



A high-statistics measurement of transverse spin effects in dihadron production from muon–proton semi-inclusive deep-inelastic scattering



C. Adolph^h, R. Akhunzyanov^g, M.G. Alekseev^x, Yu. Alexandrov^{o,18}, G.D. Alexeev^g, A. Amoroso^{aa,ab}, V. Andrieux^v, V. Anosov^g, A. Austregesilo^{j,q}, B. Badelek^{ae}, F. Balestra^{aa,ab}, J. Barth^d, G. Baum^a, R. Beck^c, Y. Bedfer^v, A. Berlin^b, J. Bernhard^m, R. Bertini^{aa,ab}, K. Bicker^{j,q}, J. Bieling^d, R. Birsa^x, J. Bisplinghoff^c, M. Bodlak^s, M. Boer^v, P. Bordalo^{l,1}, F. Bradamante^{y,j}, C. Braun^h, A. Bravar^x, A. Bressan^{y,x,*}, M. Bücheleⁱ, E. Burtin^v, L. Capozza^v, M. Chiosso^{aa,ab}, S.U. Chung^{q,2}, A. Cicuttin^{z,x}, M.L. Crespo^{z,x}, Q. Curiel^v, S. Dalla Torre^x, S.S. Dasgupta^f, S. Dasgupta^x, O.Yu. Denisov^{ab}, S.V. Donskov^u, N. Doshita^{ag}, V. Duic^y, W. Dünnweber^p, M. Dziewiecki^{af}, A. Efremov^g, C. Elia^{y,x}, P.D. Eversheim^c, W. Eyrich^h, M. Faessler^p, A. Ferrero^v, A. Filin^u, M. Finger^s, M. Finger Jr.^s, H. Fischerⁱ, C. Franco^l, N. du Fresne von Hohenesche^{m,j}, J.M. Friedrich^q, V. Frolov^j, R. Garfagnini^{aa,ab}, F. Gautheron^b, O.P. Gavrichtchouk^g, S. Gerassimov^{o,q}, R. Geyer^p, M. Giorgi^{y,x}, I. Gnesi^{aa,ab}, B. Gobbo^x, S. Goertz^d, M. Gorzellikⁱ, S. Grabmüller^q, A. Grasso^{aa,ab}, B. Grube^q, A. Guskov^g, T. Guthörl^{i,3}, F. Haas^q, D. von Harrach^m, D. Hahne^d, R. Hashimoto^{ag}, F.H. Heinsiusⁱ, F. Herrmannⁱ, F. Hinterberger^c, Ch. Höppner^q, N. Horikawa^{r,4}, N. d'Hose^v, S. Huber^q, S. Ishimoto^{ag,5}, A. Ivanov^g, Yu. Ivanshin^g, T. Iwata^{ag}, R. Jahn^c, V. Jary^t, P. Jasinski^m, P. Joergⁱ, R. Joosten^c, E. Kabuß^m, D. Kang^m, B. Ketzer^q, G.V. Khaustov^u, Yu.A. Khokhlov^{u,6}, Yu. Kisselev^g, F. Klein^d, K. Klimaszewski^{ad}, J.H. Koivuniemi^b, V.N. Kolosov^u, K. Kondo^{ag}, K. Königsmannⁱ, I. Konorov^{o,q}, V.F. Konstantinov^u, A.M. Kotzinian^{aa,ab}, O. Kouznetsov^g, Z. Kral^t, M. Krämer^q, Z.V. Kroumchtein^g, N. Kuchinski^g, F. Kunne^{v,*}, K. Kurek^{ad}, R.P. Kurjata^{af}, A.A. Lednev^u, A. Lehmann^h, S. Levorato^x, J. Lichtenstadt^w, A. Maggiora^{ab}

* Corresponding authors.

E-mail addresses: Andrea.Bressan@cern.ch (A. Bressan), Fabienne.Kunne@cern.ch (F. Kunne).

¹ Also at Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal.

² Also at Department of Physics, Pusan National University, Busan 609-735, Republic of Korea and at Physics Department, Brookhaven National Laboratory, Upton, NY 11973, USA.

³ Supported by the DFG Research Training Group Programme 1102 “Physics at Hadron Accelerators”.

⁴ Also at Chubu University, Kasugai, Aichi, 487-8501, Japan.

⁵ Also at KEK, 1-1 Oho, Tsukuba, Ibaraki, 305-0801, Japan.

⁶ Also at Moscow Institute of Physics and Technology, Moscow Region, 141700, Russia.

⁷ Present address: RWTH Aachen University, III. Physikalisches Institut, 52056 Aachen, Germany.

⁸ Supported by the German Bundesministerium für Bildung und Forschung.

⁹ Supported by Czech Republic MEYS Grants ME492 and LA242.

¹⁰ Supported by SAIL (CSR), Govt. of India.

¹¹ Supported by CERN-RFBR Grants 08-02-91009 and 12-02-91500.

¹² Supported by the Portuguese FCT – Fundação para a Ciência e Tecnologia, COMPETE and QREN, Grants CERN/FP/109323/2009, CERN/FP/116376/2010 and CERN/FP/123600/2011.

¹³ Supported by the MEXT and the JSPS under the Grants No. 18002006, No. 20540299 and No. 18540281; Daiko Foundation and Yamada Foundation.

¹⁴ Supported by the DFG cluster of excellence ‘Origin and Structure of the Universe’ (www.universe-cluster.de).

¹⁵ Supported by EU FP7 (HadronPhysics3, Grant Agreement number 283286).

¹⁶ Supported by the Israel Science Foundation, founded by the Israel Academy of Sciences and Humanities.

¹⁷ Supported by the Polish NCN Grant DEC-2011/01/M/ST2/02350.

¹⁸ Deceased.

<http://dx.doi.org/10.1016/j.physletb.2014.06.080>

0370-2693/© 2014 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/3.0/>). Funded by SCOAP³.

A. Magnon^v, N. Makke^{y,x}, G.K. Mallot^j, C. Marchand^v, A. Martin^{y,x}, J. Marzec^{af}, J. Matousek^s, H. Matsuda^{ag}, T. Matsudaⁿ, G. Meshcheryakov^g, W. Meyer^b, T. Michigami^{ag}, Yu.V. Mikhailov^u, Y. Miyachi^{ag}, A. Nagaytsev^g, T. Nagel^q, F. Nerlingⁱ, S. Neubert^q, D. Neyret^v, V.I. Nikolaenko^u, J. Novy^t, W.-D. Nowakⁱ, A.S. Nunes^l, I. Orlov^g, A.G. Olshevsky^g, M. Ostrick^m, R. Panknin^d, D. Panzieri^{ac,ab}, B. Parsamyan^{aa,ab}, S. Paul^q, M. Pesek^s, D. Peshekhonov^g, G. Piragino^{aa,ab}, S. Platchkov^v, J. Pochodzalla^m, J. Polak^{k,x}, V.A. Polyakov^u, J. Pretz^{d,7}, M. Quaresima^l, C. Quintans^l, S. Ramos^{l,1}, G. Reicherz^b, E. Rocco^j, V. Rodionov^g, E. Rondio^{ad}, A. Rychter^{af}, N.S. Rossiyskaya^g, D.I. Ryabchikov^u, V.D. Samoylenko^u, A. Sandacz^{ad}, S. Sarkar^f, I.A. Savin^g, G. Sbrizzai^{y,x}, P. Schiavon^{y,x}, C. Schillⁱ, T. Schlüter^p, A. Schmidt^h, K. Schmidt^{i,3}, H. Schmieden^c, K. Schönning^j, S. Schopfererⁱ, M. Schott^j, O.Yu. Shevchenko^g, L. Silva^l, L. Sinha^f, S. Sirtlⁱ, M. Slunecka^g, S. Sosio^{aa,ab}, F. Sozzi^x, A. Srnka^e, L. Steiger^x, M. Stolarski^l, M. Sulc^k, R. Sulej^{ad}, H. Suzuki^{ag,4}, A. Szabelski^{ad}, T. Szameitatⁱ, P. Sznajder^{ad}, S. Takekawa^{ab}, J. ter Wolbeek^{i,3}, S. Tessaro^x, F. Tessarotto^x, F. Thibaud^v, S. Uhl^q, I. Uman^p, M. Vandenbroucke^v, M. Virius^t, J. Vondra^t, L. Wang^b, T. Weisrock^m, M. Wilfert^m, R. Windmolders^d, W. Wiślicki^{ad}, H. Wollny^v, K. Zarembo^{af}, M. Zavertyaev^o, E. Zemyanichkina^g, M. Ziembicki^{af}

^a Universität Bielefeld, Fakultät für Physik, 33501 Bielefeld, Germany⁸

^b Universität Bochum, Institut für Experimentalphysik, 44780 Bochum, Germany^{8,15}

^c Universität Bonn, Helmholtz-Institut für Strahlen- und Kernphysik, 53115 Bonn, Germany⁸

^d Universität Bonn, Physikalisches Institut, 53115 Bonn, Germany⁸

^e Institute of Scientific Instruments, AS CR, 61264 Brno, Czech Republic⁹

^f Matrivani Institute of Experimental Research & Education, Calcutta 700 030, India¹⁰

^g Joint Institute for Nuclear Research, 141980 Dubna, Moscow region, Russia¹¹

^h Universität Erlangen–Nürnberg, Physikalisches Institut, 91054 Erlangen, Germany⁸

ⁱ Universität Freiburg, Physikalisches Institut, 79104 Freiburg, Germany^{8,15}

^j CERN, 1211 Geneva 23, Switzerland

^k Technical University in Liberec, 46117 Liberec, Czech Republic⁹

^l LIP, 1000-149 Lisbon, Portugal¹²

^m Universität Mainz, Institut für Kernphysik, 55099 Mainz, Germany⁸

ⁿ University of Miyazaki, Miyazaki 889-2192, Japan¹³

^o Lebedev Physical Institute, 119991 Moscow, Russia

^p Ludwig-Maximilians-Universität München, Department für Physik, 80799 Munich, Germany^{8,14}

^q Technische Universität München, Physik Department, 85748 Garching, Germany^{8,14}

^r Nagoya University, 464 Nagoya, Japan¹³

^s Charles University in Prague, Faculty of Mathematics and Physics, 18000 Prague, Czech Republic⁹

^t Czech Technical University in Prague, 16636 Prague, Czech Republic⁹

^u State Research Center of the Russian Federation, Institute for High Energy Physics, 142281 Protvino, Russia

^v CEA IRFU/SPH N Saclay, 91191 Gif-sur-Yvette, France¹⁵

^w Tel Aviv University, School of Physics and Astronomy, 69978 Tel Aviv, Israel¹⁶

^x Trieste Section of INFN, 34127 Trieste, Italy

^y University of Trieste, Department of Physics, 34127 Trieste, Italy

^z Abdus Salam ICTP, 34151 Trieste, Italy

^{aa} University of Turin, Department of Physics, 10125 Turin, Italy

^{ab} Torino Section of INFN, 10125 Turin, Italy

^{ac} University of Eastern Piedmont, 15100 Alessandria, Italy

^{ad} National Centre for Nuclear Research, 00-681 Warsaw, Poland¹⁷

^{ae} University of Warsaw, Faculty of Physics, 00-681 Warsaw, Poland¹⁷

^{af} Warsaw University of Technology, Institute of Radioelectronics, 00-665 Warsaw, Poland¹⁷

^{ag} Yamagata University, Yamagata, 992-8510 Japan¹³

ARTICLE INFO

Article history:

Received 30 January 2014

Received in revised form 24 June 2014

Accepted 30 June 2014

Available online 4 July 2014

Editor: M. Doser

ABSTRACT

A measurement of the azimuthal asymmetry in dihadron production in deep-inelastic scattering of muons on transversely polarised proton (NH₃) targets is presented. They provide independent access to the transversity distribution functions through the measurement of the Collins asymmetry in single hadron production. The data were taken in the year 2010 with the COMPASS spectrometer using a 160 GeV/c muon beam of the CERN SPS, increasing by a factor of about four the overall statistics with respect to the previously published data taken in the year 2007. The measured sizeable asymmetry is in good agreement with the published data. An approximate equality of the Collins asymmetry and the dihadron asymmetry is observed, suggesting a common physical mechanism in the underlying fragmentation.

© 2014 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/3.0/>). Funded by SCOAP³.

Download English Version:

<https://daneshyari.com/en/article/1851048>

Download Persian Version:

<https://daneshyari.com/article/1851048>

[Daneshyari.com](https://daneshyari.com)