 50)	$-3550 \pm 440 \pm 200$ (– 167)
$\delta = \delta_0^0 - \delta_1^1$	$-16 \pm 40 \pm 2$ (+ 0.5)	$68 \pm 25 \pm 1$ (– 0.4)	$134 \pm 19 \pm 2$ (– 1.3)
χ^2/NDF	1.071	1.080	1.066
$M_{\pi\pi}, \langle M_{\pi\pi} \rangle$ (MeV)	317–331, 324.0	331–350, 339.6	>350, 370.0
F	$6022 \pm 16 \pm 94$ (+ 46)	$6145 \pm 17 \pm 96$ (+ 45)	$6196 \pm 20 \pm 83$ (+ 34)
G	$5000 \pm 51 \pm 82$ (+ 38)	$5003 \pm 49 \pm 83$ (+ 31)	$5105 \pm 50 \pm 74$ (+ 31)
H	$-3630 \pm 410 \pm 230$ (– 177)	$-1700 \pm 410 \pm 240$ (– 160)	$-2230 \pm 480 \pm 330$ (– 173)
$\delta = \delta_0^0 - \delta_1^1$	$160 \pm 17 \pm 2$ (+ 0.1)	$212 \pm 15 \pm 3$ (+ 0.2)	$284 \pm 14 \pm 3$ (+ 0.6)
χ^2/NDF	1.103	1.093	1.034

We thank Brigitte Bloch-Devaux for pointing out this mistake and for valuable discussions as well as Gilberto Colangelo for discussions and technical help.

- [1] J. R. Batley *et al.* (NA48/2 Collaboration), *Eur. Phys. J. C* **54**, 411 (2008).
- [2] G. D. Lafferty and T. R. Wyatt, *Nucl. Instrum. Methods Phys. Res., Sect. A* **355**, 541 (1995).
- [3] The statistical error of g_p in Table VIII is 0.05, not 0.48 as erroneously listed.
- [4] G. Colangelo, J. Gasser, and H. Leutwyler, *Phys. Rev. Lett.* **86**, 5008 (2001).
- [5] G. Colangelo, J. Gasser, and H. Leutwyler, *Nucl. Phys.* **B603**, 125 (2001).
- [6] D. Morgan and G. Shaw, *Nucl. Phys.* **10B**, 261 (1969).
- [7] G. Colangelo, J. Gasser, and A. Rusetsky, [arXiv:0811.0775](https://arxiv.org/abs/0811.0775); *Eur. Phys. J. C* **59**, 777 (2009).