



# Erratum to: Measurements of $\Xi^-$ and $\Xi^+$ production in proton–proton interactions at $\sqrt{s_{NN}} = 17.3$ GeV in the NA61/SHINE experiment

NA61/SHINE Collaboration

A. Aduszkiewicz<sup>15</sup>, E. V. Andronov<sup>21</sup>, T. Antičić<sup>3</sup>, V. Babkin<sup>19</sup>, M. Baszczyk<sup>13</sup>, S. Bhosale<sup>10</sup>, A. Blondel<sup>4</sup>, M. Bogomilov<sup>2</sup>, A. Brandin<sup>20</sup>, A. Bravar<sup>23</sup>, W. Bryliński<sup>17</sup>, J. Brzychczyk<sup>12</sup>, M. Buryakov<sup>19</sup>, O. Busygina<sup>18</sup>, A. Bzdak<sup>13</sup>, H. Cherif<sup>6</sup>, M. Ćirković<sup>22</sup>, M. Csanad<sup>7</sup>, J. Cybowska<sup>17</sup>, T. Czopowicz<sup>9,17</sup>, A. Damyanova<sup>23</sup>, N. Davis<sup>10</sup>, M. Deliyergiyev<sup>9</sup>, M. Deveaux<sup>6</sup>, A. Dmitriev<sup>19</sup>, W. Dominik<sup>15</sup>, P. Dorosz<sup>13</sup>, J. Dumarchez<sup>4</sup>, R. Engel<sup>5</sup>, G. A. Feofilov<sup>21</sup>, L. Fields<sup>24</sup>, Z. Fodor<sup>7,16</sup>, A. Garibov<sup>1</sup>, M. Gaździcki<sup>6,9</sup>, O. Golosov<sup>20</sup>, V. Golovatyuk<sup>19</sup>, M. Golubeva<sup>18</sup>, K. Grebieszko<sup>17</sup>, F. Guber<sup>18</sup>, A. Haesler<sup>23</sup>, S. N. Igolkin<sup>21</sup>, S. Ilieva<sup>2</sup>, A. Ivashkin<sup>18</sup>, S. R. Johnson<sup>25</sup>, K. Kadija<sup>3</sup>, N. Kargin<sup>20</sup>, E. Kashirin<sup>20</sup>, M. Kielbowicz<sup>10</sup>, V. A. Kireyeu<sup>19</sup>, V. Klochkov<sup>6</sup>, V. I. Kolesnikov<sup>19</sup>, D. Kolev<sup>2</sup>, A. Korzenev<sup>23</sup>, V. N. Kovalenko<sup>21</sup>, S. Kowalski<sup>14</sup>, M. Koziel<sup>6</sup>, A. Krasnoperov<sup>19</sup>, W. Kucewicz<sup>13</sup>, M. Kuich<sup>15</sup>, A. Kurepin<sup>18</sup>, D. Larsen<sup>12</sup>, A. László<sup>7</sup>, T. V. Lazareva<sup>21</sup>, M. Lewicki<sup>16</sup>, K. Łojek<sup>12</sup>, V. V. Lyubushkin<sup>19</sup>, M. Mačkowiak-Pawłowska<sup>17</sup>, Z. Majka<sup>12</sup>, B. Maksiak<sup>11</sup>, A. I. Malakhov<sup>19</sup>, A. Marcinek<sup>10</sup>, A. D. Marino<sup>25</sup>, K. Marton<sup>7</sup>, H.-J. Mathes<sup>5</sup>, T. Matulewicz<sup>15</sup>, V. Matveev<sup>19</sup>, G. L. Melkumov<sup>19</sup>, A. O. Merzlaya<sup>12</sup>, B. Messerly<sup>26</sup>, Ł. Mik<sup>13</sup>, S. Morozov<sup>18,20</sup>, S. Mrówczyński<sup>9</sup>, Y. Nagai<sup>25</sup>, M. Naskręt<sup>16</sup>, V. Ozvenchuk<sup>10</sup>, V. Paolone<sup>26</sup>, O. Petukhov<sup>18</sup>, R. Planeta<sup>12</sup>, P. Podlaski<sup>15</sup>, B. A. Popov<sup>4,19</sup>, B. Porfy<sup>7</sup>, M. Posiadała-Zezula<sup>15</sup>, D. S. Prokhorova<sup>21</sup>, D. Pszczel<sup>11</sup>, S. Puławski<sup>14,a</sup>, J. Puzović<sup>22</sup>, M. Ravonel<sup>23</sup>, R. Renfordt<sup>6</sup>, D. Röhrich<sup>8</sup>, E. Rondio<sup>11</sup>, M. Roth<sup>5</sup>, B. T. Rumberger<sup>25</sup>, M. Romyantsev<sup>19</sup>, A. Rustamov<sup>1,6</sup>, M. Rybczynski<sup>9</sup>, A. Rybicki<sup>10</sup>, A. Sadovsky<sup>18</sup>, K. Schmidt<sup>14</sup>, I. Selyuzhenkov<sup>20</sup>, A. Yu. Seryakov<sup>21</sup>, P. Seyboth<sup>9</sup>, M. Słodkowski<sup>17</sup>, P. Staszal<sup>12</sup>, G. Stefanek<sup>9</sup>, J. Stepaniak<sup>11</sup>, M. Strikhanov<sup>20</sup>, H. Ströbele<sup>6</sup>, T. Šušar<sup>3</sup>, A. Taranenko<sup>20</sup>, A. Tefelska<sup>17</sup>, D. Tefelski<sup>17</sup>, V. Tereshchenko<sup>19</sup>, A. Toia<sup>6</sup>, R. Tsenov<sup>2</sup>, L. Turko<sup>16</sup>, R. Ulrich<sup>5</sup>, M. Unger<sup>5</sup>, D. Uzhva<sup>21</sup>, F. F. Valiev<sup>21</sup>, D. Veberič<sup>5</sup>, V. V. Vechernin<sup>21</sup>, A. Wickremasinghe<sup>24,26</sup>, Z. Włodarczyk<sup>9</sup>, K. Wojcik<sup>14</sup>, O. Wyszynski<sup>9</sup>, E. D. Zimmerman<sup>25</sup>, R. Zwaska<sup>24</sup>

<sup>1</sup> National Nuclear Research Center, Baku, Azerbaijan  
<sup>2</sup> Faculty of Physics, University of Sofia, Sofia, Bulgaria  
<sup>3</sup> Ruđer Bošković Institute, Zagreb, Croatia  
<sup>4</sup> LPNHE, University of Paris VI and VII, Paris, France  
<sup>5</sup> Karlsruhe Institute of Technology, Karlsruhe, Germany  
<sup>6</sup> University of Frankfurt, Frankfurt, Germany  
<sup>7</sup> Wigner Research Centre for Physics of the Hungarian Academy of Sciences, Budapest, Hungary  
<sup>8</sup> University of Bergen, Bergen, Norway  
<sup>9</sup> Jan Kochanowski University in Kielce, Kielce, Poland  
<sup>10</sup> Institute of Nuclear Physics, Polish Academy of Sciences, Kraków, Poland  
<sup>11</sup> National Centre for Nuclear Research, Warsaw, Poland  
<sup>12</sup> Jagiellonian University, Kraków, Poland  
<sup>13</sup> AGH - University of Science and Technology, Kraków, Poland  
<sup>14</sup> University of Silesia, Katowice, Poland  
<sup>15</sup> University of Warsaw, Warsaw, Poland  
<sup>16</sup> University of Wrocław, Wrocław, Poland  
<sup>17</sup> Warsaw University of Technology, Warsaw, Poland  
<sup>18</sup> Institute for Nuclear Research, Moscow, Russia  
<sup>19</sup> Joint Institute for Nuclear Research, Dubna, Russia  
<sup>20</sup> National Research Nuclear University (Moscow Engineering Physics Institute), Moscow, Russia  
<sup>21</sup> St. Petersburg State University, St. Petersburg, Russia

- <sup>22</sup> University of Belgrade, Belgrade, Serbia  
<sup>23</sup> University of Geneva, Geneva, Switzerland  
<sup>24</sup> Fermilab, Batavia, USA  
<sup>25</sup> University of Colorado, Boulder, USA  
<sup>26</sup> University of Pittsburgh, Pittsburgh, USA

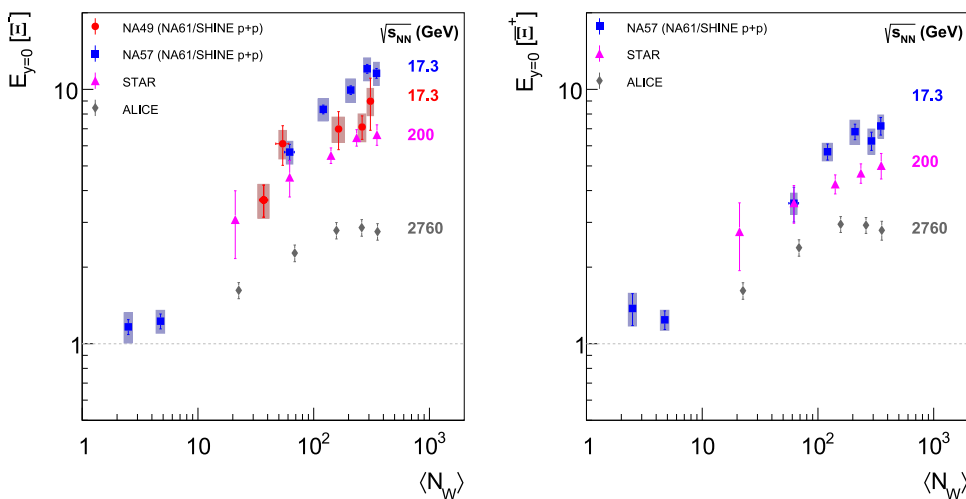
Received: 28 January 2022 / Accepted: 7 February 2022  
 © The Author(s) 2022

**Erratum to: Eur. Phys. J. C (2020) 80:833**  
<https://doi.org/10.1140/epjc/s10052-020-8381-0>

This Erratum replaces incorrect plots shown in Fig. 7 with the corrected ones. In the publication, the NA57 [1] ratios of  $\Xi^-$  and  $\Xi^+$  to the number of wounded nucleons at  $\langle N_W \rangle = 349$  by mistake were plotted at the wrong values. The ratios were calculated and plotted by mistake using  $\langle N_W \rangle = 249$ .

The correct normalization does not change the conclusions of the paper. The correctly normalized results are presented in Fig. 7.

The corrected version of the article is also available on the arXiv ([arXiv:2006.02062](https://arxiv.org/abs/2006.02062)).



**Fig. 7** The strangeness enhancement  $E$  at the mid-rapidity as a function of average number of wounded nucleons  $\langle N_W \rangle$  calculated as a ratio of rapidity density for  $\Xi^-$  production (*left*) and  $\Xi^+$  production (*right*) in nucleus-nucleus interactions per  $\langle N_W \rangle$  divided by the corresponding value for  $p+p$  interactions. Red circles – NA49 Pb+Pb at 158A GeV [2], blue squares – NA57  $p$ +Be,  $p$ +Pb and Pb+Pb at the same center-of-mass energy  $\sqrt{s_{NN}} = 17.3$  GeV [1], magenta triangles – STAR Au+Au at  $\sqrt{s_{NN}} = 200$  GeV [3], gray diamonds – ALICE Pb+Pb at  $\sqrt{s_{NN}} = 2.76$  TeV [4]. The systematic errors are represented by shaded boxes

The original article can be found online at <https://doi.org/10.1140/epjc/s10052-020-8381-0>.

<sup>a</sup>e-mail: [szymon.pulawski@us.edu.pl](mailto:szymon.pulawski@us.edu.pl) (corresponding author)

**Acknowledgements** We would like to thank the CERN EP, BE, HSE and EN Departments for the strong support of NA61/SHINE. This work was supported by the Hungarian Scientific Research Fund (Grant NKFIH 123842/123959), the Polish Ministry of Science and Higher Education (Grants 667/N-CERN/2010/0, NN202484339 and NN202231837), the National Science Centre Poland (Grants 2014/13/N/ST2/02565, 2014/14/E/ST2/00018, 2014/15/B/ST2/02537 and 2015/18/M/ST2/00125, 2015/19/N/ST2/01689, 2016/23/B/ST2/00692, 2017/25/N/ST2/02575, 2018/30/A/ST2/00226, 2018/31/G/ST2/03910), the Russian Science Foundation, Grant 16-12-10176 and 17-72-20045, the Russian Academy of Science and the Russian Foundation for Basic Research (Grants 08-02-00018, 09-02-00664 and 12-02-91503-CERN), the Ministry of Science and Education of the Russian Federation, Grant No. 3.3380.2017/4.6, the National Research Nuclear University MEPhI in the framework of the Russian Academic Excellence Project (Contract No. 02.a03.21.0005, 27.08.2013), the Ministry of Education, Culture, Sports, Science and Technology, Japan, Grant-in-Aid for Scientific Research (Grants 18071005, 19034011, 19740162, 20740160 and 20039012), the German Research Foundation (grant GA 1480/8-1), the Bulgarian Nuclear Regulatory Agency and the Joint Institute for Nuclear Research, Dubna (bilateral contract No. 4799-1-18/20), Bulgarian National Science Fund (Grant DN08/11), Ministry of Education and Science of the Republic of Serbia (grant OI171002), Swiss Nationalfonds Foundation (Grant 200020117913/1), ETH Research Grant TH-01 07-3 and the Fermi National Accelerator Laboratory (Fermilab), a U.S. Department of Energy, Office of Science, HEP User Facility managed by Fermi Research Alliance, LLC (FRA), acting under Contract No. DE-AC02-07CH11359 and the IN2P3-CNRS (France).

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. Funded by SCOAP<sup>3</sup>.

## References

1. F. Antinori et al. (NA57 Collab.), *J. Phys. G* **32**, 427–442 (2006). [arXiv:nucl-ex/0601021](https://arxiv.org/abs/nucl-ex/0601021)
2. T. Anticic et al. (NA49 Collab.), *Phys. Rev. C* **80**, 034906 (2009). [arXiv:0906.0469](https://arxiv.org/abs/0906.0469) [nucl-ex]
3. B. Abelev et al. (STAR Collab.), *Phys. Rev. C* **77**, 044908 (2008). [arXiv:0705.2511](https://arxiv.org/abs/0705.2511) [nucl-ex]
4. B.B. Abelev et al. (ALICE Collab.), *Phys. Lett. B* **728**, 216–227 (2014). [arXiv:1307.5543](https://arxiv.org/abs/1307.5543) [nucl-ex]. [Erratum: *Phys. Lett. B* **734**, 409–410 (2014)]