Erratum: Measurement of azimuthal asymmetries in inclusive production of hadron pairs in e^{+}e^{-} annihilation at sqrt[s]=10.58 GeV [Phys. Rev. D 78, 032011 (2008)]

R. Seidl *et al.* (Belle Collaboration)

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Erratum to: Measurement of Azimuthal Asymmetries in Inclusive Production of Hadron Pairs in e^+e^- Annihilation at $\sqrt{s} = 10.58$ GeV

R. Seidl,[11,36] A. Ogawa,[36] M. Grosse Perdekamp,[11,36] I. Adachi,[10] H. Aihara,[44] S. Bahinipati,[3] A. M. Bakich,[41] W. Bartel,[5] U. Bitenc,[16] A. Bondar,[1] A. Bozek,[29] M. Bračko,[22,16] J. Brodzicka,[10] T. E. Browder,[9] Y. Chao,[28] A. Chen,[26] B. G. Cheon,[8] R. Chistov,[15] I.-S. Cho,[48] Y. Choi,[40] J. Dalseno,[10] M. Dash,[47] A. Drutskoy,[3] S. Eidelman,[1] N. Gabyshev,[1] B. Golob,[21,16] H. Ha,[18] K. Hayasaka,[24] H. Hayashii,[25] M. Hazumi,[10] D. Heffernan,[34] Y. Hoshi,[43] W.-S. Hou,[28] H. J. Hyun,[19] A. Ishikawa,[37] Y. Iwasaki,[10] D. H. Kah,[19] H. Kaji,[24] H. Kawai,[2] T. Kawasaki,[31] H. J. Kim,[19] H. O. Kim,[19] Y. I. Kim,[19] Y. J. Kim,[7] P. Križan,[21,16] R. Kumar,[35] Y.-J. Kwon,[48] S.-H. Kyeong,[48] J. S. Lange,[6] J. S. Lee,[40] M. J. Lee,[39] T. Lesiak,[29,4] J. Li,[9] A. Limosani,[23] C. Liu,[38] D. Liventsev,[15] F. Mandl,[13] S. McOnie,[41] T. Medvedeva,[15] K. Miyabayashi,[25] H. Miyake,[34] H. Miyata,[31] Y. Miyazaki,[24] R. Mizuk,[15] G. R. Moloney,[23] E. Nakano,[33] H. Nakazawa,[26] S. Nishida,[10] O. Nitoh,[46] S. Ogawa,[42] T. Ohshima,[24] S. Okuno,[17] P. Pakhlov,[15] G. Pakhlova,[15] C. W. Park,[40] H. Park,[19] H. K. Park,[19] L. S. Peak,[41] L. E. Piilonen,[47] H. Sahoo,[9] Y. Sakai,[10] O. Schneider,[20] A. Sekiya,[25] K. Senyo,[24] M. E. Sevior,[23] M. Shapkin,[14] C. P. Shen,[12] J.-G. Shiu,[28] J. B. Singh,[35] S. Stanič,[32] M. Starič,[16] T. Sumiyoshi,[45] M. Tanaka,[10] Y. Teramoto,[33] I. Tikhomirov,[15] S. Uehara,[10] T. Uglov,[15] Y. Unno,[8] S. Uno,[10] P. Urquijo,[23] Y. Usov,[1] G. Varner,[9] K. Vervink,[20] C. H. Wang,[27] P. Wang,[12] X. L. Wang,[12] Y. Watanabe,[17] R. Wedd,[23] E. Won,[18] B. D. Yabsley,[41] Y. Yamashita,[30] Z. P. Zhang,[38] V. Zhilich,[1] T. Zivko,[16] A. Zupanc,[16] and O. Zyukova[1]

(The Belle Collaboration)

[1]*Budker Institute of Nuclear Physics, Novosibirsk*
[2]*Chiba University, Chiba*
[3]*University of Cincinnati, Cincinnati, Ohio 45221*
[4]*T. Kościuszko Cracow University of Technology, Krakow*
[5]*Deutsches Elektronen–Synchrotron, Hamburg*
[6]*Justus-Liebig-Universität Gießen, Gießen*
[7]*The Graduate University for Advanced Studies, Hayama*
[8]*Hanyang University, Seoul*
[9]*University of Hawaii, Honolulu, Hawaii 96822*
[10]*High Energy Accelerator Research Organization (KEK), Tsukuba*
[11]*University of Illinois at Urbana-Champaign, Urbana, Illinois 61801*
[12]*Institute of High Energy Physics, Chinese Academy of Sciences, Beijing*
[13]*Institute of High Energy Physics, Vienna*
[14]*Institute of High Energy Physics, Protvino*
[15]*Institute for Theoretical and Experimental Physics, Moscow*
[16]*J. Stefan Institute, Ljubljana*
[17]*Kanagawa University, Yokohama*
[18]*Korea University, Seoul*
[19]*Kyungpook National University, Taegu*
[20]*École Polytechnique Fédérale de Lausanne (EPFL), Lausanne*
[21]*Faculty of Mathematics and Physics, University of Ljubljana, Ljubljana*
[22]*University of Maribor, Maribor*
[23]*University of Melbourne, School of Physics, Victoria 3010*
[24]*Nagoya University, Nagoya*
[25]*Nara Women's University, Nara*
[26]*National Central University, Chung-li*
[27]*National United University, Miao Li*
[28]*Department of Physics, National Taiwan University, Taipei*
[29]*H. Niewodniczanski Institute of Nuclear Physics, Krakow*
[30]*Nippon Dental University, Niigata*
[31]*Niigata University, Niigata*
[32]*University of Nova Gorica, Nova Gorica*
[33]*Osaka City University, Osaka*
[34]*Osaka University, Osaka*
[35]*Panjab University, Chandigarh*
[36]*RIKEN BNL Research Center, Upton, New York 11973*
[37]*Saga University, Saga*
[38]*University of Science and Technology of China, Hefei*
[39]*Seoul National University, Seoul*
[40]*Sungkyunkwan University, Suwon*
[41]*University of Sydney, Sydney, New South Wales*
[42]*Toho University, Funabashi*

[43]Tohoku Gakuin University, Tagajo
[44]Department of Physics, University of Tokyo, Tokyo
[45]Tokyo Metropolitan University, Tokyo
[46]Tokyo University of Agriculture and Technology, Tokyo
[47]Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061
[48]Yonsei University, Seoul
(Dated: July 6, 2012)

In the original article, it was found in Monte Carlo simulations that the reconstructed A_0 results are roughly consistent with the generated asymmetries, while the A_{12} results systematically underestimate the generated asymmetries. This underestimation can be attributed to the difference between the reconstructed thrust axis and the original quark-antiquark axis. The corresponding correction factors are 1.66 ± 0.04 for the A_{12} results and 1.11 ± 0.05 for the A_0 results. Due to a flaw in the original analysis program, these correction factors were not applied to the A^{UC}-type asymmetries in Table V as well as in some Figures. In addition, a small mistake in the error propagation in the charm correction resulted in slightly underestimated statistical uncertainties. These omissions affect all but the charm asymmetry results. The correct central values are therefore given in Tables IV and V of this Erratum. The systematic uncertainties of the original publication remain unchanged.

A. Corrected figures

The main results are the asymmetry parameters A_0 and A_{12} for both types of double ratios (UL and UC) as a function of the fractional energies of the two hadrons. Figures 17 and 18 below (using the numbering of the original paper) show these asymmetries where all z_2 bins for a given z_1 are displayed. In both cases, the UC type asymmetries now have the correction factor appropriately taken into account, while the UL central values remain unchanged. In Figs. 19 and 20, the corrected asymmetries as a function of $\frac{\sin^2\theta}{1+\cos^2(\theta)}$ are displayed for the UL and UC results, respectively. In both figures, the central values of the asymmetries using the polar angle of the thrust axis as reference are unchanged, but the central values using the polar angle of the second hadron as reference are modified and now have the corresponding correction factors applied. Together with the properly error-propagated uncertainties, all asymmetries can now be reasonably well described by a linear dependence; this is in contrast to what was originally stated. All values of χ^2 per degree of freedom for fits that fix the constant term to zero are now around unity.

In comparing the asymmetries versus Q_T for high and low thrust data samples, the results of the reverse thrust selection were displayed uncorrected for the charm and the $\Upsilon(4S)$ contributions. Similarly, the correction factor due to the axis smearing was not applied initially; Figs. 21 and 22 below now include both effects. The high thrust results are unchanged. The conclusions of the original publication are still valid as the reversed thrust selection asymmetries remain significantly smaller.

1. *Charm asymmetries*

In the charm asymmetries, the relevant correction factor was not applied to the UC values. The corrected asymmetries as a function of the fractional energies z_1 and z_2 are displayed in Fig. 23 below. For the integrated values, only $\langle A_{12}^{UC} \rangle = 0.020 \pm 0.005$ changed within the given precision.

Overall, there is no change in the physics interpretation of the results; however, some impact on the global fits of the transversity and Collins data might ensue.

Acknowledgments

The authors would like to thank I. Garzia and F. Anulli from the BABAR experiment to have discovered this mistake when comparing our results to their measurements, which are otherwise generally in good agreement [1].

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TABLE IV: A_0^{UL} and A_{12}^{UL} values obtained from fits to pion double ratios as a function of z. The errors shown are statistical and systematic.

z_1	$\langle z_1 \rangle$	z_2	$\langle z_2 \rangle$	$\left\langle \frac{\sin^2(\text{acos } \hat{n}_z)}{(1+\hat{n}_z^2)} \right\rangle$	$\left\langle \frac{\sin^2 \theta_2}{(1+\cos^2 \theta_2)} \right\rangle$	A_0^{UL}	A_{12}^{UL}
[0.2, 0.3]	0.244	[0.2, 0.3]	0.244	0.724	0.704	$0.0038 \pm 0.0088 \pm 0.0026$	$0.0101 \pm 0.0133 \pm 0.0029$
[0.2, 0.3]	0.244	[0.3, 0.5]	0.377	0.727	0.708	$0.0204 \pm 0.0047 \pm 0.0027$	$0.0300 \pm 0.0072 \pm 0.0031$
[0.2, 0.3]	0.244	[0.5, 0.7]	0.575	0.718	0.697	$0.0258 \pm 0.0047 \pm 0.0029$	$0.0467 \pm 0.0072 \pm 0.0034$
[0.2, 0.3]	0.244	[0.7, 1.0]	0.779	0.719	0.701	$0.0414 \pm 0.0056 \pm 0.0033$	$0.0609 \pm 0.0085 \pm 0.0037$
[0.3, 0.5]	0.377	[0.2, 0.3]	0.244	0.728	0.706	$0.0170 \pm 0.0047 \pm 0.0027$	$0.0249 \pm 0.0071 \pm 0.0030$
[0.3, 0.5]	0.377	[0.3, 0.5]	0.377	0.730	0.710	$0.0265 \pm 0.0042 \pm 0.0029$	$0.0462 \pm 0.0063 \pm 0.0034$
[0.3, 0.5]	0.378	[0.5, 0.7]	0.576	0.721	0.700	$0.0341 \pm 0.0052 \pm 0.0031$	$0.0616 \pm 0.0079 \pm 0.0037$
[0.3, 0.5]	0.379	[0.7, 1.0]	0.778	0.722	0.704	$0.0630 \pm 0.0068 \pm 0.0041$	$0.0770 \pm 0.0105 \pm 0.0042$
[0.5, 0.7]	0.575	[0.2, 0.3]	0.244	0.719	0.700	$0.0262 \pm 0.0045 \pm 0.0029$	$0.0399 \pm 0.0068 \pm 0.0033$
[0.5, 0.7]	0.576	[0.3, 0.5]	0.378	0.721	0.705	$0.0349 \pm 0.0048 \pm 0.0031$	$0.0567 \pm 0.0073 \pm 0.0036$
[0.5, 0.7]	0.578	[0.5, 0.7]	0.576	0.714	0.694	$0.0412 \pm 0.0076 \pm 0.0033$	$0.1130 \pm 0.0115 \pm 0.0053$
[0.5, 0.7]	0.578	[0.7, 1.0]	0.780	0.715	0.697	$0.1069 \pm 0.0129 \pm 0.0059$	$0.1191 \pm 0.0198 \pm 0.0055$
[0.7, 1.0]	0.778	[0.2, 0.3]	0.244	0.717	0.705	$0.0335 \pm 0.0056 \pm 0.0031$	$0.0608 \pm 0.0084 \pm 0.0037$
[0.7, 1.0]	0.779	[0.3, 0.5]	0.379	0.718	0.703	$0.0524 \pm 0.0078 \pm 0.0037$	$0.0796 \pm 0.0120 \pm 0.0042$
[0.7, 1.0]	0.781	[0.5, 0.7]	0.577	0.717	0.701	$0.0784 \pm 0.0133 \pm 0.0047$	$0.1030 \pm 0.0204 \pm 0.0050$
[0.7, 1.0]	0.783	[0.7, 1.0]	0.780	0.715	0.705	$0.1525 \pm 0.0382 \pm 0.0086$	$0.2063 \pm 0.0573 \pm 0.0091$

TABLE V: A_0^{UC} and A_{12}^{UC} values obtained from fits to pion double ratios as a function of z. The errors shown are statistical and systematic.

z_1	$\langle z_1 \rangle$	z_2	$\langle z_2 \rangle$	$\left\langle \frac{\sin^2(\text{acos } \hat{n}_z)}{(1+\hat{n}_z^2)} \right\rangle$	$\left\langle \frac{\sin^2 \theta_2}{(1+\cos^2 \theta_2)} \right\rangle$	A_0^{UC}	A_{12}^{UC}
[0.2, 0.3]	0.244	[0.2, 0.3]	0.244	0.724	0.704	$0.0017 \pm 0.0041 \pm 0.0012$	$0.0049 \pm 0.0062 \pm 0.0026$
[0.2, 0.3]	0.244	[0.3, 0.5]	0.377	0.727	0.708	$0.0091 \pm 0.0022 \pm 0.0013$	$0.0129 \pm 0.0034 \pm 0.0027$
[0.2, 0.3]	0.244	[0.5, 0.7]	0.575	0.718	0.697	$0.0114 \pm 0.0022 \pm 0.0013$	$0.0200 \pm 0.0033 \pm 0.0029$
[0.2, 0.3]	0.244	[0.7, 1.0]	0.779	0.719	0.701	$0.0169 \pm 0.0025 \pm 0.0015$	$0.0249 \pm 0.0038 \pm 0.0031$
[0.3, 0.5]	0.377	[0.2, 0.3]	0.244	0.728	0.706	$0.0075 \pm 0.0022 \pm 0.0013$	$0.0103 \pm 0.0034 \pm 0.0027$
[0.3, 0.5]	0.377	[0.3, 0.5]	0.377	0.730	0.710	$0.0115 \pm 0.0019 \pm 0.0013$	$0.0197 \pm 0.0029 \pm 0.0029$
[0.3, 0.5]	0.378	[0.5, 0.7]	0.576	0.721	0.700	$0.0139 \pm 0.0023 \pm 0.0014$	$0.0250 \pm 0.0034 \pm 0.0031$
[0.3, 0.5]	0.379	[0.7, 1.0]	0.778	0.722	0.704	$0.0232 \pm 0.0028 \pm 0.0018$	$0.0283 \pm 0.0043 \pm 0.0032$
[0.5, 0.7]	0.575	[0.2, 0.3]	0.244	0.719	0.700	$0.0114 \pm 0.0020 \pm 0.0013$	$0.0169 \pm 0.0031 \pm 0.0028$
[0.5, 0.7]	0.576	[0.3, 0.5]	0.378	0.721	0.705	$0.0144 \pm 0.0021 \pm 0.0014$	$0.0230 \pm 0.0032 \pm 0.0030$
[0.5, 0.7]	0.578	[0.5, 0.7]	0.576	0.714	0.694	$0.0152 \pm 0.0030 \pm 0.0014$	$0.0427 \pm 0.0046 \pm 0.0038$
[0.5, 0.7]	0.578	[0.7, 1.0]	0.780	0.715	0.697	$0.0346 \pm 0.0046 \pm 0.0021$	$0.0375 \pm 0.0070 \pm 0.0036$
[0.7, 1.0]	0.778	[0.2, 0.3]	0.244	0.717	0.705	$0.0135 \pm 0.0025 \pm 0.0015$	$0.0246 \pm 0.0038 \pm 0.0031$
[0.7, 1.0]	0.779	[0.3, 0.5]	0.379	0.718	0.703	$0.0196 \pm 0.0032 \pm 0.0016$	$0.0296 \pm 0.0050 \pm 0.0032$
[0.7, 1.0]	0.781	[0.5, 0.7]	0.577	0.717	0.701	$0.0251 \pm 0.0048 \pm 0.0018$	$0.0324 \pm 0.0073 \pm 0.0034$
[0.7, 1.0]	0.783	[0.7, 1.0]	0.780	0.715	0.705	$0.0339 \pm 0.0135 \pm 0.0022$	$0.0392 \pm 0.0202 \pm 0.0037$

[1] I. Garzia [for the BaBar Collaboration], arXiv:1201.4678 [hep-ex].

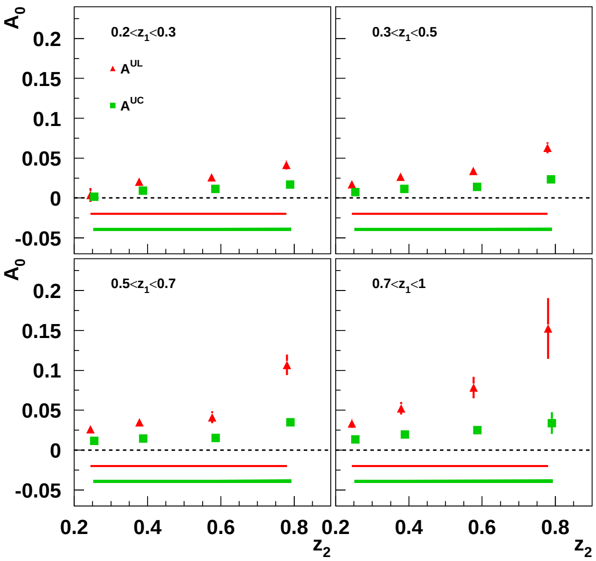

FIG. 17: Light quark (*uds*) A_0 asymmetry parameters as a function of z_2 for 4 z_1 bins. The UL data are represented by triangles and the systematic error by the upper error band. The UC data are described by the squares and their systematic uncertainty by the lower error band.

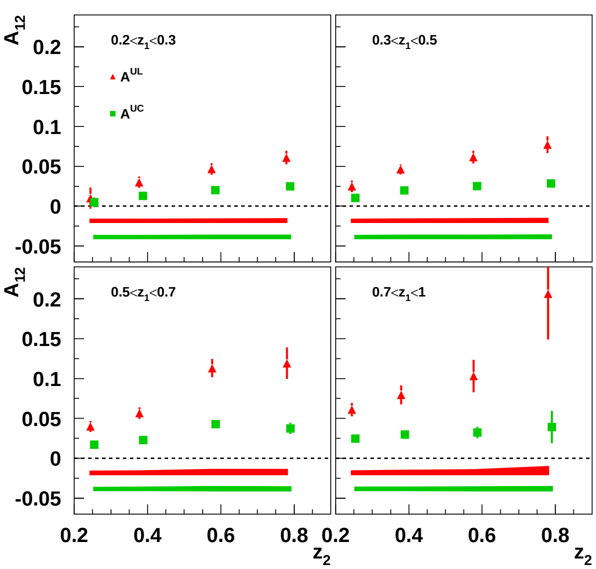

FIG. 18: Light quark (*uds*) A_{12} asymmetry parameters as a function of z_2 for 4 z_1 bins. The UL data are represented by triangles and the systematic error by the upper error band. The UC data are described by the squares and their systematic uncertainty by the lower error band.

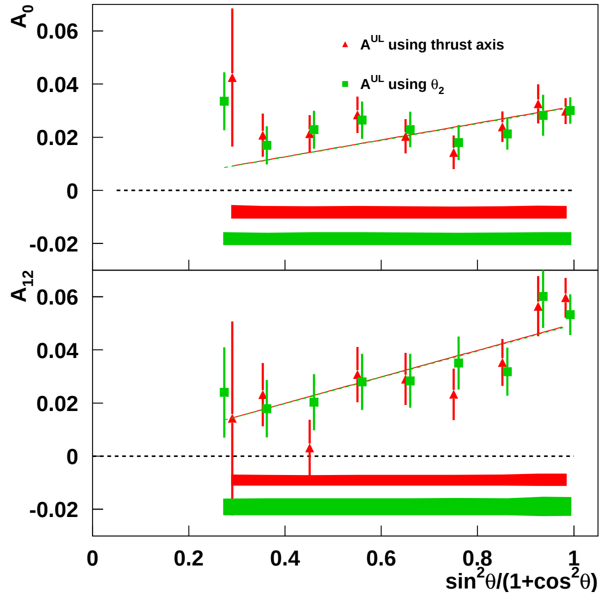

FIG. 19: Light quark (uds) A_0^{UL} (top) and A_{12}^{UL} (bottom) asymmetry parameters as a function of $\sin^2\theta/(1+\cos^2\theta)$, using the polar angle θ_2 of the second hadron (green squares, dashed green linear fit, and lower green systematic-error band) or the polar angle $\theta_{\rm thrust}$ of the thrust axis (red triangles, solid red linear fit, and upper red systematic-error band).

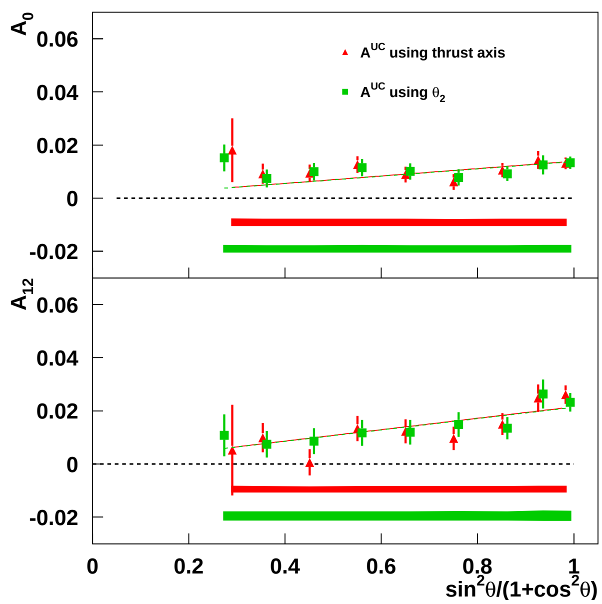

FIG. 20: Light quark (uds) A_0^{UC} (top) and A_{12}^{UC} (bottom) asymmetry parameters as a function of $\sin^2\theta/(1+\cos^2\theta)$, using the polar angle θ_2 of the second hadron (green squares, dashed green linear fit, and lower green systematic-error band) or the polar angle $\theta_{\rm thrust}$ of the thrust axis (red triangles, solid red linear fit, and upper red systematic-error band).

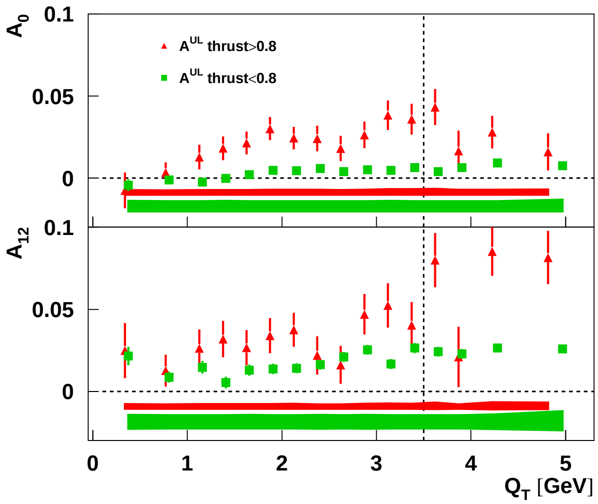

FIG. 21: Light quark (uds) A_0^{UL} (top) and A_{12}^{UL} (bottom) asymmetry parameters as a function of Q_T, for events with $T > 0.8$ (triangles) and asymmetries for events with $T < 0.8$ not corrected for heavy quark contributions (squares). The vertical line represents the main data selection $Q_T < 3.5$ GeV.

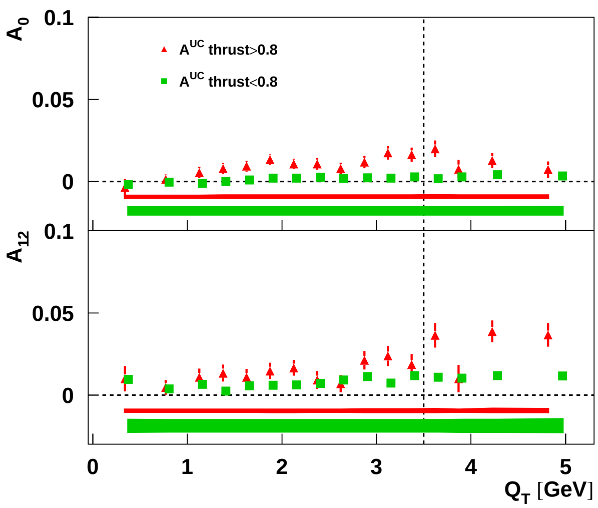

FIG. 22: Light quark (uds) A_0^{UC} (top) and A_{12}^{UC} (bottom) asymmetry parameters as a function of Q_T, for events with $T > 0.8$ (triangles) and asymmetries for events with $T < 0.8$ not corrected for heavy quark contributions (squares). The vertical line represents the main data selection $Q_T < 3.5$ GeV.

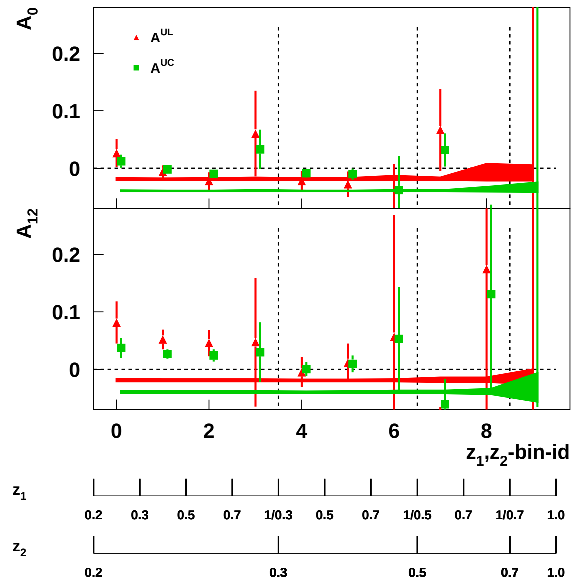

FIG. 23: Charm asymmetry parameters A_0 and A_{12} as a function of the combined z. The UL data are described by triangles, their systematic error being the top error band while the UC data are described by the squares and their systematics by the lower error band.