

# Getting Started Workshop: The Fragile Families Challenge

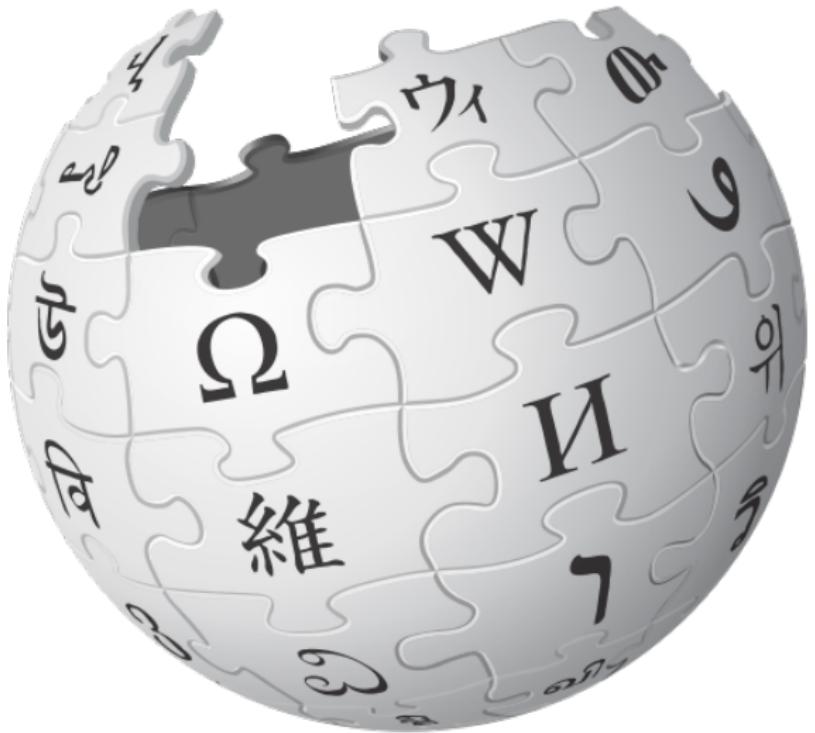
Matthew J. Salganik, Ian Lundberg, Sara S. McLanahan,  
and we hope you

Department of Sociology, Office of Population Research, &  
Center for Research on Child Wellbeing, Princeton University

April 6, 2017  
Indiana University

This research is supported by the Russell Sage Foundation. We are grateful to the members of the Board of Advisors of the Fragile Families Challenge: Jeanne Brooks-Gunn, Irwin Garfinkel, Nicholas Lemann, Karen Levy, Sara McLanahan, Arvind Narayanan, Matthew Salganik, & Duncan Watts. Source for these slides: [www.github.com/fragilefamilieschallenge](https://www.github.com/fragilefamilieschallenge).





# Initial sequencing and analysis of the human genome

**International Human Genome Sequencing Consortium\***

*\* A partial list of authors appears on the opposite page. Affiliations are listed at the end of the paper.*

---

<http://dx.doi.org/10.1038/35057062>

**Genome Sequencing Centres** (Listed in order of total genomic sequence contributed, with a partial list of personnel. A full list of contributors at each centre is available as Supplementary Information.)

**Whitehead Institute for Biomedical Research, Center for Genome Research:** Eric S. Lander<sup>1</sup>, Lauren M. Linton<sup>1</sup>, Bruce Birren<sup>1</sup>, Chad Nusbaum<sup>1</sup>, Michael C. Zody<sup>1</sup>, Jennifer Baldwin<sup>1</sup>, Keri Devon<sup>1</sup>, Ken Dewar<sup>1</sup>, Michael Doyle<sup>1</sup>, William FitzHugh<sup>1</sup>, Roel Funke<sup>1</sup>, Diane Gage<sup>1</sup>, Katrina Harris<sup>1</sup>, Andrew Heaford<sup>1</sup>, John Howland<sup>1</sup>, Lisa Kann<sup>1</sup>, Jessica Lebocky<sup>1</sup>, Rosie LeVine<sup>1</sup>, Paul McEwan<sup>1</sup>, Kevin McKernan<sup>1</sup>, James Melkman<sup>1</sup>, Jill P. Mesirov<sup>1</sup>, Cher Miranda<sup>1</sup>, William Morris<sup>1</sup>, Jerome Naylor<sup>1</sup>, Christine Raymond<sup>1</sup>, Mark Roselli<sup>1</sup>, Ralph Santos<sup>1</sup>, Andrew Sheridan<sup>1</sup>, Carrie Sougnez<sup>1</sup>, Nicole Stange-Thomann<sup>1</sup>, Nikola Stejanovic<sup>1</sup>, Aravind Subramanian<sup>1</sup>, & Dudley Wymant<sup>1</sup>

**The Sanger Centre:** Jane Rogers<sup>2</sup>, John Sulston<sup>2</sup>, Rachael Ainscough<sup>2</sup>, Stephan Beck<sup>2</sup>, David Bentley<sup>2</sup>, John Burton<sup>2</sup>, Christopher Cleef<sup>2</sup>, Nigel Carter<sup>2</sup>, Alan Coulson<sup>2</sup>, Rebecca Deadman<sup>2</sup>, Panos Deloukas<sup>2</sup>, Andrew Dunham<sup>2</sup>, Ian Dunham<sup>2</sup>, Richard Durbin<sup>2</sup>, Lisa French<sup>2</sup>, Darren Graffham<sup>2</sup>, Simon Gregory<sup>2</sup>, Tim Hubbard<sup>2</sup>, Sean Humphray<sup>2</sup>, Adrienne Hunt<sup>2</sup>, Matthew Jones<sup>2</sup>, Christine Lloyd<sup>2</sup>, Amanda McMurray<sup>2</sup>, Lucy Matthews<sup>2</sup>, Simon Mercer<sup>2</sup>, Sarah Milne<sup>2</sup>, James C. Mullikin<sup>2</sup>, Andrew Mungall<sup>2</sup>, Robert Plumb<sup>2</sup>, Mark Ross<sup>2</sup>, Ratna Showker<sup>2</sup>, & Sarah Sims<sup>2</sup>

**Washington University Genome Sequencing Center:** Robert H. Waterston<sup>3</sup>, Richard K. Wilson<sup>3</sup>, LaDeana W. Hillier<sup>3</sup>, John D. McPherson<sup>3</sup>, Marco A. Marra<sup>3</sup>, Elaine R. Mardis<sup>3</sup>, Lucinda A. Fulton<sup>3</sup>, Asil T. Chinwalla<sup>3</sup>, Kymberlie H. Pepin<sup>3</sup>, Warren R. Gish<sup>3</sup>, Stephanie L. Chissoe<sup>3</sup>, Michael C. Wendt<sup>3</sup>, Kim D. Delehaunty<sup>3</sup>, Tracie L. Miner<sup>3</sup>, Andrew Delehaunty<sup>3</sup>, Jason B. Kramer<sup>3</sup>, Lisa L. Cook<sup>3</sup>, Robert S. Fulton<sup>3</sup>, Douglas L. Johnson<sup>3</sup>, Patrick J. Minx<sup>3</sup> & Sandra W. Clifton<sup>3</sup>

**US DOE Joint Genome Institute:** Trevor Hawkins<sup>4</sup>, Elbert Branscomb<sup>4</sup>, Paul Detrixhe<sup>4</sup>, Paul Richardson<sup>4</sup>, Sarah Wenning<sup>4</sup>, Tom Slezk<sup>4</sup>, Norman Doggett<sup>4</sup>, Jan-Fang Cheng<sup>4</sup>, Anne Olsen<sup>4</sup>, Susan Lucas<sup>4</sup>, Christopher Ekin<sup>4</sup>, Edward Überbacher<sup>4</sup> & Marvin Frazier<sup>4</sup>

**Baylor College of Medicine Human Genome Sequencing Center:** Richard A. Gibbs<sup>5</sup>, Donna M. Muzny<sup>5</sup>, Steven E. Scherer<sup>5</sup>, John B. Bouck<sup>5</sup>, Erica J. Sodergren<sup>5</sup>, Kim C. Worley<sup>5</sup>, Catherine M. Rives<sup>5</sup>, James H. Gorrell<sup>5</sup>, Michael L. Metzker<sup>5</sup>, Susan L. Nayrol<sup>5</sup>, Raju S. Kucherlapati<sup>5</sup>, David L. Nelson<sup>5</sup>, & George M. Weinstock<sup>5</sup>

**RIKEN Genomic Sciences Center:** Yoshiyuki Sakai<sup>6</sup>, Asoo Fujiyama<sup>6</sup>, Masaharu Hattori<sup>6</sup>, Tetsushi Yada<sup>6</sup>, Atsushi Toyoda<sup>6</sup>, Takehiko Itoh<sup>6</sup>, Chiharu Kawabe<sup>6</sup>, Hiromi Watabayashi<sup>6</sup>, Yasutomo Totoku<sup>6</sup> & Todd Taylor<sup>6</sup>

**Genoscope and CNRS UMR-8030:** Jean Weissenbach<sup>7</sup>, Roland Hellier<sup>7</sup>, William Saurin<sup>7</sup>, Francois Arigonave<sup>7</sup>, Philippe Brotte<sup>7</sup>, Thomas Brule<sup>7</sup>, Eric Pelletier<sup>7</sup>, Catherine Robert<sup>7</sup> & Patrick Wincker<sup>7</sup>

**GTC Sequencing Center:** Douglas R. Smith<sup>11</sup>, Lynn Doucette-Stamm<sup>11</sup>, Marc Rubenfield<sup>11</sup>, Keith Weinstock<sup>11</sup>, Hong Mei Lee<sup>11</sup> & JoAnne Dubois<sup>11</sup>

**Department of Genome Analysis, Institute of Molecular**

**Biotechnology:** André Rosenthal<sup>12</sup>, Matthias Platzer<sup>12</sup>, Gerald Nyakatura<sup>12</sup>, Stefan Taudien<sup>12</sup> & Andreas Rump<sup>12</sup>

**Beijing Genomics Institute/Human Genome Center:** Huanning Yang<sup>13</sup>, Jun Yu<sup>13</sup>, Jian Wang<sup>13</sup>, Guyang Huang<sup>14</sup> & Jun Gu<sup>15</sup>

**Multimegapbase Sequencing Center, The Institute for Systems Biology:** Leroy Hood<sup>16</sup>, Lee Rowen<sup>16</sup>, Anup Madan<sup>16</sup> & Shizhen Qin<sup>16</sup>

**Stanford Genome Technology Center:** Ronald W. Davis<sup>17</sup>, Nancy A. Federspil<sup>17</sup>, A. Pla Abela<sup>17</sup> & Michael J. Proctor<sup>17</sup>

**Stanford Human Genome Center:** Richard M. Myers<sup>18</sup>, Jeremy Schmutz<sup>18</sup>, Mark Dickson<sup>18</sup>, Jane Grimwood<sup>18</sup> & David R. Cox<sup>18</sup>

**University of Washington Genome Center:** Maynard V. Olson<sup>19</sup>, Rajinder Kaul<sup>19</sup> & Christopher Raymond<sup>19</sup>

**Department of Molecular Biology, Keio University School of Medicine:** Nobuyoshi Shimizu<sup>20</sup>, Kazuhiko Kawasaki<sup>20</sup> & Shinsei Minoshima<sup>20</sup>

**University of Texas Southwestern Medical Center at Dallas:** Glen A. Evans<sup>21</sup>, Maria Athanasiou<sup>21</sup> & Roger Schultz<sup>21</sup>

**University of Oklahoma's Advanced Center for Genome Technology:** Bruce A. Roe<sup>22</sup>, Feng Chen<sup>22</sup> & Huaiqin Pan<sup>22</sup>

**Max Planck Institute for Molecular Genetics:** Juliane Ramser<sup>23</sup>, Hans Lehrach<sup>23</sup> & Richard Reinhardt<sup>23</sup>

**Cold Spring Harbor Laboratory, Lita Annenberg Hazen Genome Center:** W. Richard McCombie<sup>24</sup>, Melissa de la Bastide<sup>24</sup> & Neillay Dedhia<sup>24</sup>

**GBF—German Research Centre for Biotechnology:** Helmut Blöcker<sup>25</sup>, Klaus Hornischek<sup>25</sup> & Gabriele Nordiek<sup>25</sup>

**\* Genome Analysis Group (listed in alphabetical order, also includes individuals listed under other headings):**

Richa Agarwala<sup>26</sup>, L. Aravind<sup>26</sup>, Jeffrey A. Bailey<sup>27</sup>, Alex Bateman<sup>27</sup>, Serafin Batzoglou<sup>28</sup>, Ewan Birney<sup>29</sup>, Peer Bork<sup>28</sup>, Daniel G. Brown<sup>29</sup>, Christopher B. Burge<sup>29</sup>, Lorenzo Cerutti<sup>29</sup>, Hsiao-Chuan Chen<sup>26</sup>, Deanna Church<sup>26</sup>, Michele Clamp<sup>29</sup>, Richard R. Coply<sup>29</sup>, Tobias Doers<sup>29</sup>, Sean R. Eddy<sup>29</sup>, Evan E. Echler<sup>29</sup>, Terrence S. Furey<sup>29</sup>, James Galagan<sup>29</sup>, James G. R. Gilbert<sup>26</sup>, Cyrus Harmon<sup>29</sup>, Yoshihiko Hayashizaki<sup>29</sup>, David Haussler<sup>29</sup>, Henning Hermjakob<sup>29</sup>, Karsten Hockamp<sup>27</sup>, Wonhee Jang<sup>26</sup>, L. Steven Johnson<sup>29</sup>, Thomas A. Jones<sup>29</sup>, Simon Kasai<sup>29</sup>, Arik Kasprzyk<sup>29</sup>, Scott Kennedy<sup>29</sup>, W. James Kent<sup>29</sup>, Paul Kiths<sup>29</sup>, Eugene V. Koonin<sup>29</sup>, Ian Korf<sup>29</sup>, David Kulp<sup>29</sup>, Doron Lancet<sup>29</sup>, Todd M. Lowy<sup>29</sup>, Aofie Mclysaght<sup>29</sup>, Tarjei Mikkelsen<sup>29</sup>, John V. Moran<sup>29</sup>, Nicola Mulder<sup>29</sup>, Victor J. Pollara<sup>29</sup>, Chris P. Ponting<sup>29</sup>, Greg Schuler<sup>29</sup>, Jörg Schütz<sup>29</sup>, Guy Slater<sup>29</sup>, Arfan A. Smit<sup>29</sup>, Ella Stupka<sup>29</sup>, Joseph Szustakowski<sup>29</sup>, Danielle Thierry-Mieg<sup>29</sup>, Jean Thierry-Mieg<sup>29</sup>, Lukas Wagner<sup>29</sup>, John Wallis<sup>29</sup>, Raymond Wheeler<sup>29</sup>, Alan Williams<sup>29</sup>, Yuli I. Wolf<sup>29</sup>, Kenneth H. Wolfe<sup>29</sup>, Shiaw-Pyn Yang<sup>29</sup> & Ru-Fang Yeh<sup>29</sup>

**Scientific management:** National Human Genome Research Institute, US National Institutes of Health: Francis Collins<sup>29</sup>, Mark S. Guyer<sup>29</sup>, Jane Peterson<sup>29</sup>, Adam Fleischman<sup>29</sup>, Kris A. Wetterstrand<sup>29</sup>; Office of Science, US Department of Energy: Aristides Patrinos<sup>29</sup>; The Wellcome Trust: Michael J. Morgan<sup>29</sup>



# Combined Measurement of the Higgs Boson Mass in $pp$ Collisions at $\sqrt{s} = 7$ and 8 TeV with the ATLAS and CMS Experiments

G. Aad *et al.*<sup>\*</sup>

(ATLAS Collaboration)<sup>†</sup>

(CMS Collaboration)<sup>†</sup>

(Received 25 March 2015; published 14 May 2015)

<https://doi.org/10.1103/PhysRevLett.114.191803>

- Conference for Computing in High-Energy and Nuclear Physics (CHeP03), 2003, CHeP-2003-MOLT007, arXiv: physics/0306116.
- [28] L. Moneta, K. Belasco, K.S. Cranmer, A. Lazzaro, D. Piparo, G. Schott, W. Verkerke, and M. Wolf, The ROOSTAT Project, in Proceedings of the 13th International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT2010) (SISSA, 2010), Phys. Sci., ACAT2010 (2010) 057 [arXiv:1009.1003].
- [29] K. Cranmer, O. Lewis, L. Moneta, A. Shihab, and W. Verkerke (ROOT), "HISTFACTORY: A tool for creating statistical models for use with ROOFIT and ROOSTAT," Tech. Rep. CERN-OPEN-2012-016, 2012 (http://cds.cern.ch/record/1456844).
- [30] ATLAS Collaboration, Electron and photon energy calibration with the ATLAS detector using LHC Run 1 data, Eur. Phys. J. C **74**, 3071 (2014).
- [31] ATLAS Collaboration, Measurement of the muon reconstruction performance of the ATLAS detector using 2011 and 2012 LHC proton-proton collision data, Eur. Phys. J. C **74**, 3130 (2014).
- [32] CMS Collaboration, Performance of CMS muon reconstruction in  $pp$  collision events at  $\sqrt{s} = 7$  TeV, J. Instrum. **7**, P10002 (2012).
- [33] CMS Collaboration, Performance of electron reconstruction and selection with the CMS detector in proton-proton collisions at  $\sqrt{s} = 8$  TeV, arXiv:1502.02701 [J. Instrum. to be published].
- [34] CMS Collaboration, Performance of photon reconstruction and identification with the CMS detector in proton-proton collisions at  $\sqrt{s} = 8$  TeV, arXiv:1502.02702.
- [35] P.D. Dauncey, M. McKenzie, N. Waddington, and G.J. Davies, Handling uncertainty in background shapes: The discrete profiling method, J. Instrum. **10**, P04015 (2015).
- [36] ALEPH, DELPHI, L3, OPAL, SLD Collaborations, LEP Electroweak Working Group, and SLD Electroweak and Heavy Flavour Groups, Precision electroweak measurements on the Z resonance, Phys. Rep. **427**, 257 (2006).
- [37] ATLAS Collaboration, Observation and measurement of Higgs boson decays to  $WW^*$  with the ATLAS detector, arXiv:1412.2641 [Phys. Rev. D (to be published)].
- [38] ATLAS Collaboration, Evidence for the Higgs-boson Yukawa coupling to tau leptons with the ATLAS detector, J. High Energy Phys. 04 (2015) 117.
- [39] CMS Collaboration, Measurement of Higgs boson production and properties in the  $WW$  decay channel with leptonic final states, J. High Energy Phys. 01 (2014) 096.
- [40] CMS Collaboration, Evidence for the 125 GeV Higgs boson decaying to a pair of  $\tau$  leptons, J. High Energy Phys. 05 (2014) 104.

- 
- G. Aad,<sup>85,f</sup> B. Abbott,<sup>113,f</sup> J. Abdallah,<sup>151,f</sup> O. Abdinov,<sup>11,f</sup> R. Aben,<sup>107,f</sup> M. Abolins,<sup>30,f</sup> O. S. AbuZeid,<sup>158,f</sup>  
 H. Abramowicz,<sup>153,f</sup> H. Abreu,<sup>152,f</sup> R. Abreu,<sup>30,f</sup> Y. Aloulai,<sup>146a,146b,f</sup> B. S. Acharya,<sup>164a,164b,f</sup> L. Adamczyk,<sup>38a,f</sup>  
 D. L. Adams,<sup>25,f</sup> J. Adelman,<sup>108,f</sup> S. Adomeit,<sup>100,f</sup> T. Adye,<sup>131,f</sup> A. A. Afzaldeh,<sup>34,f</sup> T. Agathonovic-Jovin,<sup>13,f</sup>  
 J. A. Aguilar-Sauvage,<sup>125a,126a,f</sup> S. P. Ahlen,<sup>22,f</sup> F. Ahmadov,<sup>65,f</sup> G. Aielli,<sup>135a,135b,f</sup> H. Akersdottir,<sup>146a,146b,f</sup>  
 T.P.A. Åkesson,<sup>41,f</sup> G. Akimoto,<sup>155,f</sup> A. V. Akimov,<sup>96,f</sup> G. L. Alberghi,<sup>20a,20b,f</sup> J. Albert,<sup>109,f</sup> S. Albrand,<sup>35,f</sup>  
 M. J. Alconada Verzini,<sup>71,f</sup> M. Aleksić,<sup>30,f</sup> I.N. Aleksandrov,<sup>65,f</sup> C. Alexa,<sup>26a,f</sup> G. Alexander,<sup>153,f</sup> T. Alexopoulos,<sup>10,f</sup>  
 M. Althroop,<sup>113,f</sup> G. Altimonti,<sup>91a,f</sup> L. Alio,<sup>85,f</sup> J. Alison,<sup>31,f</sup> S. P. Alkire,<sup>35,f</sup> B. M. M. Allbrooke,<sup>18,f</sup> P. P. Alport,<sup>74,f</sup>  
 A. Aloisio,<sup>104a,106b,f</sup> A. Alonso,<sup>36,f</sup> F. Alonso,<sup>17,f</sup> C. Alpigiani,<sup>76,f</sup> A. Altheimer,<sup>35,f</sup> B. Alvarez Gonzalez,<sup>30,f</sup>  
 D. Álvarez Piqueras,<sup>36,f</sup> M. G. Alvigi,<sup>15,f</sup> T. B. Amadio,<sup>15,f</sup> K. Amako,<sup>66,f</sup> Y. Amaral Coutinho,<sup>24,f</sup> C. Ameling,<sup>23,f</sup>  
 D. Amidei,<sup>90,f</sup> S. P. Amor Dos Santos,<sup>126a,126c,f</sup> A. Amorim,<sup>126a,126b,f</sup> S. Amoroso,<sup>48,f</sup> N. Amram,<sup>153,f</sup> G. Amundsen,<sup>23,f</sup>  
 C. Anastopoulos,<sup>139,f</sup> L. S. Anzu,<sup>49,f</sup> N. Andari,<sup>30,f</sup> T. Andeen,<sup>35,f</sup> C. F. Anders,<sup>58b,f</sup> G. Anders,<sup>30,f</sup> J. K. Anders,<sup>74,f</sup>  
 K.J. Anderson,<sup>47,f</sup> A. Andreazza,<sup>14a,b,f</sup> V. Andrei,<sup>58a,f</sup> S. Angelidakis,<sup>9,f</sup> I. Angelozzi,<sup>107,f</sup> J. Anger,<sup>44,f</sup> A. Angerami,<sup>35,f</sup>  
 F. Anghinolfi,<sup>30,f</sup> A. V. Anisenkov,<sup>109,f</sup> N. Anjos,<sup>12,f</sup> A. Annovi,<sup>124a,124b,f</sup> M. Antonelli,<sup>47,f</sup> A. Antonov,<sup>98,f</sup> J. Antos,<sup>140b,f</sup>  
 F. Anulli,<sup>132a,f</sup> M. Aoki,<sup>56,f</sup> L. Aperio Bella,<sup>18,f</sup> G. Arabidez,<sup>90,f</sup> Y. Arai,<sup>66,f</sup> J. P. Araque,<sup>126a,f</sup> A. T. H. Arce,<sup>45,f</sup>  
 F. A. Ardhu,<sup>71,f</sup> J.-F. Arguin,<sup>95,f</sup> S. Argyropoulos,<sup>42,f</sup> M. Arik,<sup>19a,f</sup> A. J. Armbruster,<sup>30,f</sup> O. Arnaez,<sup>82,f</sup>  
 H. Arnold,<sup>146a,146b,f</sup> M. Arratia,<sup>85,f</sup> O. Arslan,<sup>21,f</sup> A. Artamonov,<sup>49,f</sup> G. Artoni,<sup>23,f</sup> S. Asai,<sup>155,f</sup> N. Asbah,<sup>42,f</sup> A. Ashkenazi,<sup>153,f</sup>  
 B. Åsman,<sup>146a,146b,f</sup> L. Asquith,<sup>149,f</sup> K. Assamagan,<sup>25,f</sup> R. Astalos,<sup>144,f</sup> M. Atkinson,<sup>163,f</sup> N. B. Atlay,<sup>141,f</sup> B. Auermann,<sup>6,f</sup>  
 K. Augsten,<sup>128,f</sup> M. Auroousseau,<sup>145b,f</sup> G. Avolio,<sup>30,f</sup> B. Axen,<sup>15,f</sup> M. K. Ayoub,<sup>117,f</sup> G. Azuelos,<sup>95,f</sup> M. A. Baak,<sup>30,f</sup>  
 E. A. Baas,<sup>58a,f</sup> C. Bacci,<sup>134a,134b,f</sup> H. Bachacou,<sup>136,f</sup> K. Baches,<sup>154,f</sup> M. Backes,<sup>30,f</sup> M. Backhaus,<sup>30,f</sup> E. Badescu,<sup>26a,f</sup>  
 P. Bagiacchi,<sup>148,f</sup> P. Bagnaia,<sup>132a,132b,f</sup> Y. Bai,<sup>23a,f</sup> T. Bain,<sup>35,f</sup> J. T. Barnes,<sup>131,f</sup> O. K. Baker,<sup>176,f</sup> B. Balem,<sup>129,f</sup>  
 T. Balest,<sup>148,f</sup> F. Balli,<sup>84,f</sup> E. Banza,<sup>29,f</sup> S. Van Banerjea,<sup>175,f</sup> A. E. Barnousha,<sup>175,f</sup> H. S. Bansil,<sup>18,f</sup> L. Barak,<sup>30,f</sup>  
 S. P. Baranov,<sup>96,f</sup> E.L. Barberio,<sup>88,f</sup> D. Barberis,<sup>85,f</sup> M. Barbero,<sup>101,f</sup> T. Barillari,<sup>15,f</sup> M. Barisonzi,<sup>164a,164b,f</sup>  
 T. Barklow,<sup>143,f</sup> N. Barklow,<sup>28,f</sup> S.L. Barnes,<sup>84,f</sup> B.M. Barnes,<sup>131,f</sup> R. M. Barnett,<sup>15,f</sup> Z. Barnovska,<sup>6,f</sup> A. Baroncelli,<sup>134a,f</sup>  
 G. Barone,<sup>49,f</sup> A. J. Barr,<sup>120,f</sup> F. Barreiro,<sup>82,f</sup> J. Barreiro Guimaraes da Costa,<sup>37,f</sup> R. Bartoldus,<sup>143,f</sup> A. E. Barton,<sup>72,f</sup>

- P. Bartos,<sup>144a,b</sup> A. Bassalat,<sup>117,a</sup> A. Basye,<sup>165,b</sup> R. L. Bates,<sup>53,b</sup> S. J. Batista,<sup>158,b</sup> J. R. Batley,<sup>28,t</sup> M. Battaglia,<sup>137,t</sup>  
 M. Baute,<sup>132a,b</sup> F. Bauer,<sup>116,t</sup> H. S. Bawa,<sup>145,t,f</sup> J. B. Beacham,<sup>112,t</sup> M. D. Beattie,<sup>72,t</sup> T. Beau,<sup>161,t</sup> P. H. Beauchemin,<sup>161,t</sup>  
 R. Beccerelle,<sup>126a,b</sup> P. Bechtle,<sup>21,t</sup> H. P. Beck,<sup>17,t</sup> K. Becker,<sup>120,t</sup> M. Becker,<sup>83,t</sup> S. Becker,<sup>100,t</sup> M. Beckingham,<sup>270,t</sup>  
 C. Becot,<sup>117,t</sup> A. J. Beddall,<sup>92,t</sup> A. Beddall,<sup>196,t</sup> V. A. Bednyakov,<sup>65,b</sup> C. P. Bee,<sup>148,t</sup> L. J. Beemster,<sup>107,t</sup> T. A. Beermann,<sup>175,t</sup>  
 M. Begel,<sup>25,t</sup> J. K. Behr,<sup>120,t</sup> C. Belanger-Champagne,<sup>87,t</sup> W. H. Bell,<sup>49,t</sup> G. Bella,<sup>153,t</sup> L. Bellagamba,<sup>20a,t</sup> A. Bellerive,<sup>29,t</sup>  
 M. Bellomo,<sup>16,t</sup> K. Belotsky,<sup>91,t</sup> O. Beltramello,<sup>30,t</sup> O. Benary,<sup>153,t</sup> D. Benchekroun,<sup>100,t</sup> M. Bender,<sup>100,t</sup>  
 K. Bendy,<sup>146a,b</sup> N. Benekos,<sup>10,t</sup> Y. Benhammou,<sup>153,t</sup> E. Benhar Noccioli,<sup>49,t</sup> J. A. Benitez Garcia,<sup>159b,t</sup>  
 D. P. Benjamin,<sup>45,t</sup> J. R. Bensinger,<sup>23,t</sup> S. Bentvelsen,<sup>107,t</sup> L. Beresford,<sup>120,t</sup> M. Beretta,<sup>47,t</sup> D. Berge,<sup>107,t</sup>  
 E. Bergheau Kuutmann,<sup>116,t</sup> N. Berger,<sup>5,t</sup> F. Berghaus,<sup>109,t</sup> J. Beringer,<sup>15,t</sup> C. Bernard,<sup>27,t</sup> N. R. Bernard,<sup>86,t</sup> C. Berniu,<sup>110,t</sup>  
 F. U. Bernlochner,<sup>21,t</sup> T. Berry,<sup>7,t</sup> P. Beta,<sup>120,t</sup> C. Bertella,<sup>83,t</sup> G. Bertelli,<sup>146,t</sup> F. Bertolucci,<sup>125a,b</sup> C. Berutsche,<sup>113,t</sup>  
 D. Berutsche,<sup>113,t</sup> M. I. Besana,<sup>91,t</sup> G. J. Besjes,<sup>106,t</sup> O. Bessidkina,<sup>124,t</sup> Bylund,<sup>146,t</sup> M. Bessner,<sup>42,t</sup> N. Besson,<sup>30,t</sup>  
 C. Betancourt,<sup>48,t</sup> S. Bethke,<sup>101,t</sup> A. J. Bevan,<sup>76,t</sup> W. Bhimji,<sup>46,t</sup> R. M. Bianchi,<sup>125,t</sup> L. Bianchini,<sup>23,t</sup> M. Bianco,<sup>30,t</sup>  
 O. Biebel,<sup>103,t</sup> S. P. Bienniek,<sup>143,t</sup> M. Bigletti,<sup>134,t</sup> J. Bibao De Mendizabal,<sup>60,t</sup> H. Bilokon,<sup>67,t</sup> M. Bindl,<sup>54,t</sup> S. Binet,<sup>117,t</sup>  
 A. Biebel,<sup>193,t</sup> C. Bini,<sup>132a,b</sup> C. Black,<sup>150,t</sup> J. E. Black,<sup>143,t</sup> K. M. Black,<sup>22,t</sup> D. Blackburn,<sup>138,t</sup> R. E. Blair,<sup>6,t</sup>  
 J.-B. Blanchard,<sup>136,t</sup> J. E. Blanco,<sup>77,t</sup> T. Blazek,<sup>144,t</sup> I. Bloch,<sup>42,t</sup> C. Blocker,<sup>23,t</sup> W. Blum,<sup>83,t</sup> U. Blumenschein,<sup>54,t</sup>  
 G. J. Bobbink,<sup>107,t</sup> V. S. Bobrovnikov,<sup>109,t</sup> S. S. Bocchetta,<sup>81,t</sup> A. Bocci,<sup>145,t</sup> C. Bock,<sup>100,t</sup> M. Boehler,<sup>48,t</sup> J. A. Bogaerts,<sup>30,t</sup>  
 A. G. Bogodanchikov,<sup>108,t</sup> C. Bohm,<sup>164,t</sup> V. Botvits,<sup>77,t</sup> T. Bole,<sup>130,t</sup> V. Boldea,<sup>26a,t</sup> A. S. Boldyrev,<sup>99,t</sup> M. Bombe,<sup>80,t</sup>  
 M. Bona,<sup>95,t</sup> M. Boonekamp,<sup>130,t</sup> A. Borisov,<sup>170,t</sup> G. Borissov,<sup>72,t</sup> S. Borroni,<sup>42,t</sup> J. Borfeldt,<sup>105,t</sup> V. Bortolotto,<sup>60a-60c,t</sup>  
 K. Bos,<sup>107,t</sup> D. Boscherini,<sup>20a,t</sup> M. Bosman,<sup>12,t</sup> J. Bourdaud,<sup>125,t</sup> J. Bouffard,<sup>2,t</sup> E. V. Bouhouva-Thacker,<sup>72,t</sup>  
 D. Boumediene,<sup>34,t</sup> C. Bourdarios,<sup>117,t</sup> N. Boussoin,<sup>14,t</sup> A. Boveia,<sup>30,t</sup> J. Boyd,<sup>30,t</sup> I. R. Boyke,<sup>65,t</sup> I. Bozic,<sup>13,t</sup>  
 J. Braciinski,<sup>18,t</sup> A. Brandt,<sup>48,t</sup> G. Brandt,<sup>54,t</sup> O. Brandt,<sup>156,t</sup> U. Bratzler,<sup>156,t</sup> B. Brau,<sup>46,t</sup> J. E. Brau,<sup>116,t</sup> H. M. Braun,<sup>173a,t</sup>  
 S. F. Brazzale,<sup>164a,b</sup> K. Brendlinger,<sup>122,t</sup> A. J. Brennan,<sup>88,t</sup> J. Brenner,<sup>107,t</sup> R. Brenner,<sup>166,t</sup> S. Bressler,<sup>172,t</sup>  
 K. Bristow,<sup>145,t</sup> T. M. Bristow,<sup>46,t</sup> D. Britton,<sup>53,t</sup> D. Britzger,<sup>42,t</sup> F. M. Brochu,<sup>26,t</sup> I. Brock,<sup>21,t</sup> R. Brock,<sup>90,t</sup> J. Bronner,<sup>101,t</sup>  
 G. Brooijmans,<sup>35,t</sup> T. Brooks,<sup>77,t</sup> W. K. Brooks,<sup>10,t</sup> J. Brosamer,<sup>15,t</sup> E. Brost,<sup>106,t</sup> J. Brown,<sup>55,t</sup>  
 P. A. Bruckman de Renstrom,<sup>39,t</sup> D. Bruncko,<sup>144b,t</sup> R. Bruniere,<sup>48,t</sup> A. Brunni,<sup>26a,t</sup> G. Bruni,<sup>20a,t</sup> M. Bruschi,<sup>20b,t</sup>  
 L. Bryngemark,<sup>48,t</sup> T. Buanes,<sup>14,t</sup> Q. Buat,<sup>142,t</sup> P. Bucholz,<sup>141,t</sup> A. G. Buckley,<sup>53,t</sup> S. L. Budka,<sup>26a,t</sup> I. A. Budagov,<sup>65,t</sup>  
 F. Buehrer,<sup>48,t</sup> L. Buge,<sup>119,t</sup> M. K. Buge,<sup>119,t</sup> O. Bulekov,<sup>98,t</sup> D. Bullock,<sup>5,t</sup> H. Burckhardt,<sup>30,t</sup> S. Burdin,<sup>53,t</sup>  
 B. Burghgraeve,<sup>108,t</sup> S. Burke,<sup>131,t</sup> I. Burmeister,<sup>43,t</sup> E. Busato,<sup>34,t</sup> D. Büscher,<sup>48,t</sup> V. Büscher,<sup>93,t</sup> P. Bussey,<sup>53,t</sup>  
 P. C. Buszello,<sup>164,t</sup> J. M. Butler,<sup>22,t</sup> A. I. Butt,<sup>3,t</sup> C. M. Butt,<sup>33,t</sup> J. M. Butterworth,<sup>76,t</sup> P. Butt,<sup>107,t</sup> W. Buttinger,<sup>28,t</sup>  
 A. Butazu,<sup>53,t</sup> V. Buzkayko,<sup>109,t</sup> S. Cabrera Urbán,<sup>107,t</sup> D. Caforio,<sup>128,t</sup> V. M. Cairo,<sup>37a,t</sup> O. Cakir,<sup>46,t</sup> P. Calafuria,<sup>15,t</sup>  
 A. Calandri,<sup>136,t</sup> G. Calderini,<sup>103,t</sup> P. Calfayan,<sup>100,t</sup> L. P. Caloba,<sup>24,t</sup> D. Calver,<sup>34,t</sup> S. Calvet,<sup>34,t</sup> R. Camacho Toro,<sup>31,t</sup>  
 S. Camarda,<sup>42,t</sup> P. Camarri,<sup>133a,b</sup> D. Cameron,<sup>119,t</sup> L. M. Caminada,<sup>15,t</sup> R. Caminada Armadans,<sup>12,t</sup> S. Campana,<sup>30,t</sup>  
 M. Campanelli,<sup>78,t</sup> A. Campanvero,<sup>148,t</sup> V. Canale,<sup>30a,b</sup> A. Canepa,<sup>148,t</sup> M. Canete Beri,<sup>76,t</sup> J. Cantero,<sup>42,t</sup>  
 R. Cantrell,<sup>126a,t</sup> T. Cao,<sup>40,t</sup> M. D. M. Capaenos Garrido,<sup>30,t</sup> I. Caprini,<sup>26a,t</sup> M. Caprini,<sup>26a,t</sup> M. Capua,<sup>37a,t</sup> R. Caputo,<sup>83,t</sup>  
 R. Cardarelli,<sup>133a,t</sup> T. Carli,<sup>30,t</sup> G. Carino,<sup>104,t</sup> L. Carmatin,<sup>91a,b</sup> S. Caron,<sup>106,t</sup> E. Carquin,<sup>32,t</sup> G. D. Carrillo-Montoya,<sup>8,t</sup>  
 J. R. Carter,<sup>28,t</sup> J. Carvalho,<sup>126a,b</sup> D. Casader,<sup>78,t</sup> M. P. Casado,<sup>12,t</sup> M. Casolino,<sup>12,t</sup> E. Castaneda-Miranda,<sup>149b,t</sup>  
 A. Castelli,<sup>107,t</sup> V. Castillo Gimenez,<sup>107,t</sup> N. F. Castro,<sup>128,t</sup> P. Catastini,<sup>59,t</sup> A. Catimacco,<sup>30,t</sup> J. R. Catmore,<sup>119,t</sup>  
 A. Cattai,<sup>30,t</sup> J. Cauldron,<sup>83,t</sup> V. Cavaliere,<sup>165,t</sup> M. Cavalli,<sup>27,t</sup> M. Cavalli-Sforza,<sup>12,t</sup> V. Cavasinni,<sup>124a,b</sup>  
 F. Ceradini,<sup>134a,b</sup> B. C. Cerio,<sup>45,t</sup> K. Cerny,<sup>129,t</sup> A. S. Cerqueira,<sup>24b,t</sup> A. Cerni,<sup>149,t</sup> L. Cerrito,<sup>76,t</sup> F. Cerutti,<sup>15,t</sup> M. Cerv,<sup>30,t</sup>  
 A. Cervelli,<sup>27,t</sup> S. A. Cetin,<sup>136,t</sup> A. Chafaq,<sup>135a,t</sup> D. Chakraborty,<sup>108,t</sup> I. Chalupkova,<sup>128,t</sup> P. Chang,<sup>165,t</sup> B. Chapleau,<sup>87,t</sup>  
 J. D. Chapman,<sup>28,t</sup> D. G. Charlton,<sup>18,t</sup> C. C. Chan,<sup>128,t</sup> C. A. Chavez Barajas,<sup>49,t</sup> S. Cheatham,<sup>132,t</sup> A. Chegwidden,<sup>90,t</sup>  
 S. Chekanov,<sup>6,t</sup> S. V. Chekulaev,<sup>159a,t</sup> G. A. Chelkov,<sup>65,t</sup> M. A. Chelstowska,<sup>99,t</sup> C. Chen,<sup>64,t</sup> H. Chen,<sup>25,t</sup> K. Chen,<sup>148,t</sup>  
 L. Chen,<sup>33a,t</sup> S. Chen,<sup>33,t</sup> Y. Chen,<sup>67,t</sup> H. C. Cheng,<sup>90,t</sup> Y. Chen,<sup>31,t</sup> A. Cheplakov,<sup>65,t</sup> E. Cheremushkina,<sup>130,t</sup>  
 R. Cherkouai El Mousli,<sup>135c,t</sup> V. Chernyatin,<sup>25,t</sup> E. Cheu,<sup>7,t</sup> L. Chevalier,<sup>136,t</sup> V. Chiarella,<sup>47,t</sup> J. T. Childers,<sup>6,t</sup>  
 G. Chiodini,<sup>73,t</sup> A. S. Chisholm,<sup>18,t</sup> R. T. Chislett,<sup>78,t</sup> A. Chitan,<sup>26a,t</sup> M. V. Chizhov,<sup>65,t</sup> K. Choi,<sup>41,t</sup> S. Chouridou,<sup>9,t</sup>  
 B. K. B. Chow,<sup>200,t</sup> V. Christodoulou,<sup>78,t</sup> D. Chromek-Burckhardt,<sup>30,t</sup> M. L. Chu,<sup>131,t</sup> J. Chudoba,<sup>127,t</sup> A. J. Chujnowski,<sup>87,t</sup>  
 J. J. Chwastowski,<sup>39,t</sup> L. Chytka,<sup>115,t</sup> G. Ciapetti,<sup>132a,b</sup> A. K. Ciftci,<sup>46,t</sup> D. Cinca,<sup>53,t</sup> V. Cindro,<sup>75,t</sup> I. A. Ciocara,<sup>21,t</sup>  
 A. Cicoci,<sup>15,t</sup> Z. H. Citron,<sup>172,t</sup> M. Ciubancan,<sup>26a,t</sup> A. Clark,<sup>40,t</sup> B. L. Clark,<sup>37,t</sup> P. J. Clark,<sup>46,t</sup> R. N. Clarke,<sup>15,t</sup>  
 W. Cleland,<sup>125,t</sup> C. Clement,<sup>146a,b</sup> Y. Coadou,<sup>83,t</sup> M. Cobal,<sup>164a,b</sup> A. Coccaro,<sup>138,t</sup> J. Cochran,<sup>64,t</sup> L. Coffey,<sup>23,t</sup>

- J. G. Cogan,<sup>143,t</sup> B. Cole,<sup>35,t</sup> S. Cole,<sup>108,t</sup> A. P. Colijn,<sup>107,t</sup> J. Collot,<sup>55,t</sup> T. Colombo,<sup>58c,f</sup> G. Compastella,<sup>101,t</sup>  
 P. Conde Muñoz,<sup>126a,126b,t</sup> E. Conovatis,<sup>48,t</sup> S. H. Connell,<sup>148b,t</sup> L. A. Connolly,<sup>17,t</sup> S. M. Consonni,<sup>92a,b,t</sup> V. Consorti,<sup>48,t</sup>  
 S. Constantinescu,<sup>26a,t</sup> C. Conta,<sup>123a,123b,t</sup> G. Conti,<sup>30,t</sup> F. Conventi,<sup>104a,t</sup> M. Cooke,<sup>15,t</sup> B. D. Cooper,<sup>78,t</sup>  
 A. M. Cooper-Sarkar,<sup>120,t</sup> T. Cornelissen,<sup>175,t</sup> M. Corradi,<sup>20,t</sup> F. Corriveau,<sup>87,t</sup> A. Corso-Radu,<sup>103,t</sup> A. Cortes-Gonzalez,<sup>12,t</sup>  
 G. Cortiana,<sup>101,t</sup> G. Costa,<sup>91a,t</sup> M. J. Costa,<sup>107,t</sup> D. Costanzo,<sup>139,t</sup> D. Côte,<sup>8,t</sup> G. Cottin,<sup>28,t</sup> G. Cowan,<sup>77,t</sup> B. E. Cox,<sup>84,t</sup>  
 K. Cranmer,<sup>110,t</sup> G. Cree,<sup>29,t</sup> S. Crépel-Renaudin,<sup>46,t</sup> F. Crescioli,<sup>40,t</sup> W. A. Cribbs,<sup>146a,146b,t</sup> M. Crispin Ortuzar,<sup>120,t</sup>  
 M. Cristinziani,<sup>21,t</sup> V. Croft,<sup>106,t</sup> G. Crosetti,<sup>27a,27b,t</sup> T. Cuhadar Donszelmann,<sup>139,t</sup> J. Cummings,<sup>176,t</sup> M. Curatolo,<sup>47,t</sup>  
 C. Cuthbert,<sup>150,t</sup> H. Czir,<sup>141,t</sup> P. Czodrowski,<sup>3,t</sup> S. D'Auria,<sup>53,t</sup> M. D'Onofrio,<sup>74,t</sup>  
 M. J. Da Cunha Sargedas De Sousa,<sup>123a,123b,t</sup> C. Da Via,<sup>84,t</sup> W. Dabrowski,<sup>38a,t</sup> A. Dafinac,<sup>120,t</sup> T. Dai,<sup>99,t</sup> O. Dale,<sup>14,t</sup>  
 F. Dallaire,<sup>6,t</sup> C. Dellapiccola,<sup>36,t</sup> M. Dam,<sup>36,t</sup> R. J. Dandoy,<sup>31,t</sup> N. P. Pang,<sup>48,t</sup> A. C. Daniells,<sup>18,t</sup> M. Danninger,<sup>166,t</sup>  
 M. Dano Hoffmann,<sup>136,t</sup> V. Dav,<sup>48,t</sup> G. Darbo,<sup>50a,t</sup> S. Darmora,<sup>8,t</sup> J. Dassoulas,<sup>3,t</sup> A. Datta Gupta,<sup>61,t</sup> W. Davy,<sup>21,t</sup>  
 C. David,<sup>109,t</sup> T. Davidek,<sup>129,t</sup> E. Davies,<sup>53,t</sup> M. Davies,<sup>153,t</sup> P. Davison,<sup>78,t</sup> Y. Davygora,<sup>58,t</sup> E. Dawe,<sup>88,t</sup> I. Dawson,<sup>139,t</sup>  
 R. K. Daya-Ishmukhametova,<sup>86,t</sup> K. De,<sup>8,t</sup> R. De Asmundis,<sup>104a,t</sup> D. De Castro,<sup>20a,20b,t</sup> S. De Cecco,<sup>80,t</sup> N. De Groot,<sup>106,t</sup>  
 P. de Jong,<sup>107,t</sup> H. De la Torre,<sup>82,t</sup> F. De Lorenzi,<sup>64,t</sup> L. De Nooit,<sup>107,t</sup> D. De Peidis,<sup>132a,t</sup> A. De Salvo,<sup>122a,t</sup> U. De Sanctis,<sup>149,t</sup>  
 A. De Santo,<sup>149,t</sup> J. B. De Vivie De Regie,<sup>117,t</sup> W. J. Deamey,<sup>149,t</sup> R. Debbe,<sup>25,t</sup> C. Debenedetti,<sup>137,t</sup> D. V. Dedovich,<sup>65,t</sup>  
 I. Deigaard,<sup>107,t</sup> J. Del Peso,<sup>82,t</sup> T. Del Prete,<sup>124a,124b,t</sup> D. Delgove,<sup>117,t</sup> F. Delion,<sup>116,t</sup> C. M. Delitschz,<sup>49,t</sup> M. Deliyergiyev,<sup>75,t</sup>  
 A. Dell'Acqua,<sup>30,t</sup> L. Dell'asta,<sup>22,t</sup> M. Dello Russo,<sup>124a,124b,t</sup> M. Della Pietra,<sup>30a,b,t</sup> D. della Volpe,<sup>49,t</sup> M. Delmastro,<sup>5,t</sup>  
 P. A. Delsart,<sup>55,t</sup> C. Deluca,<sup>107,t</sup> D. A. DeMarco,<sup>158,t</sup> S. Demers,<sup>176,t</sup> M. Demichev,<sup>85,t</sup> A. Demilly,<sup>80,t</sup> S. P. Denisov,<sup>130,t</sup>  
 D. Derendarz,<sup>39,t</sup> J. E. Derkaoui,<sup>155,t</sup> F. Derue,<sup>80,t</sup> P. Dervan,<sup>34,t</sup> K. Desch,<sup>21,t</sup> C. Deterre,<sup>42,t</sup> P. O. Deviereiros,<sup>30,t</sup>  
 A. Dewhurst,<sup>131,t</sup> S. Dhaliwal,<sup>107,t</sup> A. Di Ciaccio,<sup>133a,133b,t</sup> L. Di Ciazzo,<sup>5,t</sup> A. Di Domenico,<sup>132a,132b,t</sup> C. Di Donato,<sup>104a,104b,t</sup>  
 A. Di Girolamo,<sup>30,t</sup> B. Di Girolamo,<sup>30,t</sup> A. Di Mattia,<sup>152,t</sup> B. Di Micco,<sup>152,t</sup> R. Di Nardo,<sup>47,t</sup> A. Di Simone,<sup>48,t</sup>  
 R. Di Sipio,<sup>158,t</sup> D. Di Valentino,<sup>29,t</sup> C. Diaconi,<sup>83,t</sup> M. Diamond,<sup>138,t</sup> F. A. Dias,<sup>46,t</sup> M. A. Diaz,<sup>32a,t</sup> E. B. Diehl,<sup>99,t</sup>  
 J. Dietrich,<sup>16,t</sup> S. Diglio,<sup>85,t</sup> A. Dimitrijevska,<sup>13,t</sup> J. Dijngfelder,<sup>21,t</sup> P. Dita,<sup>26a,t</sup> S. Dittus,<sup>20a,t</sup> F. Dittus,<sup>30,t</sup> F. Djama,<sup>85,t</sup>  
 T. Djobava,<sup>51b,t</sup> J. I. Djuvland,<sup>58a,t</sup> M. A. B. do Vale,<sup>24c,t</sup> D. Dobos,<sup>30,t</sup> M. Dobre,<sup>26a,t</sup> C. Doglioni,<sup>49,t</sup> T. Dolhmae,<sup>155,t</sup>  
 J. Dolejsi,<sup>128,t</sup> Z. Dolezal,<sup>129,t</sup> B. A. Dolgoshein,<sup>98a,t</sup> M. Donadelli,<sup>24d,t</sup> S. Donati,<sup>124a,124b,t</sup> P. Dondero,<sup>121a,121b,t</sup>  
 J. Donini,<sup>34,t</sup> J. Dopke,<sup>131,t</sup> A. Doris,<sup>104a,t</sup> M. T. Dova,<sup>71,t</sup> A. T. Doyle,<sup>33,t</sup> E. Drechsler,<sup>34,t</sup> M. Dris,<sup>10,t</sup> E. Dubreuil,<sup>34,t</sup>  
 E. Duchovn,<sup>172,t</sup> G. Duckeck,<sup>100,t</sup> O. A. Duda,<sup>20a,20b,t</sup> D. Duda,<sup>175,t</sup> A. Dularayev,<sup>30,t</sup> L. Duflo,<sup>117,t</sup> L. Duguid,<sup>77,t</sup>  
 M. Dührssen,<sup>30,t</sup> M. Dunford,<sup>58a,t</sup> H. Duran Yildiz,<sup>46,t</sup> M. Dürren,<sup>52,t</sup> A. Durgishvili,<sup>51b,t</sup> D. Duschinger,<sup>44,t</sup> M. Dyndal,<sup>38a,t</sup>  
 C. Eckardt,<sup>42,t</sup> K. M. Ecker,<sup>201,t</sup> R. C. Edgar,<sup>98,t</sup> W. Edson,<sup>96,t</sup> N. C. Edwards,<sup>16,t</sup> W. Ehrenfeld,<sup>21,t</sup> T. Elifert,<sup>30,t</sup> G. Eigen,<sup>14,t</sup>  
 K. Einsweiler,<sup>15,t</sup> T. Ekelof,<sup>166,t</sup> M. El Kacimi,<sup>135,t</sup> M. Ellert,<sup>166,t</sup> S. Elles,<sup>8,t</sup> F. Ellinghaus,<sup>83,t</sup> A. A. Elliott,<sup>169,t</sup> N. Ellis,<sup>30,t</sup>  
 J. Elmsheuser,<sup>100,t</sup> M. Eising,<sup>30,t</sup> D. Emelyanov,<sup>131,t</sup> Y. Enari,<sup>155,t</sup> O. C. Endner,<sup>33,t</sup> M. Endo,<sup>118,t</sup> R. Engelmann,<sup>148,t</sup>  
 J. Erdmann,<sup>43,t</sup> A. Ereditato,<sup>175,t</sup> G. Ernis,<sup>175,t</sup> J. Ernst,<sup>2,t</sup> M. Ernst,<sup>25,t</sup> S. Errede,<sup>165,t</sup> E. Ertel,<sup>83,t</sup> M. Escalier,<sup>117,t</sup> H. Esch,<sup>43,t</sup>  
 J. Erdmann,<sup>125,t</sup> B. Esposito,<sup>47,t</sup> A. I. Etienne,<sup>136,t</sup> E. Etzion,<sup>133,t</sup> H. Evans,<sup>64,t</sup> A. Ezhilov,<sup>123,t</sup> L. Fabriti,<sup>20a,20b,t</sup> G. Facini,<sup>31,t</sup>  
 C. Escobar,<sup>125,t</sup> B. Espósito,<sup>47,t</sup> A. I. Etienne,<sup>136,t</sup> E. Etzion,<sup>133,t</sup> H. Evans,<sup>64,t</sup> A. Ezhilov,<sup>123,t</sup> L. Fabriti,<sup>20a,20b,t</sup> G. Facini,<sup>31,t</sup>  
 R. M. Fakhruddin,<sup>130,t</sup> S. Faloci,<sup>132,t</sup> R. J. Falla,<sup>78,t</sup> J. Fallota,<sup>120,t</sup> Y. Fang,<sup>33,t</sup> M. Fanti,<sup>91a,91b,t</sup> A. Farbin,<sup>8,t</sup>  
 A. Farilla,<sup>134a,t</sup> T. Farooque,<sup>12,t</sup> S. Farrell,<sup>15,t</sup> S. M. Farrington,<sup>170,t</sup> P. Farthouat,<sup>30,t</sup> F. Fassa,<sup>135a,t</sup> P. Fasnacht,<sup>30,t</sup>  
 D. Fassouliots,<sup>9,t</sup> M. Faucci Giannelli,<sup>73,t</sup> A. Favaro,<sup>17,t</sup> L. Fayard,<sup>117,t</sup> P. Federic,<sup>144a,t</sup> O. L. Fedin,<sup>123a,t</sup>  
 W. Fedorko,<sup>168,t</sup> S. Feigl,<sup>30,t</sup> L. Feligioni,<sup>83,t</sup> C. Feng,<sup>334,t</sup> E. J. Feng,<sup>6,t</sup> H. Feng,<sup>99,t</sup> A. B. Fenyuk,<sup>130,t</sup>  
 P. Fernandez Martinez,<sup>167,t</sup> S. Fernandez Perez,<sup>30,t</sup> S. Ferrap,<sup>33,t</sup> J. Ferrando,<sup>33,t</sup> A. Ferrari,<sup>166,t</sup> P. Ferrari,<sup>107,t</sup> R. Ferrari,<sup>123a,t</sup>  
 D. E. Ferreira de Lima,<sup>53,t</sup> A. Ferreir,<sup>167,t</sup> D. Ferreira,<sup>49,t</sup> C. Ferretti,<sup>89,t</sup> A. Ferretto Parodi,<sup>30a,30b,t</sup> M. Fiascaris,<sup>31,t</sup>  
 F. Fiedler,<sup>83,t</sup> A. Filipic,<sup>25,t</sup> M. Filipuzzi,<sup>42,t</sup> F. Filthaut,<sup>108,t</sup> M. Fincke-Kehler,<sup>160,t</sup> K. D. Finelli,<sup>130,t</sup>  
 M. C. N. Fiolhas,<sup>126a,126b,t</sup> L. Fiorini,<sup>167,t</sup> A. Firan,<sup>49,t</sup> A. Fischer,<sup>2,t</sup> C. Fischer,<sup>12,t</sup> J. Fischer,<sup>175,t</sup> W. C. Fisher,<sup>90,t</sup>  
 E. A. Fitzgerald,<sup>23,t</sup> M. Flechi,<sup>48,t</sup> I. Fleck,<sup>141,t</sup> G. Fleischmann,<sup>89,t</sup> S. Fleischmann,<sup>173,t</sup> G. T. Fletcher,<sup>139,t</sup> G. Fletcher,<sup>76,t</sup>  
 T. Flick,<sup>175,t</sup> A. Floderus,<sup>81,t</sup> L. R. Flores Castillo,<sup>60a,t</sup> M. J. Flowerdew,<sup>108,t</sup> A. Formica,<sup>136,t</sup> A. Forti,<sup>46,t</sup> D. Fournier,<sup>117,t</sup>  
 H. Fox,<sup>72,t</sup> S. Fracchia,<sup>12,t</sup> P. Francavilla,<sup>170,t</sup> M. Franchini,<sup>20a,20b,t</sup> D. Francis,<sup>30,t</sup> L. Franconi,<sup>138,t</sup> M. Franklin,<sup>57,t</sup>  
 M. Fraternali,<sup>123a,123b,t</sup> D. Freeborn,<sup>78,t</sup> S. French,<sup>28,t</sup> F. Friedrich,<sup>44,t</sup> D. Froidevaux,<sup>30,t</sup> J. A. Frost,<sup>120,t</sup> C. Fukunaga,<sup>156,t</sup>  
 E. Fullana Torregrosa,<sup>83,t</sup> B. G. Fulson,<sup>143,t</sup> J. Fuller,<sup>167,t</sup> C. Gabaldon,<sup>55,t</sup> O. Gabizon,<sup>175,t</sup> A. Gabrielli,<sup>20a,20b,t</sup>  
 A. Gabrielli,<sup>132a,132b,t</sup> S. Gadatsch,<sup>107,t</sup> S. Gadomski,<sup>49,t</sup> G. Gagliardi,<sup>50a,50b,t</sup> P. Gagnon,<sup>61,t</sup> C. Galea,<sup>106,t</sup>  
 B. Galhardo,<sup>126a,126b,t</sup> E. J. Gallas,<sup>131,t</sup> B. J. Gallop,<sup>128,t</sup> P. Gallus,<sup>28,t</sup> G. Galster,<sup>36,t</sup> K. K. Gan,<sup>111,t</sup> J. Gao,<sup>33b,85,t</sup> Y. Gao,<sup>46,t</sup>  
 Y. S. Gao,<sup>143,t</sup> F. M. Gray Walls,<sup>46,t</sup> F. Garberson,<sup>176,t</sup> C. Garcia,<sup>167,t</sup> J. E. Garcia Navarro,<sup>167,t</sup> M. Garcia-Sciveres,<sup>15,t</sup>

- R. W. Gardner,<sup>31,t</sup> N. Garelli,<sup>143,t</sup> V. Garonne,<sup>119,t</sup> C. Gatti,<sup>47,t</sup> A. Gaudiello,<sup>50,50h,t</sup> G. Gaudio,<sup>121a,t</sup> B. Gaur,<sup>141,t</sup>  
 L. Gauthier,<sup>95,t</sup> P. Gauzzi,<sup>132a,132b,t</sup> I. L. Gavrilenko,<sup>96,t</sup> C. Gay,<sup>168,t</sup> G. Gaycken,<sup>21,t</sup> E. N. Gazis,<sup>167,t</sup> P. Ge,<sup>33d,t</sup> Z. Gece,<sup>168,t</sup>  
 C. N. P. Gee,<sup>131,t</sup> D. A. A. Geerts,<sup>107,t</sup> Ch. Geich-Gimbel,<sup>21,t</sup> M. P. Geisler,<sup>58a,t</sup> C. Gemme,<sup>50,t</sup> M. H. Genes,<sup>25,t</sup>  
 S. Gentile,<sup>132a,132b,t</sup> M. George,<sup>54,t</sup> S. George,<sup>77,t</sup> D. Gerbaudo,<sup>163,t</sup> A. Gershon,<sup>153,t</sup> H. Ghazlane,<sup>135b,t</sup> B. Giacobbe,<sup>20a,t</sup>  
 S. Giagu,<sup>132a,132b,t</sup> V. Giangiobbe,<sup>12,t</sup> P. Giannetti,<sup>124a,124b,t</sup> B. Gibbard,<sup>25,t</sup> S. M. Gibson,<sup>77,t</sup> M. Gilchrist,<sup>15,t</sup>  
 T. P. S. Gillam,<sup>28,t</sup> D. Gillberg,<sup>30,t</sup> G. Gilles,<sup>34,t</sup> D. M. Gingrich,<sup>93,t</sup> N. Giokaris,<sup>41,t</sup> M. Pi. Giordani,<sup>164a,164b,t</sup> F. M. Giorgi,<sup>20a,t</sup>  
 F. M. Giorgi,<sup>76,t</sup> P. F. Giraud,<sup>136,t</sup> P. Giromini,<sup>47,t</sup> D. Giugni,<sup>91,t</sup> C. Giuliani,<sup>48,t</sup> M. Giulini,<sup>58b,t</sup> B. K. Gjelsten,<sup>119,t</sup>  
 S. Gkaitatzis,<sup>154,t</sup> I. Gkikas,<sup>154,t</sup> E. L. Gkougkousis,<sup>117,t</sup> L. K. Gladin,<sup>99,t</sup> C. Glasman,<sup>39,t</sup> J. Glatzer,<sup>30,t</sup>  
 P. C. F. Glasher,<sup>46,t</sup> A. Glazov,<sup>12,t</sup> M. Goblerski-Kolb,<sup>103,t</sup> J. R. Goddard,<sup>76,t</sup> J. Godlewski,<sup>39,t</sup> S. Goldfarb,<sup>89,t</sup>  
 T. Golling,<sup>97,t</sup> D. Golubkov,<sup>130,t</sup> A. Gomes,<sup>128a,128b,128d,t</sup> R. Gonçalo,<sup>126b,t</sup> J. Goncalves Pinto Firmino Da Costa,<sup>136,t</sup>  
 L. Gonella,<sup>21,t</sup> S. González de la Hoz,<sup>107,t</sup> G. González Parra,<sup>12,t</sup> S. Gonzalez-Sevilla,<sup>49,t</sup> L. Goossens,<sup>30,t</sup>  
 P. A. Gorbounov,<sup>97,t</sup> H. A. Gordon,<sup>25,t</sup> I. Gorelov,<sup>105,t</sup> B. Gorini,<sup>30,t</sup> E. Gorini,<sup>73a,73b,t</sup> A. Gorisek,<sup>75,t</sup> E. Gornicki,<sup>30,t</sup>  
 A. T. Goshaw,<sup>45,t</sup> M. I. Gostkin,<sup>65,t</sup> D. Gougamli,<sup>135c,t</sup> A. Goussiou,<sup>138,t</sup> N. Govender,<sup>146b,t</sup>  
 H. M. X. Grabas,<sup>137,t</sup> L. Graber,<sup>24,t</sup> I. Grabowska-Bold,<sup>38a,t</sup> P. Grafström,<sup>20a,20b,t</sup> K. J. Grahn,<sup>42,t</sup> J. Gramling,<sup>49,t</sup>  
 E. Gramstad,<sup>119,t</sup> S. Grancagnolo,<sup>168,t</sup> V. Grassi,<sup>148,t</sup> V. Gratchev,<sup>123,t</sup> H. M. Gray,<sup>30,t</sup> E. Graziani,<sup>134a,t</sup> Z. D. Greenwood,<sup>29a,t</sup>  
 K. Gregersen,<sup>78,t</sup> I. M. Gregor,<sup>42,t</sup> P. Grenier,<sup>143,t</sup> J. Griffiths,<sup>8,t</sup> A. M. Grillo,<sup>137,t</sup> K. Grimm,<sup>72,t</sup> S. Grinstein,<sup>12,t</sup>  
 Ph. Gris,<sup>34,t</sup> J.-F. Grivaz,<sup>117,t</sup> J. P. Grohs,<sup>64,t</sup> A. Grohsjean,<sup>42,t</sup> E. Gross,<sup>172,t</sup> J. Gross-Kneiter,<sup>54,t</sup> G. C. Grossi,<sup>79,t</sup>  
 Z. J. Grout,<sup>140,t</sup> L. Guan,<sup>33b,t</sup> J. Guenther,<sup>128,t</sup> F. Guescini,<sup>40,t</sup> D. Guest,<sup>176,t</sup> O. Gueta,<sup>153,t</sup> E. Guido,<sup>30a,30b,t</sup> T. Guillemin,<sup>117,t</sup>  
 S. Guindon,<sup>21,t</sup> U. Gul,<sup>53,t</sup> C. Guelpert,<sup>44,t</sup> J. Guo,<sup>33a,t</sup> S. Gupta,<sup>120,t</sup> P. Gutierrez,<sup>113,t</sup> N. G. Gutierrez Ortiz,<sup>53,t</sup>  
 C. Gutschow,<sup>44,t</sup> C. Guyot,<sup>136,t</sup> C. Gwenlan,<sup>120,t</sup> C. B. Guilliam,<sup>74,t</sup> A. Haas,<sup>110,t</sup> C. Habes,<sup>15,t</sup> H. K. Hadavand,<sup>8,t</sup>  
 N. Haddad,<sup>135,t</sup> P. Haeferl,<sup>21,t</sup> S. Hageböck,<sup>21,t</sup> Z. Hajduk,<sup>30,t</sup> H. Habokyan,<sup>171,t</sup> M. Haleem,<sup>42,t</sup> J. Haley,<sup>114,t</sup> D. Hall,<sup>120,t</sup>  
 G. Halladjian,<sup>90,t</sup> G. D. Hellwell,<sup>85,t</sup> K. Hamacher,<sup>175,t</sup> P. Hamal,<sup>115,t</sup> K. Hanama,<sup>109,t</sup> M. Hamer,<sup>54,t</sup> A. Hamilton,<sup>143a,t</sup>  
 G. N. Hamity,<sup>145,t</sup> P. G. Hamnett,<sup>42,t</sup> L. Han,<sup>33b,t</sup> K. Hanagaki,<sup>118,t</sup> K. Hanawa,<sup>155,t</sup> M. Hance,<sup>15,t</sup> P. Hanke,<sup>58a,t</sup>  
 R. Hanna,<sup>136,t</sup> J. B. Hansen,<sup>36,t</sup> M. C. Hansen,<sup>36,t</sup> P. H. Hansen,<sup>21,t</sup> P. H. Hansen,<sup>36,t</sup> K. Hara,<sup>168,t</sup> A. S. Hard,<sup>173,t</sup>  
 T. Harenberg,<sup>175,t</sup> F. Hariri,<sup>117,t</sup> S. Harkusha,<sup>92,t</sup> R. D. Harrington,<sup>46,t</sup> P. F. Harrison,<sup>170,t</sup> R. Hartjes,<sup>107,t</sup> M. Hasegawa,<sup>67,t</sup>  
 S. Hasegawa,<sup>103,t</sup> R. Hashi,<sup>113,t</sup> S. Hassani,<sup>136,t</sup> S. Hauge,<sup>17,t</sup> R. Hauser,<sup>90,t</sup> L. Hauswald,<sup>44,t</sup>  
 M. Havranek,<sup>127,t</sup> C. M. Hawkes,<sup>18,t</sup> R. J. Hawkings,<sup>30,t</sup> A. D. Hawkins,<sup>81,t</sup> T. Hayashi,<sup>165,t</sup> D. Hayden,<sup>90,t</sup> C. P. Hays,<sup>120,t</sup>  
 J. M. Hayes,<sup>76,t</sup> H. S. Hayward,<sup>74,t</sup> S. J. Haywood,<sup>151,t</sup> J. Head,<sup>18,t</sup> T. Heck,<sup>83,t</sup> V. Hedberg,<sup>81,t</sup> L. Heelan,<sup>8,t</sup> S. Hein,<sup>122,t</sup>  
 T. Heim,<sup>176,t</sup> B. Heinemann,<sup>145,t</sup> L. Heinrich,<sup>108,t</sup> J. Hejbal,<sup>121,t</sup> L. Helary,<sup>22,t</sup> J. Hellman,<sup>240a,240b,t</sup> D. Hellmich,<sup>21,t</sup>  
 C. Helsens,<sup>30,t</sup> J. Henderson,<sup>120,t</sup> R. C. W. Hendersson,<sup>72,t</sup> Y. Heng,<sup>173,t</sup> C. Henglert,<sup>42,t</sup> A. Henrichs,<sup>176,t</sup>  
 A. M. Henriques Correia,<sup>30,t</sup> S. Hentrot-Versille,<sup>117,t</sup> G. H. Herberth,<sup>16,t</sup> Y. Hernández Jiménez,<sup>167,t</sup> R. Herberg-Schubert,<sup>16,t</sup>  
 G. Herten,<sup>48,t</sup> R. Hertenberger,<sup>100,t</sup> L. Hervas,<sup>30,t</sup> G. G. Hesketh,<sup>78,t</sup> N. P. Hessey,<sup>107,t</sup> J. W. Hetherly,<sup>40,t</sup> R. Hickling,<sup>76,t</sup>  
 E. Higón-Rodríguez,<sup>167,t</sup> E. Hill,<sup>160,t</sup> J. C. Hill,<sup>26,t</sup> K. H. Hiller,<sup>42,t</sup> S. J. Hillier,<sup>178,t</sup> I. Hincliffe,<sup>123,t</sup> E. Hines,<sup>122,t</sup>  
 R. R. Hinman,<sup>15,t</sup> M. Hirose,<sup>157,t</sup> D. Hirschbuehl,<sup>175,t</sup> J. Hobbs,<sup>148,t</sup> N. Hod,<sup>107,t</sup> M. C. Hodgkinson,<sup>130,t</sup> P. Hodgson,<sup>139,t</sup>  
 A. Hoecker,<sup>30,t</sup> M. R. Hoefkerkamp,<sup>105,t</sup> F. Hoenig,<sup>100,t</sup> M. Hofhield,<sup>83,t</sup> D. Hohn,<sup>21,t</sup> T. R. Holmes,<sup>15,t</sup> T. M. Hong,<sup>122,t</sup>  
 L. Hoof van Huysduyven,<sup>110,t</sup> W. H. Hopkins,<sup>116,t</sup> Y. Horai,<sup>30,t</sup> A. J. Horton,<sup>142,t</sup> J.-Y. Hostachy,<sup>58,t</sup> S. Hou,<sup>151,t</sup>  
 A. Hoomanidis,<sup>135,t</sup> J. Howard,<sup>128,t</sup> J. Howarth,<sup>42,t</sup> M. M. Hrabovsky,<sup>115,t</sup> I. Hristova,<sup>86,t</sup> J. Hirvna,<sup>117,t</sup> T. Hrynow,<sup>5,t</sup>  
 A. Hrynev,<sup>93,t</sup> C. Hsu,<sup>146c,t</sup> P. J. Hsu,<sup>151,t</sup> S.-C. Hsu,<sup>138,t</sup> D. Hu,<sup>25,t</sup> Q. Hu,<sup>33b,t</sup> X. Hu,<sup>90,t</sup> Y. Huang,<sup>42,t</sup> Z. Hubacek,<sup>30,t</sup>  
 F. Hubaut,<sup>85,t</sup> F. Huegging,<sup>21,t</sup> T. B. Huffman,<sup>120,t</sup> E. W. Hughes,<sup>35,t</sup> G. Hughes,<sup>72,t</sup> M. Huhtinen,<sup>30,t</sup> T. A. Hülsing,<sup>93,t</sup>  
 N. Huseynov,<sup>65,t</sup> J. Huston,<sup>90,t</sup> J. Juhn,<sup>27,t</sup> G. Iacobucci,<sup>40,t</sup> G. Iakovovidis,<sup>23,t</sup> I. Ibragimov,<sup>141,t</sup> L. Iconomou-Fayard,<sup>117,t</sup>  
 E. Ideal,<sup>178,t</sup> Z. Idrissi,<sup>135,t</sup> P. Iengo,<sup>30,t</sup> O. Igonkina,<sup>107,t</sup> T. Izawa,<sup>171,t</sup> Y. Ikegami,<sup>96,t</sup> K. Ikematsu,<sup>141,t</sup> M. Ikeno,<sup>96,t</sup>  
 Y. Ilchenko,<sup>67,t</sup> D. Iliadis,<sup>154,t</sup> N. Ilie,<sup>143,t</sup> Y. Inamaru,<sup>67,t</sup> T. Ince,<sup>101,t</sup> P. Ioannou,<sup>9,t</sup> M. Iodice,<sup>134,t</sup> K. Iordanou,<sup>35,t</sup>  
 V. Ippolito,<sup>37,t</sup> A. Irles Icasiano,<sup>166,t</sup> K. Isaksson,<sup>166,t</sup> M. Ishino,<sup>68,t</sup> M. Ishitsuka,<sup>157,t</sup> R. Ishumkhamedov,<sup>111,t</sup> C. Isiever,<sup>120,t</sup>  
 S. Istin,<sup>104,t</sup> J. M. Iturbe Ponce,<sup>84,t</sup> R. Juppa,<sup>133a,133b,t</sup> J. Ivansson,<sup>81,t</sup> W. Iwanski,<sup>39,t</sup> H. Iwasaki,<sup>66,t</sup> J. M. Izen,<sup>41,t</sup>  
 V. Izzo,<sup>104,t</sup> S. Jabbar,<sup>74,t</sup> B. Jackson,<sup>122,t</sup> D. O. Jamín,<sup>151,t</sup> D. K. Jana,<sup>97,t</sup> V. Jain,<sup>21,t</sup> K. Jakobs,<sup>28,t</sup>  
 J. Jakobson,<sup>30,t</sup> T. Jakoubek,<sup>127,t</sup> J. Jakubek,<sup>128,t</sup> D. O. Jamín,<sup>151,t</sup> D. K. Jana,<sup>97,t</sup> V. Jain,<sup>21,t</sup> K. Jakobs,<sup>28,t</sup>  
 J. Janssen,<sup>21,t</sup> M. Janus,<sup>170,t</sup> G. Jarlskog,<sup>81,t</sup> N. Javadov,<sup>65,t</sup> T. Javurek,<sup>48,t</sup> L. Jeanty,<sup>15,t</sup> J. Jejelava,<sup>51a,t</sup> G. Y. Jeng,<sup>150,t</sup>  
 D. Jennens,<sup>88,t</sup> P. Jenni,<sup>48,t</sup> J. Jentsch,<sup>43,t</sup> C. Jeske,<sup>130,t</sup> S. Jézquel,<sup>8,t</sup> H. Ji,<sup>173,t</sup> J. Jia,<sup>148,t</sup> Y. Jiang,<sup>33b,t</sup> S. Jiggins,<sup>78,t</sup>  
 J. Jimenez Pena,<sup>167,t</sup> S. Jin,<sup>33a,t</sup> A. Jinaru,<sup>26a,t</sup> O. Jinnouchi,<sup>157,t</sup> M. D. Joergenson,<sup>36,t</sup> P. Johansson,<sup>139,t</sup> K. A. Johns,<sup>7,t</sup>

- K. Jon-And<sup>146a,146b,†</sup> G. Jones<sup>170,†</sup> R. W. L. Jones<sup>72,†</sup> T. J. Jones<sup>74,†</sup> Johnnemann,<sup>58a,†</sup> P. M. Jorge,<sup>126a,126b,†</sup> K. D. Joshi,<sup>84,†</sup> J. Jovicic<sup>139a,†</sup> X. Ju,<sup>73,†</sup> C. A. Jung,<sup>75,†</sup> P. Jussel,<sup>62,†</sup> A. Juste Rozas,<sup>72,†</sup> M. Kaci,<sup>26,†</sup> A. Kaczmarcka,<sup>96,†</sup> M. Kado,<sup>117,†</sup> H. Kagan,<sup>171,†</sup> M. Kagan,<sup>143,†</sup> S. J. Kahn,<sup>85,†</sup> E. Kajomovitz,<sup>65,†</sup> C. W. Kalderon,<sup>120,†</sup> S. Kama,<sup>103,†</sup> A. Kamenshchikov,<sup>130,†</sup> N. Kanaya,<sup>155,†</sup> M. Kaneda,<sup>30,†</sup> S. Kaneti,<sup>28,†</sup> V. A. Kantserov,<sup>98,†</sup> J. Kanzaki,<sup>66,†</sup> B. Kaplan,<sup>110,†</sup> A. Kaply,<sup>31,†</sup> D. Kar,<sup>53,†</sup> K. Karakostas,<sup>10,†</sup> A. Karamouzi,<sup>3,†</sup> N. Karastathis,<sup>10,107,†</sup> M. J. Karem,<sup>54,†</sup> M. Karnevsky,<sup>83,†</sup> S. N. Karpov,<sup>65,†</sup> Z. M. Karpova,<sup>40,†</sup> K. Kartik,<sup>180,†</sup> V. Kartvelishvili,<sup>72,†</sup> A. N. Karyukhin,<sup>138,†</sup> L. Kashif,<sup>173,†</sup> R. D. Kass,<sup>21,†</sup> A. Kastanas,<sup>14,†</sup> Y. Kataoka,<sup>155,†</sup> A. Katre,<sup>49,†</sup> J. Katzy,<sup>42,†</sup> K. Kawago,<sup>70,†</sup> T. Kawamoto,<sup>25,†</sup> G. Kawamura,<sup>54,†</sup> S. Kazama,<sup>155,†</sup> V. F. Kazanin,<sup>109,†,4,†</sup> M. Y. Kazanin,<sup>55,†</sup> R. Keefer,<sup>169,†</sup> R. Kehoe,<sup>40,†</sup> J. S. Keller,<sup>42,†</sup> J. J. Kempster,<sup>77,†</sup> H. Keoshkerian,<sup>84,†</sup> O. Kepka,<sup>127,†</sup> B. P. Kersevan,<sup>31,†</sup> S. Kersten,<sup>178,†</sup> R. A. Keyes,<sup>87,†</sup> F. Khalil-zada,<sup>11,†</sup> H. Khandamany,<sup>146a,146b,†</sup> A. Khanov,<sup>114,†</sup> A. G. Kharlamov,<sup>209,†,4,†</sup> T. J. Kho,<sup>28,†</sup> V. Khovansky,<sup>97,†</sup> E. Khramov,<sup>65,†</sup> J. Khubua,<sup>51,†,7</sup> H. Y. Kim,<sup>8,†</sup> H. Kim,<sup>146a,146b,†</sup> S. H. Kim,<sup>103,†</sup> Y. Kim,<sup>31,†</sup> N. Kimura,<sup>154,†</sup> O. M. Kind,<sup>16,†</sup> B. T. King,<sup>74,†</sup> M. King,<sup>167,†</sup> R. S. B. King,<sup>120,†</sup> S. B. King,<sup>158,†</sup> J. Kirk,<sup>131,†</sup> A. E. Kiryunin,<sup>107,†</sup> T. Kishimoto,<sup>67,†</sup> D. Kisielewska,<sup>184,†</sup> F. Kiss,<sup>46,†</sup> K. Kiuchi,<sup>165,†</sup> O. Kivemyk,<sup>136,†</sup> E. Kladiva,<sup>144,†</sup> M. H. Klein,<sup>58,†</sup> M. Klein,<sup>74,†</sup> K. Kleintnech,<sup>83,†</sup> P. Klimek,<sup>146a,146b,†</sup> A. Klimentov,<sup>25,†</sup> E. Klingenberg,<sup>43,†</sup> A. Klinger,<sup>80,†</sup> T. Kluhutchnikova,<sup>30,†</sup> E.-E. Kluge,<sup>50,†,7</sup> P. Kluit,<sup>107,†</sup> S. Kluth,<sup>101,†</sup> E. Knerner,<sup>82,†</sup> E. B. F. G. Knoops,<sup>35,†</sup> A. Knu<sup>e</sup>,<sup>29,†</sup> A. Kobayashi,<sup>153,†</sup> D. Kobayashi,<sup>157,†</sup> M. Kobel,<sup>44,†</sup> M. Kocian,<sup>143,†</sup> P. Kodys,<sup>129,†</sup> T. Koffas,<sup>99,†</sup> E. Koffman,<sup>107,†</sup> L. A. Kogan,<sup>96,†,7</sup> S. Kohlmann,<sup>175,†</sup> Z. Kohout,<sup>128,†</sup> T. Kohrik,<sup>66,†</sup> T. Koi,<sup>143,†</sup> H. Kolanski,<sup>5,†</sup> I. Koletsou,<sup>5,†</sup> A. A. Komar,<sup>96,†,7</sup> Y. Komori,<sup>155,†</sup> T. Kondo,<sup>66,†</sup> N. Kondrashova,<sup>42,†</sup> K. Koneke,<sup>48,†</sup> A. C. König,<sup>106,†</sup> S. König,<sup>85,†</sup> T. Kono,<sup>66,†</sup> R. Konopnicki,<sup>110,†,7</sup> N. Konstantinidis,<sup>78,†</sup> R. Kopelianakis,<sup>152,†</sup> S. Koperny,<sup>36,†</sup> L. Köpke,<sup>83,†</sup> A. K. Kopp,<sup>48,†</sup> K. Koryci,<sup>39,†</sup> K. Kordas,<sup>154,†</sup> A. Korn,<sup>78,†</sup> A. A. Korol,<sup>109,†</sup> I. Korolov,<sup>12,†</sup> E. V. Korolkova,<sup>139,†</sup> O. Kortner,<sup>101,†</sup> S. Kortner,<sup>101,†</sup> T. Kosel,<sup>129,†</sup> V. V. Kostyukhin,<sup>21,†</sup> V. M. Kotov,<sup>63,†</sup> A. Kotwal,<sup>45,†</sup> A. Kourkoumelis-Charalampidi,<sup>154,†</sup> C. Kourkoumelis,<sup>9,†</sup> V. Kouskoura,<sup>24,†</sup> A. Koutsman,<sup>159,†</sup> R. Kowalewski,<sup>30,†</sup> T. Z. Kowalski,<sup>26,†</sup> W. Kozanecki,<sup>156,†</sup> A. S. Kozhin,<sup>130,†</sup> V. A. Kramarenko,<sup>99,†</sup> G. Kramberger,<sup>73,†</sup> D. Krasnopevts<sup>e</sup>,<sup>78,†</sup> A. Krasznahorkay,<sup>30,†</sup> J. K. Kraus,<sup>21,†</sup> A. Kravchenko,<sup>25,†</sup> S. Kreiss,<sup>110,†</sup> M. Kretz,<sup>96,†</sup> J. Kretzschmar,<sup>74,†</sup> K. Kreutzfeldt,<sup>52,†</sup> P. Krieger,<sup>158,†</sup> K. Krizka,<sup>31,†</sup> K. Kroeninger,<sup>43,†</sup> H. Krohn,<sup>101,†</sup> J. Kroll,<sup>122,†</sup> J. Kruseberg,<sup>71,†</sup> J. Krstic,<sup>13,†</sup> U. Kruchonak,<sup>65,†</sup> H. Krüger,<sup>41,†</sup> N. Krummack,<sup>64,†</sup> Z. V. Krumshteyn,<sup>65,†</sup> A. Kruse,<sup>173,†</sup> M. C. Kruse,<sup>45,†</sup> M. Kruskal,<sup>22,†</sup> T. Kubota,<sup>78,†</sup> H. Kucuk,<sup>82,†</sup> S. Kuday,<sup>46,†</sup> S. Kuehn,<sup>48,†</sup> A. Kugel,<sup>58c,†</sup> F. Kuger,<sup>174,†</sup> A. Kuhl,<sup>137,†</sup> T. Kuhl,<sup>42,†</sup> V. Kukhlin,<sup>65,†</sup> Y. Kulchitsky,<sup>92,†</sup> S. Kulesshev,<sup>32,†</sup> M. Kunz,<sup>132a,132b,†</sup> T. Kunigo,<sup>68,†</sup> A. Kupco,<sup>127,†</sup> H. Kurashige,<sup>47,†</sup> Y. A. Kurochkin,<sup>92,†</sup> R. Kurumida,<sup>67,†</sup> V. Kus,<sup>127,†</sup> E. S. Kuwertz,<sup>160,†</sup> M. Kuze,<sup>157,†</sup> J. Kvita,<sup>115,†</sup> T. Kwan,<sup>168,†</sup> D. Kyriazopoulos,<sup>138,†</sup> A. La Rosa,<sup>98,†</sup> J. L. La Rosa Navarro,<sup>24d,†</sup> L. La Rotonda,<sup>97a,97b,†</sup> C. Lacasta,<sup>167,†</sup> F. Lacava,<sup>132a,132b,†</sup> J. Lacey,<sup>29,†</sup> H. Lacker,<sup>16,†</sup> D. Lacomur,<sup>167,†</sup> V. R. Lacuesta,<sup>167,†</sup> E. Ladypin,<sup>65,†</sup> R. Lafaye,<sup>5,†</sup> B. Laforgue,<sup>80,†</sup> T. Lagouri,<sup>81,†</sup> S. Lai,<sup>48,†</sup> L. Lamboume,<sup>78,†</sup> S. Lammers,<sup>61,†</sup> C. L. Lampen,<sup>7,†</sup> W. Lampl,<sup>7,†</sup> E. Lançon,<sup>136,†</sup> U. Landgraf,<sup>48,†</sup> M. P. J. Landon,<sup>76,†</sup> V. S. Lang,<sup>58a,†</sup> C. J. Lange,<sup>12,†</sup> A. J. Lankford,<sup>163,†</sup> F. Lanni,<sup>25,†</sup> K. Lantsch,<sup>78,†</sup> S. Laplace,<sup>60,†</sup> C. Lapoire,<sup>136,†</sup> J. F. Laporte,<sup>136,†</sup> T. Lari,<sup>30,†</sup> F. Lasagab Manghi,<sup>20a,20b,†</sup> M. Lassnig,<sup>30,†</sup> P. Laurelli,<sup>47,†</sup> W. Lavrijen,<sup>15,†</sup> A. T. Law,<sup>137,†</sup> P. Laycock,<sup>74,†</sup> O. Le Dortz,<sup>81,†</sup> E. Le Guirice,<sup>45,†</sup> E. Le Meneude,<sup>12,†</sup> M. LeBlanc,<sup>169,†</sup> T. LeCompte,<sup>6,†</sup> Ledroit-Guillon,<sup>55,†</sup> S. C. Lee,<sup>144b,†</sup> S. C. Lee,<sup>151,†</sup> L. Lee,<sup>1,†</sup> G. Lefebvre,<sup>30,†</sup> M. Lefebvre,<sup>109,†</sup> F. Legger,<sup>100,†</sup> C. Leggett,<sup>15,†</sup> A. Lehau,<sup>74,†</sup> G. Lehmann Miotti,<sup>30,†</sup> X. Lei,<sup>7,†</sup> W. A. Leigh,<sup>29,†</sup> A. Leisos,<sup>154,†</sup> A. G. Leister,<sup>176,†</sup> M. A. L. Leite,<sup>24d,†</sup> R. Leitner,<sup>120,†</sup> D. Lellouch,<sup>172,†</sup> B. Lemmer,<sup>54,†</sup> K. J. C. Lenev,<sup>76,†</sup> T. Lenz,<sup>21,†</sup> B. Lenzi,<sup>20,†</sup> R. Leone,<sup>7,†</sup> S. Leone,<sup>126,126b,†</sup> C. Leonidopoulos,<sup>46,†</sup> S. Leontsinis,<sup>10,†</sup> C. Leroy,<sup>95,†</sup> C. G. Lester,<sup>28,†</sup> M. Levchenko,<sup>123,†</sup> J. Leveque,<sup>5,†</sup> D. Levin,<sup>80,†</sup> L. J. Levinson,<sup>172,†</sup> M. Levy,<sup>18,†</sup> A. Lewis,<sup>120,†</sup> A. M. Leyko,<sup>21,†</sup> M. Leyton,<sup>41,†</sup> B. Li,<sup>133a,†</sup> H. Li,<sup>148,†</sup> H. L. Li,<sup>31,†</sup> L. Li,<sup>45,†</sup> L. Li,<sup>33c,†</sup> S. Li,<sup>45,†</sup> Y. Li,<sup>33c,†</sup> Z. Liang,<sup>17,†</sup> H. Liao,<sup>34,†</sup> B. Liberti,<sup>133a,†</sup> A. Liblong,<sup>158,†</sup> P. Lichard,<sup>30,†</sup> K. Lie,<sup>165,†</sup> J. Liebal,<sup>21,†</sup> W. Liebig,<sup>14,†</sup> C. Limbach,<sup>21,†</sup> A. Limosani,<sup>130,†</sup> S. C. Lin,<sup>151,†</sup> T. H. Lin,<sup>131,†</sup> F. Linde,<sup>107,†</sup> B. E. Lindquist,<sup>148,†</sup> J. T. Linnemann,<sup>90,†</sup> E. Lipelies,<sup>122,†</sup> A. Lipniacka,<sup>14,†</sup> M. Lisoviy,<sup>26b,†</sup> T. M. Liss,<sup>165,†</sup> D. Lissauer,<sup>25,†</sup> A. Lister,<sup>158,†</sup> M. A. Litke,<sup>157,†</sup> B. Liu,<sup>151,†</sup> D. Liu,<sup>151,†</sup> J. Liu,<sup>85,†</sup> J. B. Liu,<sup>133b,†</sup> K. Liu,<sup>165,†</sup> L. Liu,<sup>165,†</sup> M. Liu,<sup>145,†</sup> M. Liu,<sup>33b,†</sup> Y. Liu,<sup>33b,†</sup> M. Livian,<sup>121a,121b,†</sup> A. Lleres,<sup>55,†</sup> J. Llorente Merino,<sup>84,†</sup> E. Llorente Merino,<sup>84,†</sup> F. Lloyd,<sup>82,†</sup> P. Lo Sterzo,<sup>42,†</sup> E. Lobodzinska,<sup>42,†</sup> J. Loch,<sup>7,†</sup> W. S. Lockman,<sup>137,†</sup> F. K. Loebinger,<sup>84,†</sup> A. E. Lovelace-Jensen,<sup>36,†</sup> A. Logionov,<sup>176,†</sup> T. Lohse,<sup>16,†</sup> K. Lohwasser,<sup>42,†</sup> M. Lokajicek,<sup>127,†</sup> B. A. Long,<sup>22,†</sup> J. D. Long,<sup>89,†</sup> R. E. Long,<sup>72,†</sup> C. A.Looper,<sup>111,†</sup> L. Lopez,<sup>126a,†</sup> D. Lopez Mateos,<sup>57,†</sup> B. Lopez Paredes,<sup>139,†</sup> I. Lopez Paz,<sup>12,†</sup> J. Lorenz,<sup>100,†</sup> N. Lorenzo Martinez,<sup>61,†</sup> M. Losada,<sup>162,†</sup> P. Loscufoff,<sup>15,†</sup> P. J. Lösel,<sup>100,†</sup> X. Lou,<sup>33a,†</sup> A. Louinis,<sup>117,†</sup> J. Love,<sup>8,†</sup> P. A. Love,<sup>72,†</sup> N. Lu,<sup>98,†</sup> H. J. Lubat,<sup>138,†</sup> C. Luci,<sup>132a,132b,†</sup> A. Lucotte,<sup>55,†</sup> F. Luehring,<sup>41,†</sup>

- W. Lukas,<sup>62,†</sup> L. Luminari,<sup>132a,b</sup> O. Lundberg,<sup>146a,146b,†</sup> B. Lund-Jensen,<sup>147,†</sup> D. Lynn,<sup>25,†</sup> R. Lysak,<sup>127,†</sup> E. Lytken,<sup>81,†</sup>  
 H. Ma,<sup>25,†</sup> L. L. Ma,<sup>20,†</sup> G. Maccarone,<sup>47,†</sup> A. Macchione,<sup>106,†</sup> C. M. Macdonald,<sup>139,†</sup> J. Machado-Migues,<sup>122,123b,†</sup>  
 D. Macina,<sup>30,†</sup> D. Madaffari,<sup>85,†</sup> R. Madar,<sup>34,†</sup> H. J. Maddocks,<sup>72,†</sup> W. F. Mader,<sup>44,†</sup> A. Madsen,<sup>106,†</sup> S. Maeland,<sup>14,†</sup>  
 T. Maeno,<sup>25,†</sup> A. Maevskiy,<sup>99,†</sup> E. Magradze,<sup>54,†</sup> K. Mahboubi,<sup>48,†</sup> J. Mahstedt,<sup>107,†</sup> C. Maiani,<sup>136,†</sup> C. Maidantchik,<sup>24a,†</sup>  
 A. A. Maier,<sup>101,†</sup> T. Maier,<sup>100,†</sup> A. Maior,<sup>128a,128b,128d,†</sup> S. Majewski,<sup>98,†</sup> Y. Makide,<sup>68,†</sup> N. Makovec,<sup>80,†</sup>  
 P. Malecki,<sup>39,†</sup> V. Maleev,<sup>20,†</sup> F. Malek,<sup>55,†</sup> U. Mallik,<sup>63,†</sup> D. Malon,<sup>6,†</sup> C. Malone,<sup>143,†</sup> S. Maltezos,<sup>10,†</sup>  
 V. M. Malyshev,<sup>109,†</sup> S. Malyukov,<sup>20,†</sup> J. Mamuzic,<sup>42,†</sup> G. Mancini,<sup>47,†</sup> B. Mandelli,<sup>30,†</sup> L. Mandelli,<sup>91a,†</sup> I. Mandic,<sup>75,†</sup>  
 R. Mandrysch,<sup>61,†</sup> J. Manreira,<sup>126a,126b,†</sup> A. Manfredini,<sup>101,†</sup> L. Manhaes de Andrade Filho,<sup>126,†</sup> J. Manjares Ramos,<sup>150b,†</sup>  
 A. Mann,<sup>108,†</sup> P. M. Manning,<sup>137,†</sup> A. Manousakis-Katsikakis,<sup>9,†</sup> B. Mansouli,<sup>136,†</sup> R. Mantel,<sup>83,†</sup> M. Mantouani,<sup>54,†</sup>  
 L. Mapelli,<sup>30,†</sup> L. March,<sup>145,†</sup> G. Marchiori,<sup>103,†</sup> M. Marcusi,<sup>127,†</sup> C. Marta,<sup>109,†</sup> M. Marano,<sup>109,†</sup> M. Marjanovic,<sup>13,†</sup> F. Marroquin,<sup>24a,†</sup>  
 S. P. Marsden,<sup>44,†</sup> Z. Marshall,<sup>15,†</sup> F. L. Marti,<sup>17,†</sup> S. Marti-Garcia,<sup>106,†</sup> B. Martin,<sup>90,†</sup> T. A. Martin,<sup>170,†</sup> V. J. Martin,<sup>46,†</sup>  
 B. Martin dit Latour,<sup>14,†</sup> M. Martinez,<sup>12,†</sup> S. Martin-Haque,<sup>131,†</sup> V. S. Martoiu,<sup>26a,†</sup> A. C. Martyniuk,<sup>78,†</sup> M. Marx,<sup>138,†</sup>  
 F. Marzano,<sup>132a,†</sup> A. Marzin,<sup>96,†</sup> L. Masetti,<sup>83,†</sup> T. Mashimo,<sup>155,†</sup> R. Mashinistov,<sup>96,†</sup> J. Masis,<sup>84,†</sup> A. L. Maslenikov,<sup>109,†</sup>  
 I. Massa,<sup>20a,20b,†</sup> L. Massa,<sup>99,†</sup> N. Massol,<sup>5,†</sup> P. Mastandrea,<sup>148,†</sup> A. Mastroberardino,<sup>37a,37b,†</sup> T. Matsubashi,<sup>155,†</sup>  
 P. Mättig,<sup>175,†</sup> J. Mattmann,<sup>83,†</sup> J. Maure,<sup>20a,†</sup> S. J. Maxfield,<sup>74,†</sup> D. A. Maximov,<sup>109,†</sup> R. Mazini,<sup>151,†</sup> S. M. Mazza,<sup>91a,91b,†</sup>  
 L. Mazzaferro,<sup>132a,132b,†</sup> G. Mc Goldrick,<sup>158,†</sup> S. P. Mc Kee,<sup>89,†</sup> A. Mc Cann,<sup>89,†</sup> R. L. McCarthy,<sup>148,†</sup> T. G. McCarthy,<sup>28,†</sup>  
 N. A. McCubbin,<sup>131,†</sup> K. W. McFarlane,<sup>56,†</sup> J. A. McFayden,<sup>78,†</sup> G. McHedlidze,<sup>54,†</sup> S. J. McMahon,<sup>131,†</sup>  
 R. A. McPherson,<sup>208,†</sup> M. Medimis,<sup>42,†</sup> S. Meehan,<sup>85,†</sup> S. Melihase,<sup>200,†</sup> A. Mehta,<sup>74,†</sup> K. Meier,<sup>58a,†</sup> C. Meineck,<sup>100,†</sup>  
 B. Meirois,<sup>41,†</sup> B. R. Mellado Garcia,<sup>145,†</sup> F. Meloni,<sup>17,†</sup> A. Mengarelli,<sup>21a,21b,†</sup> S. Menke,<sup>101,†</sup> E. Meoni,<sup>161,†</sup>  
 K. M. Mercurio,<sup>57,†</sup> S. Mergelman,<sup>21,†</sup> P. Memrod,<sup>49,†</sup> L. Merolla,<sup>104a,104b,†</sup> C. Meromi,<sup>91a,†</sup> F. S. Merritt,<sup>31,†</sup>  
 A. Messina,<sup>132a,132b,†</sup> J. Metcalfe,<sup>25,†</sup> A. S. Mete,<sup>163,†</sup> C. Meyer,<sup>81,†</sup> J. P. Meyer,<sup>154,†</sup> J. Meyer,<sup>107,†</sup>  
 R. P. Middleton,<sup>131,†</sup> S. Miglioranzi,<sup>164,164c,†</sup> L. Mijović,<sup>71,†</sup> G. Mikenberg,<sup>172,†</sup> N. Miketstikova,<sup>127,†</sup> M. Mikusz,<sup>75,†</sup>  
 M. Milesi,<sup>88,†</sup> A. Milic,<sup>30,†</sup> D. W. Miller,<sup>31,†</sup> C. Mills,<sup>46,†</sup> A. Milov,<sup>172,†</sup> D. A. Milstead,<sup>146a,146b,†</sup> A. A. Minchenko,<sup>130,†</sup>  
 Y. Minami,<sup>155,†</sup> I. A. Minashvili,<sup>85,†</sup> A. I. Mincer,<sup>110,†</sup> B. Mindur,<sup>38a,†</sup> M. Mineev,<sup>65,†</sup> Y. Ming,<sup>173,†</sup> L. M. Mir,<sup>12,†</sup>  
 T. Mitani,<sup>171,†</sup> J. Mitrevski,<sup>100,†</sup> V. A. Mitsou,<sup>167,†</sup> A. Miucci,<sup>95,†</sup> P. S. Miyagawa,<sup>139,†</sup> J. U. Mjörmark,<sup>84,†</sup> T. Moa,<sup>146b,†</sup>  
 K. Mochizuki,<sup>85,†</sup> S. Mohapatra,<sup>25,†</sup> W. Mohr,<sup>48,†</sup> S. Molander,<sup>146a,146b,†</sup> R. Moles-Valls,<sup>107,†</sup> K. Möng,<sup>42,†</sup> C. Monini,<sup>55,†</sup>  
 J. Monk,<sup>36,†</sup> E. Monnier,<sup>83,†</sup> J. Montejo Berlingen,<sup>12,†</sup> F. Monticelli,<sup>71,†</sup> S. Monzani,<sup>132a,132b,†</sup> R. W. Moore,<sup>3,†</sup>  
 N. Morano,<sup>117,†</sup> D. Moreno,<sup>162,†</sup> M. Moreno Llacer,<sup>54,†</sup> P. Morettini,<sup>50a,†</sup> M. Morgenstern,<sup>44,†</sup> M. Mori,<sup>57,†</sup>  
 M. Morinaga,<sup>135,†</sup> V. Moritsub,<sup>119,†</sup> S. Moritz,<sup>83,†</sup> A. K. Morley,<sup>147,†</sup> G. Moronaci,<sup>36,†</sup> J. D. Morris,<sup>76,†</sup> S. S. Mortensen,<sup>36,†</sup>  
 A. Morton,<sup>51,†</sup> L. Morvaj,<sup>103,†</sup> M. Mosidze,<sup>31b,†</sup> J. Moss,<sup>111,†</sup> K. Motohashi,<sup>157,†</sup> R. Mount,<sup>143,†</sup> E. Mountricha,<sup>25,†</sup>  
 S. V. Mouravious,<sup>96,†</sup> E. J. W. Moyse,<sup>86,†</sup> S. Muanza,<sup>85,†</sup> R. D. Mudd,<sup>18,†</sup> F. Mueller,<sup>101,†</sup> J. Mueller,<sup>123,†</sup> K. Mueller,<sup>21,†</sup>  
 R. S. P. Mueller,<sup>108,†</sup> T. Mueller,<sup>28,†</sup> D. Muenstermann,<sup>40,†</sup> P. Mullen,<sup>53,†</sup> Y. Munwes,<sup>153,†</sup> J. A. Murillo Quijada,<sup>54,†</sup>  
 W. J. Murray,<sup>170,171,†</sup> H. Musheghyan,<sup>85,†</sup> E. Musto,<sup>162,†</sup> A. G. Myagkov,<sup>130a,130b,†</sup> M. Myska,<sup>128,†</sup> O. Nackenhorst,<sup>54,†</sup>  
 J. Nadai,<sup>54,†</sup> K. Nagai,<sup>120,†</sup> R. Nagai,<sup>157,†</sup> Y. Nagai,<sup>45,†</sup> K. Nagano,<sup>66,†</sup> A. Nagarkar,<sup>111,†</sup> Y. Nagasaki,<sup>99,†</sup> K. Nagata,<sup>160,†</sup>  
 M. Nagel,<sup>101,†</sup> E. Nagy,<sup>85,†</sup> A. M. Nairz,<sup>30,†</sup> Y. Nakahama,<sup>30,†</sup> K. Nakamura,<sup>66,†</sup> T. Nakamura,<sup>155,†</sup> I. Nakano,<sup>112,†</sup>  
 H. Namasyanayam,<sup>41,†</sup> R. F. Narango Garcia,<sup>31,†</sup> R. Narayan,<sup>31,†</sup> T. Naumann,<sup>42,†</sup> G. Navarro,<sup>162,†</sup> R. Nayyar,<sup>7,†</sup> H. A. Neal,<sup>89,†</sup>  
 P. Yu. Nechaeva,<sup>96,†</sup> T. J. Neep,<sup>64,†</sup> P. D. Neff,<sup>145,†</sup> A. Negri,<sup>121a,121b,†</sup> M. Negriini,<sup>200,†</sup> S. Nektarievic,<sup>106,†</sup> C. Nellist,<sup>117,†</sup>  
 A. Nelson,<sup>163,†</sup> Nemecek,<sup>177,†</sup> P. Nemethy,<sup>110,†</sup> A. A. Nepomuceno,<sup>24a,†</sup> M. Nessi,<sup>30a,c,†</sup> M. S. Neuhaber,<sup>165,†</sup>  
 M. Neumann,<sup>175,†</sup> R. M. Neves,<sup>110,†</sup> P. Newski,<sup>25,†</sup> P. R. Newman,<sup>18,†</sup> D. H. Nguyen,<sup>61,†</sup> R. B. Nickerson,<sup>120,†</sup>  
 R. Nicolaïdou,<sup>136,†</sup> B. Nicquevert,<sup>30,†</sup> J. Nielsen,<sup>137,†</sup> N. Nikiforou,<sup>153,†</sup> N. Nikiforou,<sup>16,†</sup> V. Nikolaenko,<sup>130,13b,†</sup>  
 I. Nikolic-Audit,<sup>80,†</sup> K. Niklopoulos,<sup>18,†</sup> J. Nilsen,<sup>119,†</sup> P. Nilsson,<sup>25,†</sup> Y. Ninomiya,<sup>155,†</sup> A. Nisati,<sup>132a,†</sup> R. Nisius,<sup>101,†</sup>  
 T. Nobe,<sup>157,†</sup> M. Nomachi,<sup>118,†</sup> I. Nomidis,<sup>20,†</sup> T. Nooney,<sup>76,†</sup> S. Norberg,<sup>113,†</sup> M. Nordberg,<sup>30,†</sup> O. Novgorodova,<sup>44,†</sup>  
 S. Nowak,<sup>101,†</sup> M. Nowak,<sup>66,†</sup> L. Nozka,<sup>115,†</sup> K. Niekras,<sup>10,†</sup> G. Nunes Haminger,<sup>88,†</sup> T. Nunnemann,<sup>100,†</sup> E. Nurse,<sup>78,†</sup>  
 F. Nutt,<sup>88,†</sup> B. J. O'Brien,<sup>46,†</sup> F. O'Grady,<sup>7,†</sup> D. C. O'Neill,<sup>142,†</sup> V. O'Shea,<sup>53,†</sup> F. G. Oakham,<sup>20,6,†</sup> H. Oberlack,<sup>108,†</sup>  
 T. Obermann,<sup>21,†</sup> J. Ocariz,<sup>18,†</sup> A. Ochi,<sup>167,†</sup> L. Ochoa,<sup>76,†</sup> P. J. Ochoa-Ricoux,<sup>32a,†</sup> S. Oda,<sup>70,†</sup> S. Oda,<sup>68,†</sup> H. Ogren,<sup>61,†</sup>  
 A. Oh,<sup>84,†</sup> S. H. Oh,<sup>30,†</sup> C. O. Ohm,<sup>166,†</sup> H. Ohide,<sup>30,†</sup> W. Okamura,<sup>218,†</sup> H. Okawa,<sup>200,†</sup> Y. Okumura,<sup>31,†</sup>  
 T. Okuyama,<sup>155,†</sup> A. Olarin,<sup>26a,†</sup> S. A. Olivares Pino,<sup>46,†</sup> D. Oliveira Damazio,<sup>25,†</sup> E. Oliver Garcia,<sup>167,†</sup> A. Olszewski,<sup>39,†</sup>  
 J. Olszowska,<sup>134a,134b,†</sup> A. Onofre,<sup>31,†</sup> P. U. E. Onyisi,<sup>31,†</sup> C. J. Oram,<sup>159a,†</sup> M. J. Oreglia,<sup>31,†</sup> Y. Oren,<sup>153,†</sup>  
 D. Orestano,<sup>134a,134b,†</sup> N. Orlando,<sup>154,†</sup> C. Oropeza Barrera,<sup>33,†</sup> R. S. Orr,<sup>158,†</sup> B. Osculati,<sup>30a,50b,†</sup> R. Ospanol,<sup>39,†</sup>

- G. Otero y Garzon,<sup>27,†</sup> H. Otomo,<sup>70,‡</sup> M. Ouchrif,<sup>135,§</sup> E. A. Ouellette,<sup>169,†</sup> F. Ould-Saada,<sup>119,‡</sup> A. Ouraou,<sup>136,†</sup> K. P. Ouusoren,<sup>107,‡</sup> Q. Ouyang,<sup>33,†</sup> A. Ovcharov,<sup>14,§</sup> M. Owen,<sup>18,‡</sup> R. E. Owen,<sup>18,‡</sup> V. E. Ozcan,<sup>16,‡</sup> N. Ozturk,<sup>8,§</sup> K. Pachal,<sup>142,‡</sup> A. Pacheco Pages,<sup>12,‡</sup> C. Padilla Aranda,<sup>12,‡</sup> M. Palagiova,<sup>48,‡</sup> S. Pagan Griso,<sup>15,‡</sup> E. Paganis,<sup>130,‡</sup> C. Pahl,<sup>101,‡</sup> F. Paige,<sup>25,‡</sup> P. Pais,<sup>86,‡</sup> K. Pajchel,<sup>119,‡</sup> G. Palacino,<sup>150,§</sup> S. Palestini,<sup>30,‡</sup> M. Palka,<sup>38,‡</sup> D. Pallin,<sup>24,‡</sup> A. Palma,<sup>126a,126b,‡</sup> Y. B. Pan,<sup>173,‡</sup> E. Panagiopoulou,<sup>10,‡</sup> C. E. Pandini,<sup>80,‡</sup> J. G. Panduro Vazquez,<sup>77,‡</sup> P. Pani,<sup>146a,146b,‡</sup> S. Panitkin,<sup>25,‡</sup> D. Pantea,<sup>26a,‡</sup> L. Paolozzi,<sup>49,‡</sup> Th.D. Papadopoulos,<sup>101,‡</sup> K. Papageorgiou,<sup>184,‡</sup> A. Paramonov,<sup>6,‡</sup> D. Paredes Hernandez,<sup>154,‡</sup> M. A. Parker,<sup>28,‡</sup> K. A. Parker,<sup>130,‡</sup> F. Parodi,<sup>50a,50b,‡</sup> J. A. Parsons,<sup>35,‡</sup> U. Parzefall,<sup>46,‡</sup> E. Pasqualucci,<sup>132a,‡</sup> S. Passaggio,<sup>20a,‡</sup> F. Pastore,<sup>134a,134b,‡</sup> Fr. Pastore,<sup>77,‡</sup> G. Pásztor,<sup>29,‡</sup> S. Pataraia,<sup>175,‡</sup> N. D. Patel,<sup>150,‡</sup> J. R. Pater,<sup>94,‡</sup> T. Pauri,<sup>30,‡</sup> J. Pearce,<sup>169,‡</sup> B. Pearson,<sup>113,‡</sup> L. E. Pedersen,<sup>36,‡</sup> M. Pedersen,<sup>189,‡</sup> S. Pedraza Lopez,<sup>167,‡</sup> R. Pedro,<sup>126a,126b,‡</sup> S. V. Peleganchuk,<sup>108,‡</sup> D. Pelikan,<sup>196,‡</sup> H. Peng,<sup>108,‡</sup> B. Penning,<sup>31,‡</sup> J. Penwell,<sup>26,‡</sup> P. Perellesta,<sup>25,‡</sup> E. Perez Codina,<sup>159,‡</sup> M. T. Pérez García-Estate,<sup>167,‡</sup> L. Perini,<sup>91a,91b,‡</sup> H. Permegger,<sup>30,‡</sup> S. Perrella,<sup>104a,104b,‡</sup> R. Peschke,<sup>42,‡</sup> V. D. Peschekhonov,<sup>65,‡</sup> K. Peters,<sup>30,‡</sup> R. F. Y. Peters,<sup>84,‡</sup> B. A. Petersen,<sup>134a,134b,‡</sup> T. C. Petersen,<sup>36,‡</sup> E. Petit,<sup>42,‡</sup> A. Petridis,<sup>146a,146b,‡</sup> C. Petridou,<sup>154,‡</sup> E. Petrolo,<sup>132a,‡</sup> F. Petrucci,<sup>18,‡</sup> E. N. Pettersson,<sup>157,‡</sup> R. Pezoa,<sup>32,‡</sup> P. W. Phillips,<sup>131,‡</sup> G. Picciadio,<sup>143,‡</sup> E. Pianori,<sup>170,‡</sup> A. Picazio,<sup>49,‡</sup> E. Piccaro,<sup>16,‡</sup> M. Piccinini,<sup>20a,20b,‡</sup> M. A. Pickett,<sup>126,‡</sup> R. Piegaia,<sup>27,‡</sup> D. T. Pignotti,<sup>111,‡</sup> J. E. Pilcher,<sup>31,‡</sup> A. D. Pilkington,<sup>84,‡</sup> J. Pina,<sup>126a,126b,126d,‡</sup> M. Pinamonti,<sup>164a,164c,48,‡</sup> J. L. Pinfol,<sup>37,‡</sup> A. Pingel,<sup>36,‡</sup> B. Pinto,<sup>126a,‡</sup> S. Pires,<sup>80,‡</sup> M. Pitt,<sup>172,‡</sup> C. Pizio,<sup>91a,91b,‡</sup> L. Plazak,<sup>144a,‡</sup> M.-A. Pleier,<sup>28,‡</sup> V. Plesko,<sup>129,‡</sup> D. P. Plotnikova,<sup>65,‡</sup> P. Plucinski,<sup>146a,146b,‡</sup> D. Pluth,<sup>64,‡</sup> R. Poettgen,<sup>83,‡</sup> L. Poglioni,<sup>117,‡</sup> D. Polh,<sup>21,‡</sup> G. Pollesello,<sup>121,‡</sup> A. Pollicicchio,<sup>19,‡</sup> R. Polifka,<sup>158,‡</sup> A. Polini,<sup>26b,‡</sup> C. S. Pollard,<sup>53,‡</sup> V. Polychronakos,<sup>25,‡</sup> K. Pommeis,<sup>30,‡</sup> I. Pontecorvo,<sup>132a,‡</sup> B. G. Pope,<sup>90,‡</sup> G. A. Popenciu,<sup>21b,‡</sup> D. S. Popovic,<sup>13,‡</sup> A. Popleton,<sup>30,‡</sup> S. Pospisil,<sup>128,‡</sup> K. Potamianos,<sup>15,‡</sup> I. N. Potrat,<sup>65,‡</sup> C. J. Potter,<sup>149,‡</sup> C. T. Potter,<sup>116,‡</sup> G. Poulard,<sup>53,‡</sup> J. J. Poveda,<sup>74,‡</sup> V. Pozdnjakov,<sup>65,‡</sup> P. Pralavorio,<sup>85,‡</sup> A. Pranko,<sup>15,‡</sup> S. Prasad,<sup>30,‡</sup> S. Prell,<sup>64,‡</sup> D. Price,<sup>94,‡</sup> L. Price,<sup>6,‡</sup> M. Primavera,<sup>74,‡</sup> S. Prince,<sup>10,‡</sup> M. Proissl,<sup>60,‡</sup> K. Prokofiev,<sup>1,‡</sup> F. Prokoshin,<sup>37b,‡</sup> E. Protopapadaki,<sup>130,‡</sup> S. Protopopescu,<sup>25,‡</sup> J. Proudfoot,<sup>6,‡</sup> M. Przybycien,<sup>38a,‡</sup> J. Ptacek,<sup>116,‡</sup> D. Puddu,<sup>134a,134b,‡</sup> E. Pueschl,<sup>60,‡</sup> D. Puldorn,<sup>148,‡</sup> M. Purnohi,<sup>25,‡</sup> P. Puzzo,<sup>117,‡</sup> J. Qian,<sup>90,‡</sup> G. Qin,<sup>53,‡</sup> Y. Qin,<sup>94,‡</sup> A. Quadt,<sup>34,‡</sup> D. R. Quarrie,<sup>15,‡</sup> W. B. Quayle,<sup>16,‡</sup> M. Queitsch-Maitland,<sup>64,‡</sup> D. Quilty,<sup>53,‡</sup> S. Radduum,<sup>119,‡</sup> V. Radeka,<sup>25,‡</sup> V. Radescu,<sup>42,‡</sup> S. K. Radhakrishnan,<sup>148,‡</sup> P. Radloff,<sup>116,‡</sup> P. Rados,<sup>83,‡</sup> F. Ragusa,<sup>91a,91b,‡</sup> G. Rahal,<sup>178,‡</sup> S. Rajagopalan,<sup>25,‡</sup> M. Rammenhoven,<sup>30,‡</sup> C. Rangel-Smith,<sup>81,‡</sup> F. Rauscher,<sup>100,‡</sup> S. Rave,<sup>83,‡</sup> T. Ravencroft,<sup>53,‡</sup> M. Raymond,<sup>30,‡</sup> A. L. Read,<sup>119,‡</sup> N. P. Readoff,<sup>24,‡</sup> D. M. Rebuzzi,<sup>121a,121b,‡</sup> A. Redelbach,<sup>174,‡</sup> G. Redlinger,<sup>25,‡</sup> R. Reece,<sup>137,‡</sup> K. Reeves,<sup>41,‡</sup> L. Rehmsch,<sup>16,‡</sup> H. Reisin,<sup>27,‡</sup> M. Relich,<sup>163,‡</sup> C. Rembser,<sup>30,‡</sup> H. Ren,<sup>35a,‡</sup> A. Renaud,<sup>117,‡</sup> M. Rescigno,<sup>132a,‡</sup> S. Resconi,<sup>91a,‡</sup> O. L. Rezanova,<sup>109,‡</sup> P. Reznickz,<sup>123,‡</sup> R. Rezvani,<sup>95,‡</sup> R. Richter,<sup>88,‡</sup> S. Richter,<sup>78,‡</sup> E. Richter-Was,<sup>58b,‡</sup> O. Ricken,<sup>21,‡</sup> M. Ridel,<sup>80,‡</sup> P. Rieck,<sup>16,‡</sup> C. J. Riegel,<sup>175,‡</sup> J. Rieger,<sup>54,‡</sup> M. Rijssenbeek,<sup>148,‡</sup> A. Rimoldi,<sup>121a,121b,‡</sup> L. Rinaldi,<sup>17,‡</sup> B. Ristic,<sup>49,‡</sup> E. Ritsch,<sup>62,‡</sup> I. Riu,<sup>12,‡</sup> F. Rizatdinova,<sup>114,‡</sup> E. Rizvi,<sup>76,‡</sup> S. H. Robertson,<sup>87,‡</sup> A. Robichaud-Veronneau,<sup>87,‡</sup> D. Robinson,<sup>28,‡</sup> J. E. M. Robinson,<sup>84,‡</sup> A. Robson,<sup>53,‡</sup> C. Roda,<sup>124a,124b,‡</sup> S. Roe,<sup>30,‡</sup> O. Roßnhe,<sup>119,‡</sup> S. Rolli,<sup>161,‡</sup> A. Romanik,<sup>96,‡</sup> M. Romano,<sup>80,‡</sup> S. M. Romano Saez,<sup>34,‡</sup> E. Romere Adam,<sup>167,‡</sup> N. Rompotis,<sup>138,‡</sup> M. Ronzani,<sup>48,‡</sup> L. Roos,<sup>20,‡</sup> E. Ros,<sup>167,‡</sup> S. Rosati,<sup>112,‡</sup> K. Rosbach,<sup>46,‡</sup> P. Rose,<sup>137,‡</sup> P. L. Rosendahl,<sup>144,‡</sup> O. Rosenthal,<sup>141,‡</sup> V. Rossetti,<sup>146a,146b,‡</sup> E. Rossi,<sup>104a,104b,‡</sup> L. P. Rossi,<sup>50a,‡</sup> R. Rosten,<sup>138,‡</sup> M. Rotaru,<sup>26a,‡</sup> I. Roth,<sup>172,‡</sup> J. Rothberg,<sup>138,‡</sup> D. Rousseau,<sup>117,‡</sup> C. R. Royon,<sup>136,‡</sup> A. Rozanov,<sup>85,‡</sup> Y. Rozen,<sup>152,‡</sup> X. Ruan,<sup>145c,‡</sup> F. Rubbo,<sup>143,‡</sup> I. Rubinsky,<sup>42,‡</sup> V. I. Rud,<sup>99,‡</sup> C. Rudolph,<sup>44,‡</sup> M. S. Rudolph,<sup>158,‡</sup> F. Rühr,<sup>48,‡</sup> A. Ruiz-Martinez,<sup>30,‡</sup> Z. Runikova,<sup>48,‡</sup> N. A. Rusakovitch,<sup>65,‡</sup> A. Ruschke,<sup>100,‡</sup> H. L. Russell,<sup>138,‡</sup> J. P. Rutherford,<sup>7,‡</sup> N. Ruthmann,<sup>48,‡</sup> F. Y. Ryabov,<sup>123,‡</sup> M. Rybar,<sup>129,‡</sup> G. Rybkina,<sup>117,‡</sup> N. C. Ryder,<sup>120,‡</sup> A. F. Saavedra,<sup>150,‡</sup> G. Sabato,<sup>107,‡</sup> S. Sacerdoti,<sup>27,‡</sup> A. Sadidze,<sup>14,‡</sup> H. F.-W. Sadrozinski,<sup>137,‡</sup> R. Sadykov,<sup>65,‡</sup> F. Safai Tehrani,<sup>132a,‡</sup> M. Samipert,<sup>136,‡</sup> H. Sakamoto,<sup>155,‡</sup> Y. Sakurai,<sup>171,‡</sup> G. Salamanna,<sup>134a,134b,‡</sup> A. Salamon,<sup>133a,‡</sup> M. Saleem,<sup>113,‡</sup> D. Salek,<sup>107,‡</sup> P. H. Sales De Bruin,<sup>158,‡</sup> D. Salihagic,<sup>101,‡</sup> A. Salnikov,<sup>143,‡</sup> J. Salt,<sup>167,‡</sup> D. Salvatore,<sup>170a,170b,‡</sup> F. Salvatore,<sup>140,‡</sup> A. Salucci,<sup>106,‡</sup> A. Salzburger,<sup>154,‡</sup> D. Sampsonidis,<sup>154,‡</sup> A. Sanchez,<sup>104a,104b,‡</sup> J. Sanchez,<sup>167,‡</sup> V. Sanchez Martinez,<sup>167,‡</sup> H. Sandaker,<sup>4,‡</sup> R. L. Sandbach,<sup>76,‡</sup> H. G. Sander,<sup>83,‡</sup> M. P. Sanders,<sup>100,‡</sup> M. Sandhoff,<sup>175,‡</sup> C. Sandoval,<sup>162,‡</sup> R. Sandstrom,<sup>101,‡</sup> D. P. C. Sankey,<sup>131,‡</sup> M. Sammizo,<sup>50a,50b,‡</sup> A. Sansoni,<sup>47,‡</sup> C. Santoni,<sup>34,‡</sup> R. Santonicio,<sup>133a,133b,‡</sup> H. Santos,<sup>126a,‡</sup> L. Santoyo Castillo,<sup>149,‡</sup> K. Sapp,<sup>125,‡</sup> A. Sapromov,<sup>65,‡</sup> J. G. Sarava,<sup>126a,126b,‡</sup> B. Sarrazinot,<sup>21,‡</sup> O. Sasaki,<sup>66,‡</sup> Y. Sasaki,<sup>155,‡</sup> K. Satoh,<sup>160,‡</sup> G. Sauvage,<sup>5,‡</sup> E. Sauvan,<sup>5,‡</sup> G. Savage,<sup>77,‡</sup> P. Savard,<sup>128,‡</sup> C. Sawyer,<sup>120,‡</sup> L. Sawyer,<sup>70,‡</sup> J. Saxon,<sup>31,‡</sup> C. Sharra,<sup>20a,‡</sup> A. Sherriff,<sup>172,‡</sup> T. Scanlon,<sup>78,‡</sup> D. A. Scannicchio,<sup>83,‡</sup> M. Scarcella,<sup>150,‡</sup> V. Scarfone,<sup>37a,37b,‡</sup> J. Schaarschmidt,<sup>172,‡</sup> P. Schacht,<sup>101,‡</sup> D. Schaefer,<sup>30,‡</sup> R. Schaefer,<sup>42,‡</sup> J. Schaeffer,<sup>83,‡</sup> S. Schaepe,<sup>21,‡</sup> S. Schaetzl,<sup>50b,‡</sup> U. Schäfer,<sup>83,‡</sup> A. C. Schaffer,<sup>117,‡</sup> D. Schaele,<sup>100,‡</sup> R. D. Schamberger,<sup>140,‡</sup> V. Scharf,<sup>90a,‡</sup>

- V. A. Schegelsky,<sup>128,†</sup> D. Scheirich,<sup>129,†</sup> M. Schernau,<sup>163,‡</sup> C. Schiavi,<sup>50a,50b,‡</sup> C. Schillo,<sup>48,†</sup> M. Schioppa,<sup>37a,37b,†</sup>  
 S. Schlenker,<sup>30,‡</sup> E. Schmidt,<sup>48,†</sup> K. Schmieden,<sup>30,‡</sup> C. Schmitt,<sup>48,†</sup> S. Schmitt,<sup>42,†</sup> B. Schneider,<sup>189a,†</sup>  
 Y. J. Schnellbach,<sup>74,†</sup> U. Schoonroek,<sup>44,†</sup> L. Schoofel,<sup>136,†</sup> A. Schoening,<sup>20b,†</sup> B. D. Schoenrock,<sup>90,†</sup> E. Schopf,<sup>21,†</sup>  
 A. L. S. Schorlemmer,<sup>54,†</sup> M. Schott,<sup>83,†</sup> D. Schouten,<sup>159a,†</sup> J. Schovancova,<sup>8,†</sup> S. Schramm,<sup>158,†</sup> M. Schreyer,<sup>174,†</sup>  
 C. Schroeder,<sup>83,†</sup> N. Schuh,<sup>83,†</sup> M. J. Schulmes,<sup>21,†</sup> H.-C. Schultz-Coulon,<sup>98,†</sup> H. Schulz,<sup>16,†</sup> M. Schumacher,<sup>48,†</sup>  
 B. A. Schumann,<sup>137,†</sup> Ph. Schune,<sup>136,†</sup> C. Schwanenberger,<sup>143,†</sup> A. Schwartzman,<sup>143,†</sup> T. A. Schwarz,<sup>90,†</sup> Ph. Schwegler,<sup>101,†</sup>  
 Ph. Schwemling,<sup>136,†</sup> R. Schwienhorst,<sup>90,†</sup> J. Schwindt,<sup>21,†</sup> M. Schwoerer,<sup>5,†</sup> F. G. Sciacca,<sup>47,†</sup>  
 E. Seifo,<sup>117,†</sup> G. Sciolta,<sup>23,†</sup> F. Scuri,<sup>21,†</sup> E. Seuti,<sup>21,†</sup> J. Seucy,<sup>89,†</sup> G. Sedov,<sup>42,†</sup> E. Sedykh,<sup>93,†</sup> P. Seema,<sup>21,†</sup>  
 S. C. Seidel,<sup>105,†</sup> A. Seiden,<sup>137,†</sup> F. Seifert,<sup>128,†</sup> J. M. Sexias,<sup>24a,†</sup> G. Sekhniaidze,<sup>83,†</sup> K. Sekhon,<sup>89,†</sup> S. J. Sekula,<sup>40,†</sup>  
 K. E. Selbach,<sup>46,†</sup> D. M. Silverman,<sup>123,8,†</sup> N. Semprini-Cesari,<sup>20a,20b,†</sup> C. Serfon,<sup>30,†</sup> L. Serin,<sup>117,†</sup> L. Serkin,<sup>164,164b,†</sup>  
 T. Serre,<sup>85,†</sup> M. Sessa,<sup>134,134b,†</sup> R. Seuster,<sup>159a,†</sup> H. Severini,<sup>113,†</sup> T. Stilfsgoj,<sup>75,†</sup> F. Sforza,<sup>101,†</sup> A. Sfyrla,<sup>20,†</sup> E. Shabalina,<sup>54,†</sup>  
 M. Shamini,<sup>116,†</sup> L. Y. Shan,<sup>33a,†</sup> R. Shang,<sup>165,†</sup> J. T. Shank,<sup>22,†</sup> M. Shapiro,<sup>15,†</sup> P. B. Shatalov,<sup>140,†</sup> K. Shaw,<sup>164a,164b,†</sup>  
 S. M. Shaw,<sup>84,†</sup> A. Scherbakov,<sup>140a,140b,†</sup> C. Y. Shehu,<sup>140,†</sup> P. Sherwood,<sup>78,†</sup> L. Shi,<sup>131,131b,†</sup> S. Shimizu,<sup>63,†</sup> C. O. Shimmin,<sup>163,†</sup>  
 M. Shimojima,<sup>102,†</sup> M. Shiyakova,<sup>65,†</sup> A. Shmeleva,<sup>96,†</sup> D. Shoalahe Saadi,<sup>42,†</sup> M. J. Shochet,<sup>71,†</sup> S. Shojaii,<sup>91,91b,†</sup>  
 S. Shrestha,<sup>111,†</sup> E. Shulga,<sup>98,†</sup> M. A. Shupe,<sup>7,†</sup> S. Shushkevich,<sup>42,†</sup> P. Sicho,<sup>127,†</sup> O. Sidiropolou,<sup>174,†</sup> D. Sidorov,<sup>134,†</sup>  
 A. Sidoti,<sup>20a,20b,†</sup> F. Siegert,<sup>44,†</sup> D. Sijacki,<sup>13,†</sup> J. Silva,<sup>126a,126d,†</sup> Y. Silver,<sup>153,†</sup> S. B. Silverstein,<sup>146a,†</sup> V. Simak,<sup>128,†</sup>  
 O. Simard,<sup>83,†</sup> Lj. Simic,<sup>13,†</sup> S. Simon,<sup>117,†</sup> E. Simioni,<sup>83,†</sup> B. Simmonis,<sup>48,†</sup> D. Simon,<sup>34,†</sup> R. Simonello,<sup>91a,91b,†</sup> P. Sinervo,<sup>158,†</sup>  
 N. B. Sinev,<sup>118,†</sup> G. Siragusa,<sup>174,†</sup> A. Sisakyan,<sup>48,†</sup> S. Yu. Sivoklokov,<sup>90,†</sup> J. Sjolin,<sup>146a,146b,†</sup> T. B. Bjursen,<sup>14,†</sup>  
 M. B. Skinner,<sup>72,†</sup> H. P. Skottowe,<sup>37,†</sup> P. Skubic,<sup>118,†</sup> M. Slater,<sup>25,†</sup> T. Slavicek,<sup>128,†</sup> M. Slawinska,<sup>107,†</sup> K. Sliwa,<sup>161,†</sup>  
 V. Smakhtin,<sup>172,†</sup> B. H. Smart,<sup>46,†</sup> L. Smestad,<sup>14,†</sup> S. Yu. Smirnov,<sup>98,†</sup> Y. Smirnov,<sup>88,†</sup> L. N. Smirnova,<sup>99,99b,†</sup> O. Smirnova,<sup>81,†</sup>  
 M. N. K. Smith,<sup>35,†</sup> R. W. Smith,<sup>35,†</sup> M. Smizanska,<sup>44,†</sup> K. Smolek,<sup>126,†</sup> A. A. Snesarev,<sup>43,†</sup> G. Smidero,<sup>26,†</sup> S. Snyder,<sup>98,†</sup>  
 R. Sobie,<sup>109,109,†</sup> F. Socher,<sup>44,†</sup> A. Soffer,<sup>133,†</sup> D. A. Soh,<sup>151,151,†</sup> C. A. Solans,<sup>93,†</sup> M. Solar,<sup>128,†</sup> J. Solc,<sup>128,†</sup> E. Yu. Soldatov,<sup>98,†</sup>  
 U. Soldevila,<sup>167,†</sup> A. A. Solodkov,<sup>130,†</sup> A. Soloshenko,<sup>65,†</sup> O. V. Solovyanov,<sup>130,†</sup> V. Solov'yev,<sup>123,†</sup> P. Sommer,<sup>48,†</sup>  
 H. Y. Song,<sup>93,†</sup> N. Soni,<sup>1,†</sup> A. Sood,<sup>15,†</sup> A. Sopezak,<sup>128,†</sup> B. Sopko,<sup>128,†</sup> V. Sorin,<sup>12,†</sup> D. Sosa,<sup>58b,†</sup>  
 M. M.索塞比,<sup>43,†</sup> C. L. Sotiriopoulou,<sup>126a,126b,†</sup> F. Soualah,<sup>164,164c,†</sup> P. Souseid,<sup>83,†</sup> A. M. Soukharev,<sup>109,109,†</sup> D. South,<sup>42,†</sup>  
 B. C. Sowden,<sup>77,†</sup> S. Spagnolo,<sup>77a,77b,†</sup> M. Spalla,<sup>124a,124b,†</sup> F. Spanò,<sup>77,†</sup> W. R. Spearman,<sup>77,†</sup> F. Spettel,<sup>101,†</sup> R. Spighi,<sup>20a,†</sup>  
 G. Spiga,<sup>30,†</sup> L. A. Spiller,<sup>88,†</sup> M. Spousa,<sup>129,†</sup> T. Spritzer,<sup>158,†</sup> R. D. St. Denz,<sup>53,53,†</sup> S. Staerz,<sup>44,†</sup> J. Stahlin,<sup>119,†</sup>  
 R. Stamen,<sup>58,†</sup> S. Stamm,<sup>96,†</sup> E. Staneecka,<sup>49,†</sup> C. Stanescu,<sup>134,8,†</sup> M. Stanescu-Bellu,<sup>42,†</sup> M. M. Stanizki,<sup>42,†</sup> S. Stappnes,<sup>25,†</sup>  
 E. A. Starchenko,<sup>130,†</sup> J. Stark,<sup>54,†</sup> P. Staroba,<sup>127,†</sup> P. Starovitz,<sup>42,†</sup> R. Staszewski,<sup>98,†</sup> P. Stavina,<sup>146a,146b,†</sup> P. Steinberg,<sup>25,†</sup>  
 B. Stelzer,<sup>142,†</sup> H. J. Stelzer,<sup>103,†</sup> O. Stielzer-Chilton,<sup>159a,†</sup> F. Soualah,<sup>164,164c,†</sup> S. Stern,<sup>20,20,†</sup> G. A. Stewart,<sup>53,†</sup> J. A. Stillings,<sup>21,†</sup>  
 M. C. Stockton,<sup>87,†</sup> M. Stoebe,<sup>47,†</sup> G. Stoica,<sup>26a,†</sup> P. Stoltz,<sup>54,†</sup> S. Stojanek,<sup>201,†</sup> A. R. Stradling,<sup>8,†</sup> A. Straessner,<sup>34,†</sup>  
 M. E. Stramaglia,<sup>17,†</sup> J. Strandberg,<sup>147,†</sup> S. Strandberg,<sup>146a,146b,†</sup> A. Strandlie,<sup>119,†</sup> E. Strauss,<sup>113,†</sup> M. Strauss,<sup>113,†</sup>  
 P. Strizelecki,<sup>144,†</sup> R. Strömler,<sup>143,†</sup> D. M. Strom,<sup>116,†</sup> J. Stroykowski,<sup>40,†</sup> A. Strubig,<sup>108,†</sup> S. A. Stucci,<sup>13,†</sup> B. Stugu,<sup>14,†</sup>  
 N. A. Styles,<sup>42,†</sup> D. Su,<sup>143,†</sup> J. Sun,<sup>125,†</sup> R. Subramanian,<sup>79,†</sup> A. Sucurro,<sup>12,†</sup> Y. Sugaya,<sup>118,†</sup> C. Suhr,<sup>108,†</sup> M. Suk,<sup>128,†</sup>  
 V. V. Sulim,<sup>96,†</sup> S. T. Sun,<sup>4c,†</sup> T. Sumida,<sup>68,†</sup> S. Sun,<sup>57,†</sup> X. Sun,<sup>33a,†</sup> J. E. Sundermann,<sup>48,†</sup> K. Suruliz,<sup>149,†</sup>  
 G. Susimmo,<sup>37a,37b,†</sup> M. R. Sutton,<sup>149,†</sup> S. Suzuki,<sup>66,†</sup> Y. Suzuki,<sup>66,†</sup> M. Svatos,<sup>127,†</sup> S. Swedish,<sup>168,†</sup> M. Swiatlowski,<sup>144,†</sup>  
 I. Sykora,<sup>144a,†</sup> I. Sykora,<sup>129,7,†</sup> D. Ta,<sup>90,†</sup> C. Tacconi,<sup>134a,134b,†</sup> K. Tackmann,<sup>42,†</sup> J. Taenzer,<sup>158,†</sup> A. Taffard,<sup>163,†</sup> R. Tarifour,<sup>159a,†</sup>  
 N. Taiblum,<sup>153,†</sup> H. Takai,<sup>25,†</sup> T. Takashima,<sup>69,†</sup> H. Takeda,<sup>87,†</sup> T. Takeishi,<sup>140,†</sup> Y. Takubo,<sup>66,†</sup> M. Talby,<sup>83,†</sup>  
 A. A. Talyshev,<sup>109,109,†</sup> J. Y. C. Tan,<sup>174,†</sup> K. G. Tan,<sup>38,†</sup> J. Tanaka,<sup>158,†</sup> R. Tanaka,<sup>117,†</sup> S. Tanaka,<sup>66,†</sup> B. B. Tannenwald,<sup>111,†</sup>  
 N. Tamoury,<sup>23,†</sup> S. Tapprogue,<sup>83,†</sup> S. Tarem,<sup>152,†</sup> F. Tarrade,<sup>29,†</sup> G. F. Tartarelli,<sup>21a,†</sup> P. Tas,<sup>128,†</sup> M. Tasevsky,<sup>127,†</sup>  
 T. Tashiro,<sup>161,†</sup> E. Tassi,<sup>37a,37b,†</sup> A. Tavares Delgado,<sup>126a,126b,†</sup> Y. Tayalati,<sup>135d,†</sup> F. E. Taylor,<sup>94,†</sup> G. N. Taylor,<sup>88,†</sup> W. Taylor,<sup>159b,†</sup>  
 F. A. Teischinger,<sup>30,†</sup> M. Teixeira Dias Castanheira,<sup>76,†</sup> P. Teixeira-Dias,<sup>77,†</sup> K. K. Temming,<sup>48,†</sup> H. Ten Kate,<sup>30,†</sup>  
 P. K. Teng,<sup>151,†</sup> J. J. Teoh,<sup>118,†</sup> F. Tepel,<sup>178,†</sup> S. Terada,<sup>66,†</sup> K. Terashi,<sup>155,†</sup> J. Terren,<sup>82,†</sup> S. Terzo,<sup>101,†</sup> M. Testa,<sup>47,†</sup>  
 R. J. Teuscher,<sup>158,158,†</sup> J. Therhaag,<sup>21,†</sup> T. Theveneau-Pelzer,<sup>34,†</sup> J. Thomas,<sup>18,†</sup> J. J. Thomas-Wilsker,<sup>77,†</sup> E. N. Thompson,<sup>35,†</sup>  
 P. D. Thompson,<sup>18,†</sup> R. J. Thompson,<sup>84,†</sup> A. S. Thompson,<sup>53,53,†</sup> A. S. Thomas,<sup>122,†</sup> E. Thomson,<sup>122,†</sup> M. Thomson,<sup>26,†</sup>  
 R. P. Thun,<sup>30,30,†</sup> M. J. Tibbets,<sup>25,†</sup> E. Tiece Torres,<sup>85,†</sup> S. Tokimori,<sup>96,96,†</sup> Yu. A. Tikhonov,<sup>109,109,†</sup> S. Timoshenko,<sup>98,†</sup>  
 E. Tiouchichine,<sup>85,†</sup> P. Tipton,<sup>176,†</sup> S. Tisserant,<sup>85,†</sup> T. Todoro,<sup>5,5,†</sup> S. Todorova-Nova,<sup>120,†</sup> J. Tojo,<sup>70,†</sup> S. Tokář,<sup>144a,†</sup>  
 K. Tokushuku,<sup>66,†</sup> K. Tolleson,<sup>90,†</sup> E. Tolley,<sup>57,†</sup> L. Tomlinson,<sup>84,†</sup> M. Tomoto,<sup>103,†</sup> L. Tompkins,<sup>143,143,†</sup> K. Toms,<sup>105,†</sup>  
 E. Torrence,<sup>116,†</sup> H. Torres,<sup>142,†</sup> E. Torrò Pastor,<sup>167,†</sup> J. Toth,<sup>85,85,†</sup> F. Touchard,<sup>85,†</sup> D. R. Tovey,<sup>139,†</sup> T. Trefzger,<sup>174,†</sup>

- L. Tremblet,<sup>30,†</sup> A. Tricoli,<sup>30,‡</sup> I. M. Trigger,<sup>159a,§</sup> S. Trincaz-Duvord,<sup>30,||</sup> M. F. Tripiana,<sup>12,†</sup> W. Trischuk,<sup>158,¶</sup> B. Trocmé,<sup>55,¶</sup> C. Troncon,<sup>94,¶</sup> M. Trottier-McDonald,<sup>12,†</sup> M. Trouvaille,<sup>12a,13a,¶</sup> P. True,<sup>90,‡</sup> L. Truong,<sup>164,164c,¶</sup> M. Trzebinski,<sup>99,¶</sup> A. Trzupek,<sup>30,‡</sup> C. Tsarouchas,<sup>30,‡</sup> J.-C.-L. Tseng,<sup>120,‡</sup> P. V. Tsiareska,<sup>92,‡</sup> D. Tsionis,<sup>154,‡</sup> G. Tsipoliti,<sup>10,§</sup> N. Tsiririanitis,<sup>9,‡</sup> S. Tsikaridze,<sup>12,†</sup> V. Tsikaridze,<sup>48,‡</sup> E. G. Tskhadadze,<sup>51,‡</sup> I. I. Tsukerman,<sup>97,‡</sup> V. Tsulai,<sup>15,‡</sup> S. Tsuno,<sup>66,‡</sup> D. Tyshychev,<sup>148,‡</sup> A. Tudorache,<sup>26a,†</sup> V. Tudorache,<sup>26a,†</sup> A. N. Tuna,<sup>20a,†</sup> S. A. Tuppur,<sup>20a,20b,†</sup> S. Turchikhin,<sup>99,¶</sup> D. Turecek,<sup>128,‡</sup> R. Turra,<sup>91a,91b,†</sup> A. J. Turvey,<sup>40,‡</sup> P. M. Tuts,<sup>14,‡</sup> A. Tykhonov,<sup>20,†</sup> M. Tymiad,<sup>148a,148b,†</sup> M. Tyndel,<sup>131,‡</sup> I. Ueda,<sup>155,‡</sup> R. Ueno,<sup>20,‡</sup> M. Ughetto,<sup>140a,140b,†</sup> M. Uglan,<sup>14,‡</sup> M. Uhlenbroek,<sup>21,‡</sup> F. Ukegawa,<sup>160,‡</sup> G. Unal,<sup>30,‡</sup> A. Undrus,<sup>25,‡</sup> G. Unel,<sup>48,‡</sup> F. C. Ungaro,<sup>48,‡</sup> Y. Unno,<sup>66,‡</sup> C. Unverdorben,<sup>100,‡</sup> J. Urban,<sup>140b,†</sup> P. Usquijo,<sup>88,‡</sup> P. Uriegola,<sup>83,‡</sup> G. Usaï,<sup>83,‡</sup> A. Usanova,<sup>62,‡</sup> L. Vacavant,<sup>48,‡</sup> V. Vacek,<sup>120,‡</sup> B. Vachon,<sup>87,‡</sup> C. Valkeronis,<sup>9,‡</sup> N. Valencic,<sup>9,‡</sup> S. Valentim,<sup>20a,20b,†</sup> A. Valero,<sup>167,‡</sup> L. Valery,<sup>12,‡</sup> S. Valkar,<sup>129,‡</sup> E. Valladolid Gallego,<sup>167,‡</sup> S. Vallecorta,<sup>49,‡</sup> J. A. Valls Ferre,<sup>197,‡</sup> W. Van Den Wollenberg,<sup>107,‡</sup> P. C. Van Der Deijl,<sup>107,‡</sup> R. van der Geer,<sup>107,‡</sup> H. van der Graaf,<sup>107,‡</sup> R. Van Der Leeuw,<sup>107,‡</sup> N. van Eldik,<sup>152,‡</sup> P. van Gemmeren,<sup>6,‡</sup> J. Van Nieuwkoop,<sup>142,‡</sup> I. van Vulpen,<sup>107,‡</sup> M. C. van Woerden,<sup>38,‡</sup> M. Vanadia,<sup>132a,132b,†</sup> W. Vandael,<sup>30,‡</sup> R. Vanguri,<sup>122,‡</sup> A. Vaniacchine,<sup>6,‡</sup> F. Vannucci,<sup>80,‡</sup> G. Vardanyan,<sup>347,‡</sup> R. Varri,<sup>132,‡</sup> E. W. Varner,<sup>7,‡</sup> T. Varol,<sup>40,‡</sup> R. Varouchas,<sup>80,‡</sup> A. Varnapetian,<sup>8,‡</sup> K. E. Varvel,<sup>150,‡</sup> F. Vazeille,<sup>347,‡</sup> T. Vazquez Schroeder,<sup>87,‡</sup> J. Veatch,<sup>7,‡</sup> L. M. Veloci,<sup>158,‡</sup> F. Veloso,<sup>126a,126b,†</sup> T. Velz,<sup>21,‡</sup> S. Veneziano,<sup>132a,‡</sup> A. Ventura,<sup>73a,73b,‡</sup> D. Ventura,<sup>86,‡</sup> M. Venturi,<sup>169,‡</sup> N. Venturi,<sup>158,‡</sup> A. Venturini,<sup>23,‡</sup> V. Vercesi,<sup>121a,‡</sup> M. Verducci,<sup>132a,132b,‡</sup> W. Verkerke,<sup>107,‡</sup> J. C. Vermeulen,<sup>107,‡</sup> A. Vest,<sup>44,‡</sup> M. C. Vetterli,<sup>142,‡</sup> O. Viazlo,<sup>81,‡</sup> I. Ichou,<sup>165,‡</sup> T. Vickey,<sup>139,‡</sup> O. E. Vickey Boeriu,<sup>139,‡</sup> G. H. A. Viehhauser,<sup>120,‡</sup> S. Viel,<sup>15,‡</sup> R. Vigne,<sup>30,‡</sup> M. Villa,<sup>20a,20b,†</sup> M. Villaplana Perez,<sup>91a,91b,‡</sup> E. Vilucchi,<sup>47,‡</sup> M. G. Vinctor,<sup>29,‡</sup> V. B. Vinogradov,<sup>65,‡</sup> I. Vivarelli,<sup>140,‡</sup> F. Vives Vaque,<sup>3,‡</sup> S. Vlachos,<sup>10,‡</sup> D. Vladou,<sup>100,‡</sup> M. Vlasak,<sup>128,‡</sup> M. Vogel,<sup>128,‡</sup> P. Vokac,<sup>128,‡</sup> M. Volpi,<sup>88,‡</sup> H. von der Schmitz,<sup>101,‡</sup> H. von Radziewski,<sup>48,‡</sup> E. von Toerne,<sup>27,‡</sup> K. Vorobel,<sup>28,‡</sup> M. Vos,<sup>30,‡</sup> R. Voss,<sup>74,‡</sup> N. Vranjes,<sup>31,‡</sup> J. H. Vossebeld,<sup>74,‡</sup> N. Vranjes,<sup>31,‡</sup> M. Vranjes Milosavljevic,<sup>13,‡</sup> V. Vrba,<sup>127,‡</sup> M. Vreeswijk,<sup>107,‡</sup> R. Vuillermet,<sup>30,‡</sup> L. Vukotic,<sup>31,‡</sup> Z. Vykydal,<sup>128,‡</sup> P. Wagner,<sup>21,‡</sup> W. Wagner,<sup>175,‡</sup> H. Wahlberg,<sup>71,‡</sup> S. Wahrund,<sup>44,‡</sup> J. Wakabayashi,<sup>103,‡</sup> J. Walker,<sup>72,‡</sup> R. Walker,<sup>108,‡</sup> W. Walkowiak,<sup>141,‡</sup> C. Wang,<sup>33c,‡</sup> F. Wang,<sup>173,‡</sup> H. Wang,<sup>15,‡</sup> L. Wang,<sup>40,‡</sup> J. Wang,<sup>42,‡</sup> J. Wang,<sup>33a,‡</sup> K. Wang,<sup>37,‡</sup> R. Wang,<sup>6,‡</sup> S. M. Wang,<sup>151,‡</sup> T. Wang,<sup>21,‡</sup> X. Wang,<sup>27b,‡</sup> C. Wanotayaroj,<sup>116,‡</sup> A. Warburton,<sup>87,‡</sup> C. P. Ward,<sup>26,‡</sup> D. R. Wardrobe,<sup>76,‡</sup> M. Warsinsky,<sup>48,‡</sup> A. Washbrook,<sup>46,‡</sup> C. Wasicki,<sup>42,‡</sup> P. M. Watson,<sup>18,‡</sup> L. J. Watson,<sup>150,‡</sup> M. F. Watson,<sup>18,‡</sup> G. Watts,<sup>128,‡</sup> S. Watts,<sup>84,‡</sup> B. M. Waugh,<sup>84,‡</sup> S. Webb,<sup>84,‡</sup> M. S. Weber,<sup>84,‡</sup> S. W. Webber,<sup>174,‡</sup> J. S. Webster,<sup>31,‡</sup> A. R. Weidberg,<sup>120,‡</sup> B. Weinert,<sup>61,‡</sup> J. Weingarten,<sup>54,‡</sup> C. Weiser,<sup>48,‡</sup> H. Weiss,<sup>107,‡</sup> P. S. Wells,<sup>30,‡</sup> T. Wenaus,<sup>28,‡</sup> T. Wengler,<sup>30,‡</sup> S. Wenzl,<sup>30,‡</sup> N. Wermes,<sup>21,‡</sup> M. Werner,<sup>40,‡</sup> P. Werner,<sup>30,‡</sup> M. Wessels,<sup>20a,‡</sup> J. Wetter,<sup>84,‡</sup> K. Whalen,<sup>29,‡</sup> A. M. Wharton,<sup>72,‡</sup> A. White,<sup>8,‡</sup> M. J. White,<sup>12,‡</sup> R. White,<sup>32b,‡</sup> S. White,<sup>124a,124b,†</sup> D. Whiteson,<sup>165,‡</sup> F. J. Wickens,<sup>131,‡</sup> W. Wiedemann,<sup>173,‡</sup> M. Wieler,<sup>131,‡</sup> P. Wienemann,<sup>21,‡</sup> C. Wiglesworth,<sup>36,‡</sup> L. A. M. Wiik-Fuchs,<sup>21,‡</sup> A. Wildauer,<sup>101,‡</sup> H. G. Wilkens,<sup>30,‡</sup> H. H. Williams,<sup>122,‡</sup> S. Williams,<sup>107,‡</sup> C. Willis,<sup>90,‡</sup> S. Willcoq,<sup>88,‡</sup> A. Wilson,<sup>89,‡</sup> J. A. Wilson,<sup>18,‡</sup> I. Wingerter-Seetz,<sup>5,‡</sup> F. Winklmeier,<sup>116,‡</sup> B. T. Winter,<sup>21,‡</sup> M. Wittgen,<sup>144,‡</sup> J. Wittkowski,<sup>100,‡</sup> S. J. Wolffstadt,<sup>83,‡</sup> M. W. Wolter,<sup>98,‡</sup> H. Wolters,<sup>120a,120c,‡</sup> B. K. Wosiak,<sup>39,‡</sup> J. Wotschack,<sup>30,‡</sup> M. J. Woudstra,<sup>84,‡</sup> K. W. Woźniak,<sup>98,‡</sup> M. Wu,<sup>55,‡</sup> M. Wu,<sup>21,‡</sup> S. L. Wu,<sup>273,‡</sup> X. Wu,<sup>49,‡</sup> Y. Wu,<sup>89,‡</sup> T. R. Wyatt,<sup>84,‡</sup> B. M. Wynne,<sup>66,‡</sup> S. K. Xella,<sup>36,‡</sup> D. Xu,<sup>33a,‡</sup> L. Xu,<sup>33b,‡</sup> B. Yabsley,<sup>150,‡</sup> S. Yacoob,<sup>148,‡</sup> Y. Yakabe,<sup>67,‡</sup> M. Yamada,<sup>66,‡</sup> Y. Yamaguchi,<sup>118,‡</sup> A. Yamamoto,<sup>66,‡</sup> S. Yamamoto,<sup>155,‡</sup> T. Yamashita,<sup>155,‡</sup> K. Yamanchi,<sup>103,‡</sup> Y. Yamazaki,<sup>67,‡</sup> Z. Yan,<sup>22,‡</sup> H. Yang,<sup>3,‡</sup> H. Yang,<sup>173,‡</sup> Y. Yang,<sup>151,‡</sup> L. Yao,<sup>36a,‡</sup> W.-M. Yao,<sup>15,‡</sup> Y. Yao,<sup>66,‡</sup> E. Yatsenko,<sup>5,‡</sup> K. Hay,Wong,<sup>21,‡</sup> J. Ye,<sup>40,‡</sup> S. Ye,<sup>23,‡</sup> I. Yetleksiz,<sup>65,‡</sup> A. L. Yen,<sup>37,‡</sup> E. Yıldırım,<sup>42,‡</sup> K. Yorita,<sup>171,‡</sup> R. Yoshida,<sup>6,‡</sup> K. Yoshihara,<sup>122,‡</sup> C. Young,<sup>143,‡</sup> C. J. S. Young,<sup>30,‡</sup> S. Yousell,<sup>22,‡</sup> D. R. Yu,<sup>15,‡</sup> J. Yu,<sup>8,‡</sup> J. M. Yu,<sup>89,‡</sup> J. Yu,<sup>114,‡</sup> L. Yuan,<sup>67,‡</sup> A. Yurkewicz,<sup>108,‡</sup> I. Yusoff,<sup>28,‡</sup> B. Zabinski,<sup>19,‡</sup> R. Zaidan,<sup>63,‡</sup> A. M. Zaitsev,<sup>130,3b,‡</sup> J. Zalewicka,<sup>84,‡</sup> A. Zaman,<sup>148,‡</sup> S. Zamitbo,<sup>57,‡</sup> L. Zanello,<sup>132a,132b,‡</sup> D. Zanzi,<sup>98,‡</sup> C. Zeitlin,<sup>175,‡</sup> M. Zeman,<sup>128,‡</sup> A. Zemla,<sup>38a,‡</sup> K. Zengel,<sup>23,‡</sup> O. Zenin,<sup>130,‡</sup> T. Ženčík,<sup>144,‡</sup> D. Žerwas,<sup>177,‡</sup> D. Zhang,<sup>103,‡</sup> F. Zhang,<sup>173,‡</sup> L. Zhang,<sup>6,‡</sup> L. Zhang,<sup>48,‡</sup> R. Zhang,<sup>30b,‡</sup> X. Zhang,<sup>33d,‡</sup> Z. Zhang,<sup>117,‡</sup> X. Zhao,<sup>40,‡</sup> Y. Zhao,<sup>33a,17,‡</sup> Z. Zhao,<sup>33b,‡</sup> A. Zhembegov,<sup>65,‡</sup> J. Zhong,<sup>120,‡</sup> B. Zhou,<sup>80,‡</sup> C. Zhou,<sup>45,‡</sup> L. Zhou,<sup>35,‡</sup> L. Zhou,<sup>40,‡</sup> N. Zhou,<sup>163,‡</sup> C. G. Zhu,<sup>33d,‡</sup> H. Zhu,<sup>33a,‡</sup> J. Zhu,<sup>89,‡</sup> Y. Zhu,<sup>33b,‡</sup> X. Zhuang,<sup>33a,‡</sup> K. Zhukov,<sup>96,‡</sup> A. Zibell,<sup>174,‡</sup> D. Ziemińska,<sup>61,‡</sup> N. I. Zimine,<sup>65,‡</sup> C. Zimmermann,<sup>83,‡</sup> S. Zimmermann,<sup>54,‡</sup> M. Zinser,<sup>83,‡</sup> M. Ziolkowski,<sup>141,‡</sup> L. Živković,<sup>173,‡</sup> G. Zobemig,<sup>179,‡</sup> A. Zoccoli,<sup>20a,20b,†</sup> M. zur Nedden,<sup>16,‡</sup> G. Zurzolo,<sup>104a,104b,‡</sup> L. Zwalski,<sup>30,‡</sup> V. Khachatryan,<sup>173,‡</sup> A. M. Sirunyan,<sup>170,‡</sup> A. Tumasyan,<sup>170,‡</sup> W. Adam,<sup>180,‡</sup> E. Asilar,<sup>180,‡</sup> T. Bergauer,<sup>180,‡</sup> J. Brandstötter,<sup>180,‡</sup> E. Brondolin,<sup>180,‡</sup> M. Dragicevic,<sup>180,‡</sup> J. Erő,<sup>180,‡</sup> M. Flechi,<sup>180,‡</sup> M. Friedl,<sup>180,‡</sup> R. Fröhwith,<sup>180,‡</sup> V. M. Ghete,<sup>180,‡</sup> C. Hartl,<sup>180,‡</sup> N. Hörmann,<sup>174,‡</sup> J. Huubec,<sup>180,‡</sup> M. Jeitler,<sup>180,‡</sup> A. König,<sup>180,‡</sup>

- M. Krammer,<sup>180,mn,2</sup> L. Krätschmer,<sup>180,2</sup> D. Liko,<sup>180,2</sup> T. Matsushita,<sup>180,2</sup> I. Mikulec,<sup>180,2</sup> D. Rabady,<sup>180,mn,2</sup> B. Rahbaran,<sup>180,2</sup> H. Rohringer,<sup>180,2</sup> J. Schieck,<sup>180,mn,2</sup> R. Schönbeck,<sup>180,2</sup> J. Strauss,<sup>180,2</sup> W. Treberer-Treberspurg,<sup>180,2</sup> W. Waltenberger,<sup>180,2</sup> C.-E. Wulz,<sup>180,mn,2</sup> V. Mossolov,<sup>182,2</sup> N. Shumeiko,<sup>182,2</sup> J. Suarez Gonzalez,<sup>182,2</sup> S. Alderweireldt,<sup>182,2</sup> T. Cornelis,<sup>182,2</sup> E. A. De Wolf,<sup>182,2</sup> X. Janssen,<sup>182,2</sup> A. Knutsson,<sup>182,2</sup> J. Lauwers,<sup>182,2</sup> S. Luyckx,<sup>182,2</sup> S. Ochesanu,<sup>182,2</sup> R. Rougny,<sup>182,2</sup> M. Van De Klaender,<sup>182,2</sup> H. Van Haevermaet,<sup>182,2</sup> P. Van Mechelen,<sup>182,2</sup> N. Van Remortel,<sup>182,2</sup> A. Van Spilbeeck,<sup>182,2</sup> S. Abu Zeid,<sup>183,2</sup> F. Blekman,<sup>183,2</sup> D. Hondt,<sup>183,2</sup> N. Daci,<sup>183,2</sup> I. De Bruyn,<sup>183,2</sup> K. Deroover,<sup>183,2</sup> N. Heracleous,<sup>183,2</sup> J. Keaveney,<sup>183,2</sup> S. Lowette,<sup>183,2</sup> L. Moreels,<sup>183,2</sup> A. Olbrechts,<sup>183,2</sup> Q. Python,<sup>183,2</sup> D. Strom,<sup>183,2</sup> S. Tavernier,<sup>183,2</sup> W. Van Doninck,<sup>183,2</sup> P. Van Mulders,<sup>183,2</sup> G. P. Van Onsem,<sup>183,2</sup> J. Van Parjs,<sup>183,2</sup> P. Barria,<sup>184,2</sup> C. Caillol,<sup>184,2</sup> B. Clerbaux,<sup>184,2</sup> G. De Lentdecker,<sup>184,2</sup> H. Delannoy,<sup>184,2</sup> D. Dobur,<sup>184,2</sup> G. Fasnacht,<sup>184,2</sup> L. Favart,<sup>184,2</sup> A. P. R. Gay,<sup>184,2</sup> A. Grebenyuk,<sup>184,2</sup> T. Lenzi,<sup>184,2</sup> A. Léonard,<sup>184,2</sup> T. Maerschalk,<sup>184,2</sup> M. Mohammadi,<sup>184,2</sup> L. Perni,<sup>184,2</sup> A. Randle-conde,<sup>184,2</sup> T. Reis,<sup>184,2</sup> T. Seva,<sup>184,2</sup> L. Thomas,<sup>184,2</sup> C. Vander Velde,<sup>184,2</sup> P. Vanhae,<sup>184,2</sup> J. Wang,<sup>184,2</sup> R. Yonamine,<sup>184,2</sup> F. Zenoni,<sup>184,2</sup> F. Zhang,<sup>184,2</sup> K. Beernaert,<sup>185,2</sup> L. Benucci,<sup>185,2</sup> A. Cimmino,<sup>185,2</sup> S. Crucy,<sup>185,2</sup> A. Fagot,<sup>185,2</sup> G. Garcia,<sup>185,2</sup> M. Gui,<sup>185,2</sup> J. Mccartin,<sup>185,2</sup> A. Ocampo Rios,<sup>185,2</sup> D. Poyraz,<sup>185,2</sup> D. Ryckbosch,<sup>185,2</sup> S. Salva Gibala,<sup>185,2</sup> M. Sigamani,<sup>185,2</sup> N. Strobbe,<sup>185,2</sup> M. Tytgat,<sup>185,2</sup> W. Van Diressche,<sup>185,2</sup> E. Yazgan,<sup>185,2</sup> N. Zaganidis,<sup>185,2</sup> S. Basegmez,<sup>186,mn,2</sup> C. Beluffi,<sup>186,mn,2</sup> O. Bondu,<sup>186,2</sup> G. Bruno,<sup>186,2</sup> R. Castello,<sup>186,2</sup> A. Caudron,<sup>186,2</sup> L. Ceard,<sup>186,2</sup> G. G. Da Silveira,<sup>186,2</sup> C. Delaere,<sup>186,2</sup> D. Favart,<sup>186,2</sup> L. Forthomme,<sup>186,2</sup> A. Giannamico,<sup>186,2</sup> J. Hollar,<sup>186,2</sup> A. Jafari,<sup>186,2</sup> P. Jez,<sup>186,2</sup> M. Komm,<sup>186,2</sup> V. Lemaitre,<sup>186,2</sup> A. Mertens,<sup>186,2</sup> C. Nuttens,<sup>186,2</sup> L. Perni,<sup>186,2</sup> A. Pin,<sup>186,2</sup> K. Piotrkowski,<sup>186,2</sup> A. Popov,<sup>186,2</sup> L. Quertenmont,<sup>186,2</sup> M. Selvaggi,<sup>186,2</sup> M. Vidal Marono,<sup>186,2</sup> N. Bely,<sup>187,2</sup> T. Caeberg,<sup>187,2</sup> G. H. Hammad,<sup>187,2</sup> W. L. Aldá Junior,<sup>187,2</sup> G. A. Alves,<sup>187,2</sup> L. Brito,<sup>187,2</sup> M. Corre Martins Junior,<sup>188,2</sup> T. Dos Reis Martins,<sup>188,2</sup> C. Hensel,<sup>188,2</sup> C. Mora Herrera,<sup>188,2</sup> A. Morais,<sup>188,2</sup> M. E. Pot,<sup>188,2</sup> P. Rebello Teles,<sup>188,2</sup> E. Belchior Batista Das Chagas,<sup>189,2</sup> W. Carvalho,<sup>189,2</sup> J. Chinellato,<sup>189,2</sup> A. Custodio,<sup>189,2</sup> E. M. Da Costa,<sup>189,2</sup> D. De Jesus Damiao,<sup>189,2</sup> C. D. Oliveira Martins,<sup>189,2</sup> S. Fonseca De Souza,<sup>189,2</sup> L. M. Huertas Guativa,<sup>189,2</sup> H. Malbouisson,<sup>189,2</sup> D. Matos Figueiredo,<sup>189,2</sup> L. Mundini,<sup>189,2</sup> H. Nogima,<sup>189,2</sup> W. L. Prado Da Silva,<sup>189,2</sup> A. Santoro,<sup>189,2</sup> A. Sznaider,<sup>189,2</sup> E. J. Tonelli Mangano,<sup>189,2</sup> A. Vilela Pereira,<sup>189,2</sup> S. Ahuja,<sup>189,2</sup> C. A. Bernardes,<sup>189,2</sup> A. De Souza Santos,<sup>189,2</sup> S. Dogra,<sup>189,2</sup> T. R. Fernandez Perez Tomei,<sup>189,2</sup> E. M. Gregores,<sup>189,2</sup> G. Mercadante,<sup>189,2</sup> S. Moon,<sup>189,2</sup> S. F. Novais,<sup>189,2</sup> Sandra S. Padula,<sup>189,2</sup> D. Romero Abad,<sup>189,2</sup> J. C. Ruiz Vargas,<sup>189,2</sup> A. Aleksandrov,<sup>191,2</sup> V. Genchev,<sup>191,2</sup> R. Hadjiska,<sup>191,2</sup> P. Iaydjiev,<sup>191,2</sup> A. Marinov,<sup>191,2</sup> S. Piperov,<sup>191,2</sup> M. Rodozov,<sup>191,2</sup> S. Stoykova,<sup>191,2</sup> G. Sultanov,<sup>191,2</sup> M. Utovata,<sup>191,2</sup> A. Dimitrov,<sup>192,2</sup> I. Glushkov,<sup>192,2</sup> L. Litov,<sup>192,2</sup> B. Pavlov,<sup>192,2</sup> P. Petkov,<sup>192,2</sup> M. Ahmad,<sup>193,2</sup> J. G. Bian,<sup>193,2</sup> G. M. Chen,<sup>193,2</sup> H. S. Chen,<sup>193,2</sup> M. Chen,<sup>193,2</sup> T. Cheng,<sup>193,2</sup> R. Du,<sup>193,2</sup> C. H. Jiang,<sup>193,2</sup> R. Pestina,<sup>193,2</sup> F. Romeo,<sup>193,2</sup> S. M. Shahaeen,<sup>193,2</sup> J. Tao,<sup>193,2</sup> C. Wang,<sup>193,2</sup> Z. Wang,<sup>193,2</sup> H. Zhang,<sup>193,2</sup> C. Asawatangtrakuldej,<sup>194,2</sup> Y. Ban,<sup>194,2</sup> G. Chen,<sup>194,2</sup> Q. Li,<sup>194,2</sup> J. Liu,<sup>194,2</sup> Y. Mao,<sup>194,2</sup> S. J. Qian,<sup>194,2</sup> D. Wang,<sup>194,2</sup> M. Wang,<sup>194,2</sup> Q. Wang,<sup>194,2</sup> Z. Xu,<sup>194,2</sup> D. Yang,<sup>194,2</sup> Z. Zhang,<sup>194,2</sup> W. Zou,<sup>194,2</sup> C. Avila,<sup>195,2</sup> A. Cabrera,<sup>195,2</sup> L. F. Chaparro Sierra,<sup>195,2</sup> C. Florez,<sup>195,2</sup> J. P. Gomez,<sup>195,2</sup> B. Gomez Moreno,<sup>195,2</sup> J. C. Sanabria,<sup>195,2</sup> N. Godinovic,<sup>196,2</sup> D. Lelas,<sup>196,2</sup> D. Polic,<sup>196,2</sup> I. Pujak,<sup>196,2</sup> Z. Antonovic,<sup>197,2</sup> M. Kovac,<sup>197,2</sup> V. Brigljevic,<sup>197,2</sup> K. Kadija,<sup>197,2</sup> J. Luetic,<sup>198,2</sup> L. Sudic,<sup>198,2</sup> A. Attikis,<sup>199,2</sup> G. Mavromanolakis,<sup>199,2</sup> J. Mousa,<sup>199,2</sup> C. Nicolaou,<sup>199,2</sup> F. Ptochos,<sup>199,2</sup> P. A. Razis,<sup>199,2</sup> H. Rykaczewski,<sup>199,2</sup> M. Bodlak,<sup>200,2</sup> M. Finger,<sup>200,2</sup> M. Finger Jr.,<sup>200,2</sup> A. Ali,<sup>201,2</sup> R. Aly,<sup>201,2</sup> S. Aly,<sup>201,2</sup> Y. Assran,<sup>201,2</sup> A. Ellithi Kamel,<sup>201,2</sup> A. Lotfy,<sup>201,2</sup> M. A. Mahmoud,<sup>201,2</sup> R. Masod,<sup>201,2</sup> A. Radi,<sup>201,2</sup> Y. Assran,<sup>201,2</sup> A. Ellithi Kamel,<sup>202,2</sup> M. Alridal,<sup>202,2</sup> A. Tiko,<sup>202,2</sup> C. Veelken,<sup>202,2</sup> P. Eerola,<sup>202,2</sup> B. Calpas,<sup>202,2</sup> M. Kadastik,<sup>202,2</sup> M. Murumura,<sup>202,2</sup> M. Raidal,<sup>202,2</sup> A. Tiko,<sup>202,2</sup> C. Veelken,<sup>202,2</sup> J. Pekkanen,<sup>203,2</sup> M. Voutilainen,<sup>203,2</sup> J. Härkönen,<sup>204,2</sup> V. Karimäki,<sup>204,2</sup> R. Kinnunen,<sup>204,2</sup> T. Lampén,<sup>204,2</sup> K. Lassila-Perrin,<sup>204,2</sup> S. Lehti,<sup>204,2</sup> T. Lindén,<sup>204,2</sup> P. Luukka,<sup>204,2</sup> T. Mäenpää,<sup>204,2</sup> T. Peltola,<sup>204,2</sup> E. Tuominen,<sup>204,2</sup> J. Tuominen,<sup>204,2</sup> E. Tuominen,<sup>204,2</sup> E. Tuominen,<sup>204,2</sup> E. Tuominen,<sup>204,2</sup> T. Wendland,<sup>204,2</sup> J. Talvitie,<sup>205,2</sup> T. Tuuva,<sup>205,2</sup> M. Besancon,<sup>205,2</sup> F. Couderc,<sup>205,2</sup> M. Dejardin,<sup>206,2</sup> D. Denegri,<sup>206,2</sup> B. Fabbro,<sup>206,2</sup> J. L. Faure,<sup>206,2</sup> C. Favaro,<sup>206,2</sup> F. Ferri,<sup>206,2</sup> S. Ganjour,<sup>206,2</sup> A. Givernau,<sup>206,2</sup> P. Gras,<sup>206,2</sup> G. Hamel de Monchenault,<sup>206,2</sup> P. Jarry,<sup>206,2</sup> E. Locci,<sup>206,2</sup> M. Machet,<sup>206,2</sup> J. Malcles,<sup>206,2</sup> J. Rander,<sup>206,2</sup> A. Rosowsky,<sup>207,2</sup> M. Titov,<sup>207,2</sup> A. Zghiche,<sup>207,2</sup> S. Baffioni,<sup>207,2</sup> F. Beaudelet,<sup>207,2</sup> P. Bussion,<sup>207,2</sup> L. Cadamuro,<sup>207,2</sup> E. Chapon,<sup>207,2</sup> T. Charlott,<sup>207,2</sup> T. Dahms,<sup>207,2</sup> P. Davignon,<sup>207,2</sup> N. Filipovic,<sup>207,2</sup> A. Florent,<sup>207,2</sup> R. Granier de Cassagnac,<sup>207,2</sup> S. Lisiak,<sup>207,2</sup> L. Mastrolenzio,<sup>207,2</sup> P. Miné,<sup>207,2</sup> I. N. Narango,<sup>207,2</sup> M. Nguyen,<sup>207,2</sup> C. Ochando,<sup>207,2</sup> G. Ortona,<sup>207,2</sup> P. Paganini,<sup>207,2</sup> R. Regnard,<sup>207,2</sup> R. Salerno,<sup>207,2</sup> J. B. Sauvan,<sup>207,2</sup> Y. Sirois,<sup>207,2</sup> T. Streblér,<sup>207,2</sup> Y. Yilmaz,<sup>207,2</sup> A. Zabi,<sup>207,2</sup> J.-L. Agram,<sup>208,2</sup> J. Andrea,<sup>208,2</sup> A. Aubin,<sup>208,2</sup> D. Bloch,<sup>208,2</sup> J.-M. Brom,<sup>208,2</sup> M. Buttignol,<sup>208,2</sup> E. C. Chabert,<sup>208,2</sup> N. Chanon,<sup>208,2</sup> C. Collard,<sup>208,2</sup> E. Conte,<sup>208,2</sup> J.-C. Fontaine,<sup>208,2</sup> D. Gelé,<sup>208,2</sup>

- U. Goerlach,<sup>208,1</sup> C. Goetzmann,<sup>208,1</sup> A.-C. Le Bihan,<sup>208,1</sup> J. A. Merlin,<sup>208,1</sup> K. Skovpen,<sup>208,1</sup> P. Van Hove,<sup>208,1</sup>  
 S. Gadrat,<sup>209,1</sup> S. Beauregard,<sup>209,1</sup> C. Bermet,<sup>210,1</sup> G. Bouroud,<sup>210,1</sup> E. Bouvier,<sup>210,1</sup> S. Brochet,<sup>210,1</sup> C. A. Carrillo Montoya,<sup>210,1</sup>  
 J. Chassera,<sup>210,1</sup> R. Chierici,<sup>210,1</sup> D. Contardo,<sup>210,1</sup> B. Courbon,<sup>210,1</sup> P. Depasse,<sup>210,1</sup> H. El Mamouni,<sup>210,1</sup> J. Fan,<sup>210,1</sup>  
 J. Fay,<sup>210,1</sup> S. Gascon,<sup>210,1</sup> M. Gouzevitch,<sup>210,1</sup> B. Ille,<sup>210,1</sup> L. B. Laktine,<sup>210,1</sup> M. Lethuillier,<sup>210,1</sup> L. Mirabito,<sup>210,1</sup>  
 A. L. Pequegnat,<sup>210,1</sup> S. Perries,<sup>210,1</sup> J. D. Ruiz Alvarez,<sup>210,1</sup> D. Sabes,<sup>210,1</sup> L. Sgandurra,<sup>210,1</sup> V. Sordini,<sup>210,1</sup>  
 M. Vander Donckt,<sup>210,1</sup> P. Verdin,<sup>210,1</sup> S. Viret,<sup>210,1</sup> X. Xiao,<sup>210,1</sup> Z. Tsamalaidze,<sup>211,1</sup> C. Autermann,<sup>212,1</sup> S. Beranek,<sup>212,1</sup>  
 M. Bontenackels,<sup>212,1</sup> M. Edelhoff,<sup>212,1</sup> L. Feld,<sup>212,1</sup> A. Heister,<sup>212,1</sup> M. K. Kiesel,<sup>212,1</sup> K. Klein,<sup>212,1</sup> M. Lipinski,<sup>212,1</sup>  
 A. Ostapchuk,<sup>212,1</sup> M. Preuter,<sup>212,1</sup> F. Raupach,<sup>212,1</sup> J. Sammet,<sup>212,1</sup> S. Schael,<sup>212,1</sup> J. F. Schultz,<sup>212,1</sup> T. Verlage,<sup>212,1</sup>  
 H. Weber,<sup>212,1</sup> B. Wittmer,<sup>212,1</sup> V. Zhukov,<sup>212,1</sup> M. Ata,<sup>213,1</sup> M. Brodski,<sup>213,1</sup> E. Dietz-Laursonn,<sup>213,1</sup> D. Duchardt,<sup>213,1</sup>  
 M. Endres,<sup>213,1</sup> M. Erdmann,<sup>213,1</sup> S. Erdweg,<sup>213,1</sup> T. Esch,<sup>213,1</sup> R. Fischer,<sup>213,1</sup> A. Güth,<sup>213,1</sup> T. Hebbeker,<sup>213,1</sup>  
 C. Heidemann,<sup>213,1</sup> K. Hoepfner,<sup>213,1</sup> D. Klingebiel,<sup>213,1</sup> S. Knutzen,<sup>213,1</sup> P. Kreuzer,<sup>213,1</sup> M. Merschmeyer,<sup>213,1</sup> A. Meyer,<sup>213,1</sup>  
 P. Millet,<sup>213,1</sup> M. Olschewski,<sup>213,1</sup> K. Padeken,<sup>213,1</sup> P. Papacz,<sup>213,1</sup> T. Pook,<sup>213,1</sup> M. Radziej,<sup>213,1</sup> H. Reithler,<sup>213,1</sup>  
 M. Rieger,<sup>213,1</sup> F. Scheuch,<sup>213,1</sup> L. Sonnenschein,<sup>213,1</sup> D. Teysier,<sup>213,1</sup> S. Thüer,<sup>213,1</sup> V. Cherepanov,<sup>214,1</sup> Y. Erdogan,<sup>214,1</sup>  
 G. Flügge,<sup>214,1</sup> H. Geenen,<sup>214,1</sup> M. Geisler,<sup>214,1</sup> W. Ha Ahmad,<sup>214,1</sup> F. Hoehe,<sup>214,1</sup> B. Kargoll,<sup>214,1</sup> T. Kress,<sup>214,1</sup>  
 Y. Kuessel,<sup>214,1</sup> A. Künsken,<sup>214,1</sup> J. Lingemann,<sup>214,1</sup> A. Nehrkorn,<sup>214,1</sup> A. Nowack,<sup>214,1</sup> I. M. Nugent,<sup>214,1</sup> C. Pistone,<sup>214,1</sup>  
 A. Pooth,<sup>214,1</sup> A. Stahl,<sup>214,1</sup> M. Aldaya Martin,<sup>215,1</sup> I. Asin,<sup>215,1</sup> N. Bartosik,<sup>215,1</sup> O. Behnke,<sup>215,1</sup> U. Behrens,<sup>215,1</sup>  
 A. J. Bell,<sup>215,1</sup> K. Borras,<sup>215,1</sup> A. Burgmeier,<sup>215,1</sup> A. Cakir,<sup>215,1</sup> L. Calligaris,<sup>215,1</sup> A. Campbell,<sup>215,1</sup> S. Choudhury,<sup>215,1</sup>  
 F. Costanza,<sup>215,1</sup> C. Diez Pardos,<sup>215,1</sup> G. Dolinsky,<sup>215,1</sup> S. Dooling,<sup>215,1</sup> T. Dorland,<sup>215,1</sup> G. Eckerlin,<sup>215,1</sup> D. Eckstein,<sup>215,1</sup>  
 T. Eichhorn,<sup>215,1</sup> G. Flucke,<sup>215,1</sup> E. Gallo,<sup>215,1</sup> J. Garay Garcia,<sup>215,1</sup> A. Geise,<sup>215,1</sup> A. Gitzho,<sup>215,1</sup> P. Gunnellini,<sup>215,1</sup>  
 J. Haas,<sup>215,1</sup> M. Hempel,<sup>215,1</sup> K. Kieseler,<sup>215,1</sup> C. Kleinwort,<sup>215,1</sup> I. Korol,<sup>215,1</sup> W. Lange,<sup>215,1</sup> J. Leonard,<sup>215,1</sup> K. Lipka,<sup>215,1</sup> A. Lobanova,<sup>215,1</sup>  
 W. Lohmann,<sup>215,1</sup> R. Mankel,<sup>215,1</sup> I. Marfin,<sup>215,1</sup> I.-A. Melzer-Pellmann,<sup>215,1</sup> A. B. Meyer,<sup>215,1</sup> G. Mittag,<sup>215,1</sup>  
 J. Mnich,<sup>215,1</sup> A. Mussigller,<sup>215,1</sup> S. Naumann-Emme,<sup>215,1</sup> A. Nayak,<sup>215,1</sup> E. Ntomari,<sup>215,1</sup> H. Perrey,<sup>215,1</sup> D. Pitzl,<sup>215,1</sup>  
 R. Placakyte,<sup>215,1</sup> A. Raspereza,<sup>215,1</sup> P. M. Ribeiro Cipriano,<sup>215,1</sup> B. Roland,<sup>215,1</sup> M. O. Sahin,<sup>215,1</sup> J. Salfeld-Nebgen,<sup>215,1</sup>  
 P. Saxena,<sup>215,1</sup> T. Schoerner-Sadenius,<sup>215,1</sup> M. Schröder,<sup>215,1</sup> C. Seitz,<sup>215,1</sup> S. Spannagel,<sup>215,1</sup> K. D. Trippkewitz,<sup>215,1</sup>  
 C. Wissing,<sup>215,1</sup> V. Blobel,<sup>216,1</sup> Centis Vignali,<sup>216,1</sup> A. Draeger,<sup>216,1</sup> J. Erflie,<sup>216,1</sup> E. Garutti,<sup>216,1</sup> K. Goebel,<sup>216,1</sup>  
 D. Gonzalez,<sup>216,1</sup> M. Görner,<sup>216,1</sup> J. Haller,<sup>216,1</sup> M. Hoffmann,<sup>216,1</sup> R. Höing,<sup>216,1</sup> A. Junkes,<sup>216,1</sup> R. Klanner,<sup>216,1</sup>  
 R. Kogler,<sup>216,1</sup> T. Lapsien,<sup>216,1</sup> T. Lenz,<sup>216,1</sup> I. Marchesini,<sup>216,1</sup> D. Marconi,<sup>216,1</sup> D. Nowatschin,<sup>216,1</sup> J. Ott,<sup>216,1</sup>  
 F. Pantaleo,<sup>216,1</sup> T. Peiffer,<sup>216,1</sup> A. Perieanu,<sup>216,1</sup> N. Pletsch,<sup>216,1</sup> J. Poehlsen,<sup>216,1</sup> D. Rathjens,<sup>216,1</sup> C. Sander,<sup>216,1</sup>  
 H. Schettler,<sup>216,1</sup> P. Schleper,<sup>216,1</sup> E. Schlieckau,<sup>216,1</sup> A. Schmidt,<sup>216,1</sup> J. Schwandt,<sup>216,1</sup> M. Seidel,<sup>216,1</sup> V. Sola,<sup>216,1</sup>  
 H. Stadie,<sup>216,1</sup> G. Steinbrück,<sup>216,1</sup> H. Tholen,<sup>216,1</sup> D. Treondle,<sup>216,1</sup> E. Usai,<sup>216,1</sup> L. Vanelder,<sup>216,1</sup> A. Vanhofer,<sup>216,1</sup>  
 M. Akbyiyik,<sup>217,1</sup> C. Amstutz,<sup>217,1</sup> C. Barth,<sup>217,1</sup> C. Baus,<sup>217,1</sup> J. Berger,<sup>217,1</sup> C. Beskidt,<sup>217,1</sup> C. Böser,<sup>217,1</sup> E. Butz,<sup>217,1</sup>  
 R. Casprt,<sup>217,1</sup> T. Chwalek,<sup>217,1</sup> F. Colombo,<sup>217,1</sup> W. De Boer,<sup>217,1</sup> A. Desroclos,<sup>217,1</sup> A. Dierlamm,<sup>217,1</sup> R. Eber,<sup>217,1</sup>  
 M. Feindt,<sup>217,1</sup> S. Fink,<sup>217,1</sup> M. Fischer,<sup>217,1</sup> F. French,<sup>217,1</sup> B. Freund,<sup>217,1</sup> R. Friese,<sup>217,1</sup> D. Funka,<sup>217,1</sup> M. Giffels,<sup>217,1</sup>  
 A. Gilbert,<sup>217,1</sup> D. Haitz,<sup>217,1</sup> T. Harbaum,<sup>217,1</sup> M. A. Harrendorf,<sup>217,1</sup> F. Hartmann,<sup>217,1</sup> U. Husemann,<sup>217,1</sup> F. Kassel,<sup>217,1</sup>  
 I. Katkov,<sup>217,1</sup> A. Kormayer,<sup>217,1</sup> S. Kudella,<sup>217,1</sup> P. Lobelle Pardo,<sup>217,1</sup> B. Maier,<sup>217,1</sup> H. Mildner,<sup>217,1</sup> M. U. Mozer,<sup>217,1</sup>  
 T. Müller,<sup>217,1</sup> Th. Müller,<sup>217,1</sup> M. Plagge,<sup>217,1</sup> M. Printz,<sup>217,1</sup> G. Quast,<sup>217,1</sup> K. Rabbertz,<sup>217,1</sup> S. Röcker,<sup>217,1</sup> F. Roscher,<sup>217,1</sup>  
 I. Shvetsov,<sup>217,1</sup> G. Sieber,<sup>217,1</sup> H. J. Simonis,<sup>217,1</sup> F. M. Stober,<sup>217,1</sup> R. Ulrich,<sup>217,1</sup> J. Wagner-Kuhr,<sup>217,1</sup> S. Wayand,<sup>217,1</sup>  
 T. Weiler,<sup>217,1</sup> S. Williamson,<sup>217,1</sup> C. Wöhrmann,<sup>217,1</sup> R. Wolf,<sup>217,1</sup> G. Agnostoni,<sup>218,1</sup> G. Daskalakis,<sup>218,1</sup> T. Gerald,<sup>218,1</sup>  
 V. A. Giakoumopoulou,<sup>218,1</sup> A. Kyriakis,<sup>218,1</sup> D. Loukas,<sup>218,1</sup> A. Markou,<sup>218,1</sup> A. Psallidas,<sup>218,1</sup> I. Topsis-Giotis,<sup>218,1</sup>  
 A. Agapitos,<sup>219,1</sup> S. Kesiosoglou,<sup>219,1</sup> A. Panagioutou,<sup>219,1</sup> N. Saoulidou,<sup>219,1</sup> E. Tzafiri,<sup>219,1</sup> I. Evangelou,<sup>219,1</sup> G. Flouris,<sup>219,1</sup>  
 C. Fouad,<sup>220,1</sup> P. Kokkas,<sup>220,1</sup> N. Loukas,<sup>220,1</sup> N. Manthos,<sup>220,1</sup> I. Papadopoulos,<sup>220,1</sup> E. Paradas,<sup>220,1</sup> J. Strologas,<sup>220,1</sup>  
 G. Bencze,<sup>221,1</sup> C. Hajdu,<sup>221,1</sup> A. Hazi,<sup>221,1</sup> P. Hidas,<sup>221,1</sup> D. Horvath,<sup>221,1</sup> F. Sikler,<sup>221,1</sup> V. Veszpremi,<sup>221,1</sup>  
 G. Vesztrombi,<sup>221,1</sup> A. J. Zsigmond,<sup>221,1</sup> N. Beni,<sup>222,1</sup> S. Czelarz,<sup>222,1</sup> J. Karancsi,<sup>222,1</sup> J. Molnar,<sup>222,1</sup> Z. Szillas,<sup>222,1</sup>  
 M. Bartok,<sup>223,1</sup> A. Makovec,<sup>223,1</sup> P. Raics,<sup>223,1</sup> Z. L. Trocsanyi,<sup>223,1</sup> B. Ujvari,<sup>223,1</sup> P. Mal,<sup>224,1</sup> K. Mandal,<sup>224,1</sup> N. Sahoo,<sup>224,1</sup>  
 S. K. Swain,<sup>224,1</sup> S. Bansals,<sup>224,1</sup> S. B. Beri,<sup>224,1</sup> B. Bhattacharjee,<sup>224,1</sup> A. Chawla,<sup>224,1</sup> R. Gupta,<sup>224,1</sup> U. Bhawandeep,<sup>224,1</sup>  
 A. K. Kalsi,<sup>225,1</sup> A. Kaur,<sup>225,1</sup> M. Kaur,<sup>225,1</sup> R. Kumar,<sup>225,1</sup> A. Mehta,<sup>225,1</sup> M. Mittal,<sup>225,1</sup> N. Nishu,<sup>225,1</sup> J. B. Singh,<sup>225,1</sup>  
 G. Walia,<sup>226,1</sup> Ashok Kumar,<sup>226,1</sup> Arun Kumar,<sup>226,1</sup> A. Bhardwaj,<sup>226,1</sup> B. C. Choudhary,<sup>226,1</sup> R. B. Garg,<sup>226,1</sup> A. Kumar,<sup>226,1</sup>  
 S. Malhotra,<sup>226,1</sup> M. Naimuddin,<sup>226,1</sup> K. Ranjan,<sup>226,1</sup> R. Sharma,<sup>226,1</sup> S. Banerjee,<sup>227,1</sup> S. Bhattacharya,<sup>227,1</sup>

- K. Chatterjee,<sup>227,1</sup> S. Dey,<sup>227,1</sup> S. Dutta,<sup>227,1</sup> Sa. Jain,<sup>227,1</sup> Sh. Jain,<sup>227,1</sup> R. Khurana,<sup>227,1</sup> N. Majumdar,<sup>227,1</sup> A. Modak,<sup>227,1</sup> K. Mondal,<sup>227,1</sup> S. Mukherjee,<sup>227,1</sup> S. Mukhopadhyay,<sup>227,1</sup> A. Roy,<sup>227,1</sup> D. Roy,<sup>227,1</sup> S. Roy,<sup>227,1</sup> S. Sarkar,<sup>227,1</sup> M. Sharai,<sup>227,1</sup> A. Abdulsalam,<sup>228,1</sup> R. Chudasma,<sup>228,1</sup> V. Jha,<sup>228,1</sup> V. Kumar,<sup>228,1</sup> A. K. Mohanty,<sup>228,1</sup> L. M. Pant,<sup>228,1</sup> P. Shukla,<sup>228,1</sup> A. Topkar,<sup>228,1</sup> T. Aziz,<sup>229,1</sup> S. Banerjee,<sup>229,1</sup> S. Bhownik,<sup>229,1</sup> R. M. Chatterjee,<sup>229,1</sup> R. K. Dewanji,<sup>229,1</sup> S. Dugad,<sup>229,1</sup> S. Ganguly,<sup>229,1</sup> S. Ghosh,<sup>229,1</sup> M. Guchait,<sup>229,1</sup> A. Guru,<sup>229,1</sup> G. Kole,<sup>229,1</sup> S. Kumar,<sup>229,1</sup> E. Mahakud,<sup>229,1</sup> M. Maiti,<sup>229,1</sup> G. Majumder,<sup>229,1</sup> K. Mazumdar,<sup>229,1</sup> S. Mitra,<sup>229,1</sup> G. B. Mohanty,<sup>229,1</sup> B. Parida,<sup>229,1</sup> T. Sarkar,<sup>229,1</sup> K. Sudhakar,<sup>229,1</sup> N. Sutar,<sup>229,1</sup> B. Sutar,<sup>229,1</sup> N. Wickramage,<sup>229,1</sup> S. Sharma,<sup>230,1</sup> H. Bakshiansohi,<sup>231,1</sup> H. Behnamian,<sup>231,1</sup> S. M. Etesami,<sup>231,1</sup> A. Fahim,<sup>231,1</sup> R. Goldouzian,<sup>231,1</sup> M. Khakzaei,<sup>231,1</sup> M. Mohammadi Najafabadi,<sup>231,1</sup> M. Naseri,<sup>231,1</sup> S. Pakiniai Mehdibadi,<sup>231,1</sup> F. Rezaei Hosseiniabadi,<sup>231,1</sup> B. Safarzadeh,<sup>231,1</sup> M. Zeinali,<sup>231,1</sup> M. Felcini,<sup>232,1</sup> S. Grunewald,<sup>232,1</sup> M. Abbrescia,<sup>233a,233b,1</sup> C. Calabria,<sup>233a,233b,1</sup> C. Caputo,<sup>233a,233b,1</sup> S. S. Chhibra,<sup>233a,233b,1</sup> A. Colaleo,<sup>233a,233b,1</sup> D. Creanza,<sup>233a,233b,1</sup> L. Cristella,<sup>233a,233b,1</sup> N. De Filippi,<sup>233a,233b,1</sup> M. De Palma,<sup>233a,233b,1</sup> L. Fiori,<sup>233a,233b,1</sup> G. Iaselli,<sup>233a,233b,1</sup> G. Maggi,<sup>233a,233b,1</sup> M. Maggi,<sup>233a,233b,1</sup> G. Minicello,<sup>233a,233b,1</sup> S. Mylva,<sup>233a,233b,1</sup> S. Nuzzo,<sup>233a,233b,1</sup> A. Pompli,<sup>233a,233b,1</sup> G. Pugliese,<sup>233a,233b,1</sup> R. Radogna,<sup>233a,233b,1</sup> A. Ranieri,<sup>233a,233b,1</sup> L. Silvestri,<sup>233a,233b,1</sup> R. Venditti,<sup>233a,233b,1</sup> P. Verwilligen,<sup>233a,233b,1</sup> G. Abbiendi,<sup>234a,234b,1</sup> C. Battilana,<sup>234a,234b,1</sup> A. Cenvenuti,<sup>234a,234b,1</sup> D. Bonacorsi,<sup>234a,234b,1</sup> R. Bribaart-Giacomelli,<sup>234a,234b,1</sup> L. Brigliadori,<sup>234a,234b,1</sup> R. Campanini,<sup>234a,234b,1</sup> P. Capiluppi,<sup>234a,234b,1</sup> A. Castro,<sup>234a,234b,1</sup> F. R. Cavallo,<sup>234a,234b,1</sup> G. Codispoti,<sup>234a,234b,1</sup> M. Cuffiani,<sup>234a,234b,1</sup> G. M. Dallavalle,<sup>234a,234b,1</sup> F. Fabbri,<sup>234a,234b,1</sup> A. Fanfani,<sup>234a,234b,1</sup> D. Fasanella,<sup>234a,234b,1</sup> P. Giacomelli,<sup>234a,234b,1</sup> C. Grandi,<sup>234a,234b,1</sup> L. Guiducci,<sup>234a,234b,1</sup> S. Marcelli,<sup>234a,234b,1</sup> A. Montanari,<sup>234a,234b,1</sup> F. L. Navaria,<sup>234a,234b,1</sup> A. Perrotta,<sup>234a,234b,1</sup> A. M. Rossi,<sup>234a,234b,1</sup> C. Rovelli,<sup>234a,234b,1</sup> G. P. Siroli,<sup>234a,234b,1</sup> N. Tosi,<sup>234a,234b,1</sup> R. Travaglini,<sup>234a,234b,1</sup> G. Cappello,<sup>235a,235b,1</sup> M. Chiorboli,<sup>235a,235b,1</sup> S. Costa,<sup>235a,235b,1</sup> F. Giordano,<sup>235a,235b,1</sup> R. Potenza,<sup>235a,235b,1</sup> A. Tricomi,<sup>236a,236b,1</sup> G. Barbagli,<sup>236a,236b,1</sup> V. Ciulli,<sup>236a,236b,1</sup> C. Civinini,<sup>236a,236b,1</sup> R. D'Alessandro,<sup>236a,236b,1</sup> E. Focardi,<sup>236a,236b,1</sup> S. Gonzi,<sup>236a,236b,1</sup> V. Giorni,<sup>236a,236b,1</sup> P. Lenzi,<sup>236a,236b,1</sup> M. Meschini,<sup>236a,236b,1</sup> S. Paoletti,<sup>236a,236b,1</sup> G. Sguazzoni,<sup>236a,236b,1</sup> A. Tropiano,<sup>237,1</sup> L. Viliani,<sup>236a,236b,1</sup> L. Benussi,<sup>237,1</sup> S. Bianco,<sup>237,1</sup> F. Fabri,<sup>237,1</sup> D. Piccolo,<sup>237,1</sup> V. Calvelli,<sup>238a,238b,1</sup> F. Ferro,<sup>238a,238b,1</sup> M. Lo Vetere,<sup>238a,238b,1</sup> E. Robutti,<sup>238a,238b,1</sup> S. Tosi,<sup>238a,238b,1</sup> M. E. Di Marzo,<sup>239a,239b,1</sup> S. Fiorendi,<sup>239a,239b,1</sup> S. Gennari,<sup>239a,239b,1</sup> R. Gerosa,<sup>239a,239b,1</sup> A. Ghezzi,<sup>239a,239b,1</sup> P. Govoni,<sup>239a,239b,1</sup> S. Malvezzi,<sup>239a,239b,1</sup> R. A. Manzoni,<sup>239a,239b,1</sup> B. Marzocchi,<sup>239a,239b,1</sup> D. Menasse,<sup>239a,239b,1</sup> L. Moroni,<sup>239a,239b,1</sup> M. Pagani,<sup>239a,239b,1</sup> D. Pedrini,<sup>239a,239b,1</sup> S. Ragazzi,<sup>239a,239b,1</sup> N. Redaelli,<sup>239a,239b,1</sup> T. Tabarelli de Fatis,<sup>239a,239b,1</sup> S. Buontempo,<sup>239a,239b,1</sup> N. Cavallo,<sup>240a,240b,1</sup> S. Di Guida,<sup>240a,240b,1</sup> M. Esposito,<sup>240a,240b,1</sup> F. Fabozzi,<sup>240a,240b,1</sup> A. O. M. Iorio,<sup>240a,240b,1</sup> G. Lanza,<sup>240a,240b,1</sup> L. Lista,<sup>240a,240b,1</sup> S. Meola,<sup>240a,240b,1</sup> M. Merola,<sup>240a,240b,1</sup> F. Paolucci,<sup>240a,240b,1</sup> C. Sciacca,<sup>240a,240b,1</sup> F. Thyssen,<sup>240a,240b,1</sup> P. Azzi,<sup>241a,241b,1</sup> N. Bacchetta,<sup>241a,241b,1</sup> D. Bisello,<sup>241a,241b,1</sup> J. Branca,<sup>241a,241b,1</sup> R. Carlisi,<sup>241a,241b,1</sup> A. Carvalho Antunes De Oliveira,<sup>241a,241b,1</sup> P. Checchia,<sup>241a,241b,1</sup> M. Dall'Osso,<sup>241a,241b,1</sup> T. Dorigo,<sup>241a,241b,1</sup> U. Dosselli,<sup>241a,241b,1</sup> F. Gasparini,<sup>241a,241b,1</sup> U. Gasparini,<sup>241a,241b,1</sup> A. Gozzelino,<sup>241a,241b,1</sup> K. Kanishchev,<sup>241a,241b,1</sup> S. Lacapra,<sup>241a,241b,1</sup> M. Margoni,<sup>241a,241b,1</sup> A. T. Meneguzzo,<sup>241a,241b,1</sup> J. Pazzini,<sup>241a,241b,1</sup> N. Pozzobon,<sup>241a,241b,1</sup> P. Ronchese,<sup>241a,241b,1</sup> F. Simonetto,<sup>241a,241b,1</sup> E. Torassa,<sup>241a,241b,1</sup> M. Tosi,<sup>241a,241b,1</sup> M. Zanetti,<sup>241a,241b,1</sup> P. Zotto,<sup>241a,241b,1</sup> A. Zucchetta,<sup>241a,241b,1</sup> G. Zumerle,<sup>241a,241b,1</sup> A. Braghieri,<sup>242a,242b,1</sup> M. Gabusi,<sup>242a,242b,1</sup> A. Magnani,<sup>242a,242b,1</sup> S. P. Ratti,<sup>242a,242b,1</sup> V. Re,<sup>242,1</sup> C. Riccardi,<sup>242a,242b,1</sup> P. Salvini,<sup>242a,242b,1</sup> I. Vai,<sup>242,1</sup> P. Vitali,<sup>242a,242b,1</sup> L. Alunni Solestizi,<sup>243a,243b,1</sup> M. Biasini,<sup>243a,243b,1</sup> G. M. Bilen,<sup>243a,243b,1</sup> D. Ciangottini,<sup>243a,243b,1</sup> L. Fanò,<sup>243a,243b,1</sup> P. Lericcà,<sup>243a,243b,1</sup> G. Mantovani,<sup>243a,243b,1</sup> M. Menichelli,<sup>243a,243b,1</sup> A. Saha,<sup>243a,243b,1</sup> A. Santoccia,<sup>243a,243b,1</sup> A. Spiezia,<sup>243a,243b,1</sup> K. Androssov,<sup>244a,244b,1</sup> P. Azzurri,<sup>244a,244b,1</sup> G. Bagliesi,<sup>244a,244b,1</sup> J. Bernardi,<sup>244a,244b,1</sup> T. Boccali,<sup>244a,244b,1</sup> G. Broccolo,<sup>244a,244b,1</sup> R. Castaldi,<sup>244a,244b,1</sup> M. A. Ciocci,<sup>244a,244b,1</sup> R. Dell'Orso,<sup>244a,244b,1</sup> S. Donato,<sup>244a,244b,1</sup> G. Fedi,<sup>244a,244b,1</sup> L. Fou,<sup>244a,244b,1</sup> A. Giassi,<sup>244a,244b,1</sup> M. T. Grippo,<sup>244a,244b,1</sup> F. Ligabue,<sup>244a,244b,1</sup> T. Lomtadze,<sup>244a,244b,1</sup> L. Martin,<sup>244a,244b,1</sup> A. Messineo,<sup>244a,244b,1</sup> F. Palla,<sup>244a,244b,1</sup> A. Rizzi,<sup>244a,244b,1</sup> A. Savoy-Navarro,<sup>244a,244b,1</sup> A. T. Serban,<sup>244a,244b,1</sup> P. Spagnolo,<sup>244a,244b,1</sup> P. Squillacioti,<sup>244a,244b,1</sup> R. Tenchini,<sup>244a,244b,1</sup> G. Tonelli,<sup>244a,244b,1</sup> A. Venturi,<sup>244a,244b,1</sup> P. G. Verdini,<sup>244a,244b,1</sup> L. Barone,<sup>245a,245b,1</sup> F. Cavallari,<sup>245a,245b,1</sup> G. D'imperio,<sup>245a,245b,1</sup> D. Re,<sup>245a,245b,1</sup> M. Diemoz,<sup>245a,245b,1</sup> S. Gelli,<sup>245a,245b,1</sup> C. Jorda,<sup>245a,245b,1</sup> E. Longo,<sup>245a,245b,1</sup> F. Margaroli,<sup>245a,245b,1</sup> P. Meridiani,<sup>245a,245b,1</sup> F. Michelini,<sup>245a,245b,1</sup> G. Organini,<sup>245a,245b,1</sup> R. Paramatti,<sup>245a,245b,1</sup> F. Pretiato,<sup>245a,245b,1</sup> S. Rahatlou,<sup>245a,245b,1</sup> C. Rovelli,<sup>245a,245b,1</sup> F. Santanastasio,<sup>245a,245b,1</sup> E. Traczyk,<sup>245a,245b,1</sup> N. Amapane,<sup>246a,246b,1</sup> R. Arcidiacono,<sup>246a,246b,1</sup> C. Rovelli,<sup>246a,246b,1</sup> F. Santanastasio,<sup>246a,246b,1</sup> R. Bellan,<sup>246a,246b,1</sup> C. Biino,<sup>246a,246b,1</sup> N. Cartiglia,<sup>246a,246b,1</sup> M. Costa,<sup>246a,246b,1</sup> R. Covarelli,<sup>246a,246b,1</sup> A. Degana,<sup>246a,246b,1</sup> N. Demaria,<sup>246a,246b,1</sup> L. Finco,<sup>246a,246b,1</sup> B. Kiani,<sup>246a,246b,1</sup> C. Mariotti,<sup>246a,246b,1</sup> S. Maselli,<sup>246a,246b,1</sup> E. Migliore,<sup>246a,246b,1</sup> V. Monaco,<sup>246a,246b,1</sup> E. Montel,<sup>246a,246b,1</sup> M. Musich,<sup>246a,246b,1</sup> M. Obertino,<sup>246a,246b,1</sup> L. Pacher,<sup>246a,246b,1</sup> N. Pastore,<sup>246a,246b,1</sup> M. Pelliccioni,<sup>246a,246b,1</sup> G. L. Pinna Angioni,<sup>246a,246b,1</sup>

- F. Ravera,<sup>246a,246b,1</sup> A. Romero,<sup>246a,246b,1</sup> M. Ruspa,<sup>246a,246c,1</sup> R. Sacchi,<sup>246a,246b,1</sup> A. Solano,<sup>246a,246b,1</sup> A. Staiano,<sup>246a,1</sup> U. Tamponi,<sup>246a,2,1</sup> S. Belforte,<sup>247a,1</sup> V. Candelse,<sup>247a,2,1</sup> M. Casarsa,<sup>247a,3</sup> F. Cossutti,<sup>247a,2,1</sup> G. Della Ricca,<sup>247a,247b,1</sup> B. Gibbo,<sup>247a,2</sup> C. La Licata,<sup>247a,247b,1</sup> M. Marone,<sup>247a,247b,1</sup> A. Schizzi,<sup>247a,247b,1</sup> T. Umer,<sup>247a,247b,1</sup> A. Zanetti,<sup>247a,1</sup> S. Chang,<sup>248,1</sup> A. Kropivnitskaya,<sup>248,1</sup> S. K. Nam,<sup>248,1</sup> D. H. Kim,<sup>249,1</sup> G. N. Kim,<sup>249,1</sup> M. S. Kim,<sup>249,1</sup> D. J. Kong,<sup>249,1</sup> S. Lee,<sup>249,1</sup> Y. D. Oh,<sup>249,1</sup> A. Sakharov,<sup>249,1</sup> D. C. Son,<sup>249,1</sup> J. A. Brochero Cifuentes,<sup>250,1</sup> H. Kim,<sup>250,1</sup> T. J. Kim,<sup>250,1</sup> M. S. Ryu,<sup>250,1</sup> S. Song,<sup>251,1</sup> S. Choi,<sup>252,1</sup> Y. Go,<sup>252,1</sup> D. Gyun,<sup>252,1</sup> B. Hong,<sup>252,1</sup> M. Jo,<sup>252,1</sup> H. Kim,<sup>252,1</sup> Y. Kim,<sup>252,1</sup> B. Lee,<sup>252,1</sup> K. S. Lee,<sup>252,1</sup> S. Lee,<sup>252,1</sup> S. K. Park,<sup>252,1</sup> Y. Roh,<sup>252,1</sup> H. D. Yoo,<sup>253,1</sup> M. Choi,<sup>254,1</sup> J. H. Kim,<sup>254,1</sup> J. S. H. Lee,<sup>254,1</sup> I. C. Park,<sup>254,1</sup> G. Ryu,<sup>254,1</sup> Y. Choi,<sup>255,1</sup> Y. K. Choi,<sup>255,1</sup> J. Goh,<sup>255,1</sup> D. Kim,<sup>255,1</sup> E. Kwon,<sup>255,1</sup> J. Lee,<sup>255,1</sup> I. Yu,<sup>255,1</sup> A. Juodagalvis,<sup>256,1</sup> J. Vaikus,<sup>256,1</sup> Z. A. Ibrahim,<sup>257,1</sup> J. R. Komaragiri,<sup>257,1</sup> M. A. B. Md Ali,<sup>257,1</sup> F. Mohamad Idris,<sup>257,1</sup> W. A. T. Wan Abdullah,<sup>257,1</sup> E. Casimiro Linares,<sup>258,1</sup> H. Castilla-Valdez,<sup>258,1</sup> E. De La Cruz-Burelo,<sup>258,1</sup> I. Heredia-de La Cruz,<sup>258,1</sup> A. Hernandez-Almada,<sup>258,1</sup> R. Lopez-Fernandez,<sup>258,1</sup> A. Sanchez-Hernandez,<sup>258,1</sup> S. Carrillo Moreno,<sup>259,1</sup> F. Vazquez Valencia,<sup>259,1</sup> S. Carpintero,<sup>260,1</sup> I. Pedraza,<sup>260,1</sup> H. A. Salazar Ibarague,<sup>260,1</sup> A. Morelos Pineda,<sup>261,1</sup> D. Krofcheck,<sup>262,1</sup> P. H. Butler,<sup>263,1</sup> S. Reucroft,<sup>263,1</sup> A. Ahmad,<sup>264,1</sup> M. Ahmad,<sup>264,1</sup> Q. Hassan,<sup>264,1</sup> H. R. Hoornai,<sup>264,1</sup> W. A. Khan,<sup>264,1</sup> T. Khurshid,<sup>264,1</sup> M. Shoab,<sup>264,1</sup> H. Bialkowska,<sup>265,1</sup> M. Blin,<sup>265,1</sup> B. Boimska,<sup>265,1</sup> T. Fruehoebs,<sup>265,1</sup> M. Gorski,<sup>265,1</sup> M. Kazana,<sup>265,1</sup> K. Nawrocki,<sup>265,1</sup> K. Romanowska-Rybinska,<sup>265,1</sup> M. Szleper,<sup>265,1</sup> P. Zalewski,<sup>265,1</sup> G. Brona,<sup>266,1</sup> K. Bunkowski,<sup>266,1</sup> K. Doroba,<sup>266,1</sup> A. Kalinowski,<sup>266,1</sup> M. Konecki,<sup>266,1</sup> J. Krolikowski,<sup>266,1</sup> M. Misura,<sup>266,1</sup> M. Olszewski,<sup>266,1</sup> M. Walczak,<sup>266,1</sup> P. Bargassa,<sup>267,1</sup> C. Beirão da Cruz e Silva,<sup>267,1</sup> A. Di Francesco,<sup>267,1</sup> P. Faccioli,<sup>267,1</sup> P. G. Ferreira Parracho,<sup>267,1</sup> M. Gallinaro,<sup>267,1</sup> L. Lloret Iglesias,<sup>267,1</sup> F. Nguyen,<sup>267,1</sup> J. Rodriguez Antunes,<sup>267,1</sup> J. Seixas,<sup>267,1</sup> O. Toldaiay,<sup>267,1</sup> D. Vadruccio,<sup>267,1</sup> J. Varela,<sup>267,1</sup> P. Vischia,<sup>267,1</sup> S. Afamiasiev,<sup>268,1</sup> P. Buning,<sup>268,1</sup> M. Gavrilenko,<sup>268,1</sup> I. Golutvin,<sup>268,1</sup> I. Gorbovich,<sup>268,1</sup> A. Kamenev,<sup>268,1</sup> V. Karjavin,<sup>268,1</sup> V. Komoplyanikov,<sup>268,1</sup> A. Lanev,<sup>268,1</sup> A. Malakhov,<sup>268,1</sup> V. Matveev,<sup>268,1</sup> P. Moisenko,<sup>268,1</sup> V. Palichik,<sup>268,1</sup> V. Perelygin,<sup>268,1</sup> S. Shmatov,<sup>268,1</sup> S. Shulha,<sup>268,1</sup> N. Skatchkov,<sup>268,1</sup> V. Smirnov,<sup>268,1</sup> T. Torishvili,<sup>268,1</sup> A. Zarubin,<sup>268,1</sup> V. Golovtsov,<sup>269,1</sup> Y. Ivanov,<sup>269,1</sup> V. Kim,<sup>269,1</sup> E. Kuznetsova,<sup>269,1</sup> P. Levchenko,<sup>269,1</sup> V. Murzin,<sup>269,1</sup> V. Oreshkin,<sup>269,1</sup> I. Smirnov,<sup>269,1</sup> V. Sulimov,<sup>269,1</sup> L. Uvarov,<sup>269,1</sup> S. Savilov,<sup>269,1</sup> A. Vorobьев,<sup>270,1</sup> Yu. Andreev,<sup>270,1</sup> A. Dermenev,<sup>270,1</sup> S. Gminienko,<sup>270,1</sup> N. Golubev,<sup>270,1</sup> A. Kameyev,<sup>270,1</sup> M. Kirsanov,<sup>270,1</sup> N. Krashnikov,<sup>270,1</sup> A. Pashenkov,<sup>270,1</sup> D. Tilov,<sup>270,1</sup> A. Toropin,<sup>270,1</sup> V. Epishyn,<sup>271,1</sup> V. Gavrilov,<sup>271,1</sup> N. Lychkovskaya,<sup>271,1</sup> V. Popov,<sup>271,1</sup> I. Pozdnyakov,<sup>271,1</sup> G. Safronov,<sup>271,1</sup> A. Spiridonov,<sup>271,1</sup> E. Vlason,<sup>271,1</sup> A. Zhokin,<sup>271,1</sup> V. Andreev,<sup>272,1</sup> M. Azarkin,<sup>272,1</sup> I. Dremin,<sup>272,1</sup> M. Kirakosyan,<sup>272,1</sup> A. Leonidov,<sup>272,1</sup> G. Mesyats,<sup>272,1</sup> S. V. Rusakov,<sup>272,1</sup> A. Vinogradov,<sup>272,1</sup> A. Baskakov,<sup>273,1</sup> A. Belyaev,<sup>273,1</sup> E. Boos,<sup>273,1</sup> V. Bunichev,<sup>273,1</sup> M. Dubinin,<sup>273,1</sup> L. Dudko,<sup>273,1</sup> A. Ershov,<sup>273,1</sup> A. Grishubin,<sup>273,1</sup> V. Klyukhin,<sup>273,1</sup> O. Kodolova,<sup>273,1</sup> I. Likholtin,<sup>273,1</sup> I. Myagkov,<sup>273,1</sup> S. Obraztsov,<sup>273,1</sup> S. Petrushanko,<sup>273,1</sup> V. Savrin,<sup>273,1</sup> I. Azhgirey,<sup>274,1</sup> I. Bayshev,<sup>274,1</sup> S. Bitoukov,<sup>274,1</sup> V. Kachanov,<sup>274,1</sup> A. Kalinin,<sup>274,1</sup> D. Konstantinov,<sup>274,1</sup> V. Krychkine,<sup>274,1</sup> V. Petrov,<sup>274,1</sup> R. Rytin,<sup>274,1</sup> A. Sobol,<sup>274,1</sup> L. Touarchanovich,<sup>274,1</sup> S. Troshin,<sup>274,1</sup> N. Tyurin,<sup>274,1</sup> A. Uzunian,<sup>274,1</sup> A. Volkov,<sup>274,1</sup> P. Adzie,<sup>274,1</sup> M. Ekmekci,<sup>274,1</sup> J. Milosevic,<sup>274,1</sup> V. Rekovic,<sup>274,1</sup> J. Alcaraz Maestre,<sup>276,1</sup> E. Calvo,<sup>276,1</sup> M. Cerrada,<sup>276,1</sup> M. Chamizo Llatas,<sup>276,1</sup> N. Colino,<sup>276,1</sup> B. De La Cruz,<sup>276,1</sup> A. Delgado Peris,<sup>276,1</sup> D. Dominguez Vázquez,<sup>276,1</sup> A. Escalante Del Valle,<sup>276,1</sup> C. Fernandez Bedoya,<sup>276,1</sup> J. P. Fernández Ramos,<sup>276,1</sup> J. Fliz,<sup>276,1</sup> M. C. Fouz,<sup>276,1</sup> P. Garcia-Abla,<sup>276,1</sup> O. González Lopez,<sup>276,1</sup> S. Goy Lopez,<sup>276,1</sup> J. M. Hernández,<sup>276,1</sup> M. I. Josa,<sup>276,1</sup> E. Navarro De Martino,<sup>276,1</sup> P. Pérez-Calero Yzquierdo,<sup>276,1</sup> J. Puerta Pelayo,<sup>276,1</sup> A. Quintario Olmeda,<sup>276,1</sup> I. Redondo,<sup>276,1</sup> L. Romero,<sup>276,1</sup> M. S. Soares,<sup>276,1</sup> C. Albjar,<sup>277,1</sup> J. F. P. Trocóniz,<sup>277,1</sup> M. Missiroli,<sup>277,1</sup> D. Moran,<sup>277,1</sup> H. Brun,<sup>278,1</sup> J. Cuevas,<sup>278,1</sup> J. Fernández Menéndez,<sup>278,1</sup> S. Folgueras,<sup>278,1</sup> I. Gonzalez Caballero,<sup>278,1</sup> E. Palencia Cortezon,<sup>278,1</sup> J. M. Vizan García,<sup>278,1</sup> I. J. Cabrillo,<sup>278,1</sup> A. Calderon,<sup>278,1</sup> J. R. Castilleiras De Saa,<sup>279,1</sup> J. Duarte Campderros,<sup>279,1</sup> M. Fernandez,<sup>279,1</sup> G. Gomez,<sup>279,1</sup> A. Graziano,<sup>279,1</sup> A. Lopez Virtu,<sup>279,1</sup> J. Marco,<sup>279,1</sup> R. Marco,<sup>279,1</sup> C. Martinez Rivero,<sup>279,1</sup> F. J. Munoz Sanchez,<sup>279,1</sup> J. Piedra Gomez,<sup>279,1</sup> T. Rodrigo,<sup>279,1</sup> A. Y. Rodriguez-Marrero,<sup>279,1</sup> A. Ruiz-Jimeno,<sup>279,1</sup> L. Scodellaro,<sup>279,1</sup> I. Vilà,<sup>279,1</sup> R. Vilar Cortabarri,<sup>279,1</sup> D. Abbaneo,<sup>280,1</sup> E. Auffray,<sup>280,1</sup> G. Auzinger,<sup>280,1</sup> M. Bachtis,<sup>280,1</sup> P. Baillon,<sup>280,1</sup> A. H. Ball,<sup>280,1</sup> D. Barney,<sup>280,1</sup> A. Benaglia,<sup>280,1</sup> J. Bensdorff,<sup>280,1</sup> J. F. Benitez,<sup>280,1</sup> G. M. Berruti,<sup>280,1</sup> P. Bloch,<sup>280,1</sup> A. Bocci,<sup>280,1</sup> A. Bonato,<sup>280,1</sup> C. Botti,<sup>280,1</sup> H. Breuval,<sup>280,1</sup> T. Camporesi,<sup>280,1</sup> G. Cerninaria,<sup>280,1</sup> S. Colafranceschi,<sup>280,2</sup> M. D'Alfonso,<sup>280,1</sup> D. d'Enterria,<sup>280,1</sup> A. Dabrowski,<sup>280,1</sup> V. Duponte,<sup>280,1</sup> A. David,<sup>280,1</sup> M. De Gruttola,<sup>280,1</sup> F. De Gui,<sup>280,1</sup> A. De Roeck,<sup>280,1</sup> S. De Visscher,<sup>280,1</sup> E. Di Marco,<sup>280,1</sup> M. Dobson,<sup>280,1</sup> M. Dordevic,<sup>280,1</sup> T. du Pree,<sup>280,1</sup> N. Dupont-Sagorin,<sup>280,1</sup> A. Elliott-Peisert,<sup>280,1</sup> G. Franzoni,<sup>280,1</sup> W. Funk,<sup>280,1</sup> D. Gigi,<sup>280,1</sup> K. Gill,<sup>280,1</sup> D. Giordano,<sup>280,1</sup>

- M. Girone,<sup>280,1</sup> F. Glege,<sup>280,1</sup> R. Guida,<sup>280,1</sup> S. Gundacker,<sup>280,1</sup> M. Guthoff,<sup>280,1</sup> J. Hammer,<sup>280,1</sup> M. Hansen,<sup>280,1</sup> P. Harris,<sup>280,1</sup> J. Hegeman,<sup>280,1</sup> V. Innocente,<sup>280,1</sup> P. Janot,<sup>280,1</sup> H. Kirschennmann,<sup>280,1</sup> K. Kousours,<sup>280,1</sup> J. Krajcicar,<sup>280,1</sup> P. Lecoq,<sup>280,1</sup> C. Lourenco,<sup>280,1</sup> M. T. Lucchini,<sup>280,1</sup> N. Magni,<sup>280,1</sup> L. Malgeri,<sup>280,1</sup> M. Mannelli,<sup>280,1</sup> J. Marrouche,<sup>280,1</sup> A. Martelli,<sup>280,1</sup> L. Masetti,<sup>280,1</sup> F. Meijers,<sup>280,1</sup> S. Mersi,<sup>280,1</sup> E. Meschi,<sup>280,1</sup> F. Moortgat,<sup>280,1</sup> S. Morovic,<sup>280,1</sup> M. Mulders,<sup>280,1</sup> M. V. Nemallapudi,<sup>280,1</sup> H. Neugebauer,<sup>280,1</sup> S. Orfanelli,<sup>280,1</sup> L. Orsini,<sup>280,1</sup> L. Pape,<sup>280,1</sup> E. Perez,<sup>280,1</sup> A. Petrelli,<sup>280,1</sup> G. Petrucciani,<sup>280,1</sup> A. Pfeiffer,<sup>280,1</sup> D. Piparo,<sup>280,1</sup> A. Racz,<sup>280,1</sup> G. Rolandi,<sup>280,1</sup> M. Rovere,<sup>280,1</sup> M. Ruan,<sup>280,1</sup> H. Sakulin,<sup>280,1</sup> C. Schäfer,<sup>280,1</sup> C. Schwick,<sup>280,1</sup> A. Sharma,<sup>280,1</sup> P. Silva,<sup>280,1</sup> M. Simon,<sup>280,1</sup> P. Spighi,<sup>280,1</sup> D. Spiga,<sup>280,1</sup> J. Stegemann,<sup>280,1</sup> B. Stieger,<sup>280,1</sup> M. Stoye,<sup>280,1</sup> Y. Takahashi,<sup>280,1</sup> D. Treille,<sup>280,1</sup> A. Tsirou,<sup>280,1</sup> G. I. Veres,<sup>280,1</sup> N. Wardle,<sup>280,1</sup> H. K. Wöhri,<sup>280,1</sup> A. Zagozdzinska,<sup>280,1</sup> W. D. Zeuner,<sup>280,1</sup> W. Bertl,<sup>280,1</sup> K. Deiters,<sup>280,1</sup> W. Erdmann,<sup>280,1</sup> Horisberger,<sup>280,1</sup> H. C. Kaestli,<sup>280,1</sup> D. Kotlinski,<sup>280,1</sup> U. Langenegg,<sup>280,1</sup> T. Rohr,<sup>280,1</sup> F. Bachmaier,<sup>280,1</sup> L. Biati,<sup>280,1</sup> L. Bianchini,<sup>280,1</sup> M. A. Buchmann,<sup>280,1</sup> B. Casal,<sup>280,1</sup> G. Dissertori,<sup>280,1</sup> M. Dittmar,<sup>280,1</sup> M. Donega,<sup>280,1</sup> M. Dünnser,<sup>280,1</sup> P. Eller,<sup>280,1</sup> C. Grab,<sup>280,1</sup> C. Heidegger,<sup>280,1</sup> D. Hits,<sup>280,1</sup> J. Hoss,<sup>280,1</sup> G. Kasieczka,<sup>280,1</sup> W. Lustermann,<sup>280,1</sup> B. Mangano,<sup>280,1</sup> A. C. Marini,<sup>280,1</sup> M. Marionneau,<sup>280,1</sup> P. Martinez Ruiz del Arbol,<sup>280,1</sup> B. Masciovecchio,<sup>280,1</sup> D. Meister,<sup>280,1</sup> P. Musella,<sup>280,1</sup> F. Nessi-Tedaldi,<sup>280,1</sup> F. Pandolfi,<sup>280,1</sup> J. Pata,<sup>280,1</sup> F. Pauss,<sup>280,1</sup> L. Perrozzi,<sup>280,1</sup> M. Peruzzo,<sup>280,1</sup> M. Quittman,<sup>280,1</sup> M. Rossini,<sup>280,1</sup> A. Starodumov,<sup>280,1</sup> M. Tahakoshi,<sup>280,1</sup> V. R. Tavolari,<sup>280,1</sup> K. Theofilatos,<sup>280,1</sup> R. Wallny,<sup>280,1</sup> H. A. Weber,<sup>280,1</sup> T. K. Arrestand,<sup>280,1</sup> C. Amsler,<sup>280,1</sup> M. F. Canelli,<sup>280,1</sup> V. Chiochia,<sup>280,1</sup> A. De Rosa,<sup>280,1</sup> C. Galloni,<sup>280,1</sup> A. Hinzmam,<sup>280,1</sup> T. Hreus,<sup>280,1</sup> B. Kilminster,<sup>280,1</sup> C. Lange,<sup>280,1</sup> J. Ngaduba,<sup>280,1</sup> D. Pinna,<sup>280,1</sup> T. Hoban,<sup>280,1</sup> F. J. Ronca,<sup>280,1</sup> D. Salemi,<sup>280,1</sup> S. Taromi,<sup>280,1</sup> Y. Yang,<sup>280,1</sup> M. Cardaci,<sup>280,1</sup> K. H. Chen,<sup>280,1</sup> T. H. Doan,<sup>280,1</sup> C. Ferro,<sup>280,1</sup> M. Konyushikhin,<sup>280,1</sup> C. M. Ku,<sup>280,1</sup> W. Lin,<sup>280,1</sup> Y. J. Lu,<sup>280,1</sup> R. Volpe,<sup>280,1</sup> S. S. Yu,<sup>280,1</sup> P. Chang,<sup>280,1</sup> Y. H. Chang,<sup>280,1</sup> Y. W. Chang,<sup>280,1</sup> Y. Chao,<sup>280,1</sup> K. Chen,<sup>280,1</sup> P. H. Chen,<sup>280,1</sup> C. Dietz,<sup>280,1</sup> F. Fiori,<sup>280,1</sup> U. Grunbler,<sup>280,1</sup> W.-S. Hou,<sup>280,1</sup> Y. Hsiung,<sup>280,1</sup> Y. F. Liu,<sup>280,1</sup> R.-S. Lu,<sup>280,1</sup> M. Mifiana Moya,<sup>280,1</sup> E. Petrucco,<sup>280,1</sup> J. F. Tsai,<sup>280,1</sup> Y. M. Tzeng,<sup>280,1</sup> R. Wilken,<sup>280,1</sup> B. Asavapibhop,<sup>280,1</sup> K. Kovitavong,<sup>280,1</sup> G. Singh,<sup>280,1</sup> N. Sriwanobhas,<sup>280,1</sup> N. Suwonjandee,<sup>280,1</sup> A. Adiguzel,<sup>280,1</sup> S. Cerci,<sup>280,1</sup> C. Dozen,<sup>280,1</sup> S. Girgis,<sup>280,1</sup> G. Golokub,<sup>280,1</sup> Y. Guler,<sup>280,1</sup> E. Gurpinar,<sup>280,1</sup> I. Hos,<sup>280,1</sup> E. E. Kangal,<sup>280,1</sup> A. Kayis Topaksu,<sup>280,1</sup> G. Onengu,<sup>280,1</sup> K. Ozdemir,<sup>280,1</sup> S. Ozturk,<sup>280,1</sup> B. Tali,<sup>280,1</sup> H. Topakli,<sup>280,1</sup> M. Vergili,<sup>280,1</sup> C. Zorbuluc,<sup>280,1</sup> I. V. Akin,<sup>280,1</sup> B. Bilin,<sup>280,1</sup> S. Bilmis,<sup>280,1</sup> B. Isildak,<sup>280,1</sup> G. Karapinar,<sup>280,1</sup> U. E. Surat,<sup>280,1</sup> M. Yalimzac,<sup>280,1</sup> M. Zeyrek,<sup>280,1</sup> E. A. Albayrak,<sup>280,1</sup> E. Gülmek,<sup>280,1</sup> M. Kaya,<sup>280,1</sup> O. Kaya,<sup>280,1</sup> T. Yetkin,<sup>280,1</sup> K. Cankocak,<sup>280,1</sup> S. Sen,<sup>280,1</sup> F. I. Vardarli,<sup>280,1</sup> B. Grynyov,<sup>280,1</sup> L. Levchuk,<sup>280,1</sup> P. Sorokin,<sup>280,1</sup> R. Aggleton,<sup>280,1</sup> F. Ball,<sup>280,1</sup> L. Beck,<sup>280,1</sup> J. J. Brooke,<sup>280,1</sup> E. Clement,<sup>280,1</sup> D. Cussans,<sup>280,1</sup> H. Flacher,<sup>280,1</sup> J. Goldstein,<sup>280,1</sup> M. Grimes,<sup>280,1</sup> G. P. Heath,<sup>280,1</sup> H. F. Heath,<sup>280,1</sup> A. Poll,<sup>280,1</sup> T. Sakuma,<sup>280,1</sup> C. Lucas,<sup>280,1</sup> Z. Meng,<sup>280,1</sup> D. M. Newbold,<sup>280,1</sup> S. Paramesvaran,<sup>280,1</sup> A. P. Poll,<sup>280,1</sup> T. Sakuma,<sup>280,1</sup> S. Seif El Nasr-storey,<sup>280,1</sup> S. Senkin,<sup>280,1</sup> D. Smith,<sup>280,1</sup> V. J. Smith,<sup>280,1</sup> K. W. Bell,<sup>280,1</sup> A. Belyaev,<sup>280,1</sup> C. Brew,<sup>280,1</sup> R. M. Brown,<sup>280,1</sup> D. J. A. Cockrel,<sup>280,1</sup> J. A. Coughlan,<sup>280,1</sup> K. Harder,<sup>280,1</sup> S. Harper,<sup>280,1</sup> E. Olaiya,<sup>280,1</sup> D. Petly,<sup>280,1</sup> C. H. Shepherd-Themistocleous,<sup>280,1</sup> A. Thea,<sup>280,1</sup> I. R. Tomalin,<sup>280,1</sup> T. Williams,<sup>280,1</sup> W. J. Womersley,<sup>280,1</sup> S. D. Worm,<sup>280,1</sup> M. Barber,<sup>280,1</sup> R. Bainbridge,<sup>280,1</sup> O. Buchmuller,<sup>280,1</sup> A. Bundock,<sup>280,1</sup> D. Burton,<sup>280,1</sup> S. Casasso,<sup>280,1</sup> M. Citron,<sup>280,1</sup> D. Colling,<sup>280,1</sup> L. Corpe,<sup>280,1</sup> N. Cripps,<sup>280,1</sup> P. Dauncey,<sup>280,1</sup> G. Davies,<sup>280,1</sup> A. De Wit,<sup>280,1</sup> M. Delta Negra,<sup>280,1</sup> P. Dunne,<sup>280,1</sup> A. Elwood,<sup>280,1</sup> W. Ferguson,<sup>280,1</sup> J. Fulcher,<sup>280,1</sup> D. Futyan,<sup>280,1</sup> G. Hall,<sup>280,1</sup> G. Iles,<sup>280,1</sup> G. Kurapostoli,<sup>280,1</sup> M. Kenzie,<sup>280,1</sup> R. Lane,<sup>280,1</sup> R. Lucas,<sup>280,1</sup> L. Lyons,<sup>280,1</sup> A.-M. Magnan,<sup>280,1</sup> S. Malik,<sup>280,1</sup> J. Nash,<sup>280,1</sup> A. Nikitenko,<sup>280,1</sup> J. Pela,<sup>280,1</sup> M. Pesaresi,<sup>280,1</sup> K. Petridis,<sup>280,1</sup> D. M. Raymond,<sup>280,1</sup> A. Richards,<sup>280,1</sup> A. Rose,<sup>280,1</sup> C. Seez,<sup>280,1</sup> P. Sharp,<sup>280,1</sup> A. Tapper,<sup>280,1</sup> K. Uchida,<sup>280,1</sup> M. Vazquez Acosta,<sup>280,1</sup> T. Verdec,<sup>280,1</sup> S. C. Zenz,<sup>280,1</sup> J. E. Cole,<sup>280,1</sup> R. Hobson,<sup>280,1</sup> A. Khan,<sup>280,1</sup> P. Kyberd,<sup>280,1</sup> D. Leggett,<sup>280,1</sup> D. Leslie,<sup>280,1</sup> I. D. Reid,<sup>280,1</sup> P. Symonds,<sup>280,1</sup> L. Teodorescu,<sup>280,1</sup> M. Turner,<sup>280,1</sup> A. Borzou,<sup>280,1</sup> J. Dittmar,<sup>280,1</sup> K. Hatakeyama,<sup>280,1</sup> A. Kasmi,<sup>280,1</sup> H. Liu,<sup>280,1</sup> N. Pastika,<sup>280,1</sup> O. Charaf,<sup>280,1</sup> S. J. Cooper,<sup>280,1</sup> C. H. Henderson,<sup>280,1</sup> P. Rumerio,<sup>280,1</sup> A. Avetisyan,<sup>280,1</sup> T. Bose,<sup>280,1</sup> C. Fantasia,<sup>280,1</sup> D. Gaster,<sup>280,1</sup> P. Lawson,<sup>280,1</sup> D. Rankin,<sup>280,1</sup> C. Richardson,<sup>280,1</sup> J. Rohl,<sup>280,1</sup> J. St. John,<sup>280,1</sup> L. Sulak,<sup>280,1</sup> D. Zou,<sup>280,1</sup> J. Alimenta,<sup>280,1</sup> E. Berry,<sup>280,1</sup> S. Bhattacharya,<sup>280,1</sup> D. Cutts,<sup>280,1</sup> N. Dhingra,<sup>280,1</sup> A. Ferapontov,<sup>280,1</sup> A. Garabedian,<sup>280,1</sup> U. Heintz,<sup>280,1</sup> E. Laird,<sup>280,1</sup> G. Landsberg,<sup>280,1</sup> Z. Mao,<sup>280,1</sup> M. Narain,<sup>280,1</sup> S. Sagiv,<sup>280,1</sup> T. Senthuprasadar,<sup>280,1</sup> R. Breedon,<sup>280,1</sup> G. Breto,<sup>280,1</sup> M. Calderon De La Barca Sanchez,<sup>280,1</sup> S. Chauhan,<sup>280,1</sup> M. Chertok,<sup>280,1</sup> J. Conway,<sup>280,1</sup> R. Conway,<sup>280,1</sup> P. T. Cox,<sup>280,1</sup> R. Erbacher,<sup>280,1</sup> M. Gardner,<sup>280,1</sup> W. Ko,<sup>280,1</sup> R. Lander,<sup>280,1</sup> M. Mulhearn,<sup>280,1</sup> D. Pellett,<sup>280,1</sup> J. Pilot,<sup>280,1</sup> F. Ricci-Tam,<sup>280,1</sup> S. Shalhout,<sup>280,1</sup> J. Smith,<sup>280,1</sup> M. Squires,<sup>280,1</sup> D. Stolp,<sup>280,1</sup> M. Tripathi,<sup>280,1</sup>

- S. Wilbur,<sup>301,2</sup> R. Yohay,<sup>301,2</sup> R. Cousins,<sup>302,1</sup> P. Everaerts,<sup>302,1</sup> C. Farrell,<sup>302,2</sup> J. Hauser,<sup>302,2</sup> M. Ignatenko,<sup>302,2</sup>  
 G. Rakness,<sup>302,2</sup> D. Saltzberg,<sup>302,2</sup> E. Takasugi,<sup>302,2</sup> V. Valusek,<sup>302,2</sup> M. Weber,<sup>302,2</sup> K. Burt,<sup>303,2</sup> R. Clare,<sup>303,2</sup> J. Ellison,<sup>303,2</sup>  
 J. W. Gary,<sup>303,2</sup> G. Hansson,<sup>303,2</sup> J. Heilmann,<sup>303,2</sup> M. Iovva Rikova,<sup>303,2</sup> P. Janard,<sup>303,2</sup> E. Kennedy,<sup>303,2</sup> F. Lacroix,<sup>303,2</sup>  
 O. R. Long,<sup>303,2</sup> A. Luthra,<sup>303,2</sup> M. Malberti,<sup>303,2</sup> M. Olmedo Negrete,<sup>303,2</sup> A. Shrimivas,<sup>303,2</sup> S. Sumowidagdo,<sup>303,2</sup>  
 H. Wei,<sup>303,2</sup> S. Wimpenny,<sup>303,2</sup> J. G. Branson,<sup>304,2</sup> G. B. Cerati,<sup>304,2</sup> S. Cittolin,<sup>304,2</sup> R. T. D'Agnolet,<sup>304,2</sup> A. Holzner,<sup>304,2</sup>  
 R. Kelley,<sup>304,2</sup> D. Klein,<sup>304,2</sup> J. Letts,<sup>304,2</sup> I. Macneill,<sup>304,2</sup> D. Olivito,<sup>304,2</sup> S. Padhi,<sup>304,2</sup> M. Pieri,<sup>304,2</sup> M. Sani,<sup>304,2</sup>  
 V. Sharma,<sup>304,2</sup> S. Simon,<sup>304,2</sup> M. Tadel,<sup>304,2</sup> Y. Tu,<sup>304,2</sup> A. Vartak,<sup>304,2</sup> S. Wasserbaech,<sup>304,2</sup> C. Welke,<sup>304,2</sup>  
 F. Würthwein,<sup>304,2</sup> A. Yagil,<sup>304,2</sup> G. Zevi Delta Porta,<sup>304,2</sup> D. Barge,<sup>305,2</sup> J. Bradmiller-Feld,<sup>305,2</sup> C. Campagnari,<sup>305,2</sup>  
 A. Dishaw,<sup>305,2</sup> V. Dutta,<sup>305,2</sup> K. Flowers,<sup>305,2</sup> M. Franco Sevilla,<sup>305,2</sup> P. Geffert,<sup>305,2</sup> C. George,<sup>305,2</sup> F. Golf,<sup>305,2</sup>  
 L. Gouskos,<sup>305,2</sup> J. Gran,<sup>305,2</sup> J. Incandela,<sup>305,2</sup> C. Justus,<sup>305,2</sup> N. Mccoll,<sup>305,2</sup> S. D. Mullin,<sup>305,2</sup> J. Richman,<sup>305,2</sup> D. Stuart,<sup>305,2</sup>  
 I. Suarez,<sup>305,2</sup> W. To,<sup>305,2</sup> C. West,<sup>305,2</sup> J. Yoo,<sup>305,2</sup> D. Anderson,<sup>306,2</sup> A. Apresyan,<sup>306,2</sup> A. Bornheim,<sup>306,2</sup> J. Bunn,<sup>306,2</sup>  
 Y. Chen,<sup>306,2</sup> J. Duarte,<sup>306,2</sup> A. Mott,<sup>306,2</sup> H. B. Newman,<sup>306,2</sup> C. Penna,<sup>306,2</sup> M. Pierini,<sup>306,2</sup> M. Spiropulu,<sup>306,2</sup>  
 J. R. Vlimant,<sup>307,2</sup> S. Xie,<sup>306,2</sup> R. Y. Zhu,<sup>306,2</sup> V. Azzolini,<sup>307,2</sup> A. Calamia,<sup>307,2</sup> B. Carlson,<sup>307,2</sup> T. Ferguson,<sup>307,2</sup>  
 Y. Iiyama,<sup>307,2</sup> P. Xenitidis,<sup>307,2</sup> J. Russ,<sup>307,2</sup> M. Sun,<sup>307,2</sup> H. Vogel,<sup>307,2</sup> J. P. Cumalat,<sup>308,2</sup> W. T. Ford,<sup>308,2</sup>  
 A. Gaz,<sup>308,2</sup> F. Jensen,<sup>308,2</sup> A. Johnson,<sup>308,2</sup> M. Krohn,<sup>308,2</sup> T. Mulholland,<sup>308,2</sup> U. Nauenberg,<sup>308,2</sup> J. G. Smith,<sup>308,2</sup>  
 K. Stenson,<sup>308,2</sup> S. R. Wagner,<sup>308,2</sup> J. Alexander,<sup>309,2</sup> A. Chatterjee,<sup>309,2</sup> J. Chaves,<sup>309,2</sup> J. Chu,<sup>309,2</sup> S. Dittmer,<sup>309,2</sup>  
 N. Eggert,<sup>309,2</sup> N. Mirman,<sup>309,2</sup> G. Nicolas Kaufman,<sup>309,2</sup> J. R. Patterson,<sup>309,2</sup> A. Rinkevicius,<sup>309,2</sup> A. Ryd,<sup>309,2</sup>  
 L. Skinnari,<sup>309,2</sup> L. Sofoff,<sup>309,2</sup> W. Sun,<sup>309,2</sup> S. M. Tan,<sup>309,2</sup> W. D. Teo,<sup>309,2</sup> J. Thom,<sup>309,2</sup> J. Thompson,<sup>309,2</sup> J. Tucker,<sup>309,2</sup>  
 Y. Weng,<sup>309,2</sup> P. Watiach,<sup>309,2</sup> S. Abdulla,<sup>310,2</sup> M. Albrow,<sup>310,2</sup> J. Anderson,<sup>310,2</sup> G. Apollinaris,<sup>310,2</sup> L. A. T. Bauerdick,<sup>310,2</sup>  
 A. Beretvas,<sup>310,2</sup> J. Berryhill,<sup>310,2</sup> P. C. Bhattacharya,<sup>310,2</sup> G. Bella,<sup>310,2</sup> K. Burkett,<sup>310,2</sup> J. N. Butler,<sup>310,2</sup> H. W. K. Cheung,<sup>310,2</sup>  
 F. Cilebana,<sup>310,2</sup> S. Chang,<sup>310,2</sup> V. D. Elvira,<sup>310,2</sup> I. Fisk,<sup>310,2</sup> J. Freeman,<sup>310,2</sup> E. Gottschalk,<sup>310,2</sup> L. Gray,<sup>310,2</sup> D. Green,<sup>310,2</sup>  
 S. Grünendahl,<sup>310,2</sup> O. Gutsche,<sup>310,2</sup> J. Hanlon,<sup>310,2</sup> D. Hare,<sup>310,2</sup> R. M. Harris,<sup>310,2</sup> J. Hirschauer,<sup>310,2</sup> B. Hooberman,<sup>310,2</sup>  
 Z. Hu,<sup>310,2</sup> S. Jindariani,<sup>310,2</sup> M. Johnson,<sup>310,2</sup> U. Joshi,<sup>310,2</sup> A. W. Jung,<sup>310,2</sup> B. Klima,<sup>310,2</sup> B. Kreis,<sup>310,2</sup> S. Kwan,<sup>310,2</sup>  
 S. Lammel,<sup>310,2</sup> J. Linacre,<sup>310,2</sup> D. Lincoln,<sup>310,2</sup> T. Liu,<sup>310,2</sup> R. Lopes De Sa,<sup>310,2</sup> J. Lykken,<sup>310,2</sup>  
 K. Maeshima,<sup>310,2</sup> J. M. Marrapino,<sup>310,2</sup> V. I. Martinez,<sup>310,2</sup> Outschorn,<sup>310,2</sup> S. Maruyama,<sup>310,2</sup> D. Mason,<sup>310,2</sup> P. McBride,<sup>310,2</sup>  
 P. Merkel,<sup>310,2</sup> K. Mishra,<sup>310,2</sup> S. Mirena,<sup>310,2</sup> S. Nahm,<sup>310,2</sup> C. Newman-Holmes,<sup>310,2</sup> V. O'Dell,<sup>310,2</sup> O. Prokofyev,<sup>310,2</sup>  
 E. Sexton-Kennedy,<sup>310,2</sup> A. Soha,<sup>310,2</sup> W. J. Spalding,<sup>310,2</sup> L. Spiegel,<sup>310,2</sup> L. Taylor,<sup>310,2</sup> S. Tkaczyk,<sup>310,2</sup> N. V. Tran,<sup>310,2</sup>  
 L. Uplegger,<sup>310,2</sup> E. W. Vaandering,<sup>310,2</sup> C. Vernieri,<sup>310,2</sup> M. Verzocchi,<sup>310,2</sup> R. Vidal,<sup>310,2</sup> A. Whitehead,<sup>310,2</sup> F. Yang,<sup>310,2</sup>  
 H. Yin,<sup>310,2</sup> D. Acosta,<sup>310,2</sup> P. Avery,<sup>311,2</sup> P. Bortignon,<sup>311,2</sup> D. Bourikis,<sup>311,2</sup> A. Carnes,<sup>311,2</sup> M. Carver,<sup>311,2</sup> D. Curry,<sup>311,2</sup>  
 S. Das,<sup>311,2</sup> G. P. Di Giovanni,<sup>311,2</sup> R. D. Field,<sup>311,2</sup> P. Fisher,<sup>311,2</sup> I. K. Furic,<sup>311,2</sup> J. Hugon,<sup>311,2</sup> J. Konigsberg,<sup>311,2</sup>  
 A. Korytov,<sup>311,2</sup> J. F. Low,<sup>311,2</sup> P. Ma,<sup>311,2</sup> K. Matchev,<sup>311,2</sup> H. Mei,<sup>311,2</sup> P. Milennovic,<sup>311,2</sup> G. Mitselmanker,<sup>311,2</sup>  
 L. Muniz,<sup>311,2</sup> D. Rank,<sup>311,2</sup> L. Shchukina,<sup>311,2</sup> M. Martinez,<sup>311,2</sup> M. Snowball,<sup>311,2</sup> D. Sperka,<sup>311,2</sup> S. J. Wang,<sup>311,2</sup> J. Yeltos,<sup>311,2</sup>  
 S. Hewamanage,<sup>311,2</sup> S. Linn,<sup>311,2</sup> P. Markowitz,<sup>311,2</sup> G. Martinez,<sup>311,2</sup> J. L. Rodriguez,<sup>311,2</sup> A. Ackert,<sup>311,2</sup> R. Adams,<sup>311,2</sup>  
 T. Adams,<sup>311,2</sup> A. Askew,<sup>311,2</sup> J. Bochenek,<sup>311,2</sup> B. Diamond,<sup>311,2</sup> J. Haas,<sup>311,2</sup> S. Hapogian,<sup>311,2</sup> V. Hapogian,<sup>311,2</sup>  
 K. F. Johnson,<sup>311,2</sup> A. Khatiwada,<sup>311,2</sup> H. Prosper,<sup>311,2</sup> V. Veeraraghavan,<sup>311,2</sup> M. Weinberg,<sup>311,2</sup> V. Bhopatkar,<sup>311,2</sup>  
 M. Hohlmann,<sup>311,2</sup> H. Kalakshety,<sup>311,2</sup> D. Mareska-paleck,<sup>311,2</sup> T. Roy,<sup>311,2</sup> F. Yumiceva,<sup>311,2</sup> M. R. Adams,<sup>311,2</sup>  
 A. Gapanavich,<sup>311,2</sup> D. Berry,<sup>311,2</sup> R. R. Betts,<sup>311,2</sup> I. Bucimicait,<sup>311,2</sup> R. Cavannaugh,<sup>311,2</sup> O. Evdokimov,<sup>311,2</sup>  
 L. Gauthier,<sup>311,2</sup> C. E. Gerber,<sup>311,2</sup> D. J. Hofman,<sup>311,2</sup> P. Kurt,<sup>311,2</sup> C. O'Brien,<sup>311,2</sup> D. J. Sandoval Gonzalez,<sup>311,2</sup>  
 C. Silkworth,<sup>311,2</sup> P. Turner,<sup>311,2</sup> N. Varelas,<sup>311,2</sup> Z. Wu,<sup>311,2</sup> M. Zakaria,<sup>311,2</sup> B. Bilki,<sup>311,2</sup> W. Clara,<sup>311,2</sup> K. Dilisiz,<sup>311,2</sup>  
 S. Durgut,<sup>311,2</sup> P. R. Gundrajuja,<sup>311,2</sup> M. Haytmiradov,<sup>311,2</sup> V. Khristensen,<sup>311,2</sup> J.-P. Merlo,<sup>311,2</sup> H. Memmerkaya,<sup>311,2</sup>  
 A. Mestvirishvili,<sup>311,2</sup> J. Moeller,<sup>311,2</sup> J. Nachtman,<sup>311,2</sup> H. Ogul,<sup>311,2</sup> Y. Onel,<sup>311,2</sup> F. Ozok,<sup>311,2</sup> A. Penzo,<sup>311,2</sup>  
 C. Snyder,<sup>311,2</sup> P. Tan,<sup>311,2</sup> E. Tiras,<sup>311,2</sup> J. Wetzel,<sup>311,2</sup> K. Yu,<sup>311,2</sup> I. Anderson,<sup>311,2</sup> B. A. Barnett,<sup>311,2</sup> B. Blumenfeld,<sup>311,2</sup>  
 D. Fehling,<sup>311,2</sup> L. Feng,<sup>311,2</sup> A. V. Grishan,<sup>311,2</sup> P. Makrisovic,<sup>311,2</sup> C. Martin,<sup>311,2</sup> K. Nash,<sup>311,2</sup> M. Osherson,<sup>311,2</sup>  
 M. Swartz,<sup>311,2</sup> M. Xiao,<sup>311,2</sup> Y. Xin,<sup>311,2</sup> P. Baringer,<sup>311,2</sup> A. Bean,<sup>311,2</sup> G. Benelli,<sup>311,2</sup> C. Bruner,<sup>311,2</sup> J. Gray,<sup>311,2</sup>  
 R. P. Kenny III,<sup>311,2</sup> D. Majumder,<sup>311,2</sup> M. Malek,<sup>311,2</sup> M. Murray,<sup>311,2</sup> D. Noonan,<sup>311,2</sup> S. Sanders,<sup>311,2</sup> R. Stringer,<sup>311,2</sup>  
 Q. Wang,<sup>311,2</sup> J. S. Wood,<sup>311,2</sup> I. Chakaberia,<sup>311,2</sup> A. Ivanov,<sup>311,2</sup> K. Kaadze,<sup>311,2</sup> S. Khalil,<sup>311,2</sup> M. Makouski,<sup>311,2</sup>  
 Y. Maravin,<sup>311,2</sup> L. K. Saini,<sup>311,2</sup> N. Skhirtladze,<sup>311,2</sup> I. Svintradze,<sup>311,2</sup> S. Toda,<sup>311,2</sup> D. Lange,<sup>311,2</sup> F. Rebassoo,<sup>311,2</sup>  
 D. Wright,<sup>311,2</sup> C. Anelli,<sup>311,2</sup> A. Baden,<sup>311,2</sup> O. Baron,<sup>311,2</sup> A. Belloni,<sup>311,2</sup> B. Calvert,<sup>311,2</sup> S. C. Eno,<sup>311,2</sup> C. Ferraioli,<sup>311,2</sup>  
 J. A. Gomez,<sup>311,2</sup> N. J. Hadley,<sup>311,2</sup> S. Jabeen,<sup>311,2</sup> R. G. Kellogg,<sup>311,2</sup> T. Kolberg,<sup>311,2</sup> J. Kunkle,<sup>311,2</sup> Y. Lu,<sup>311,2</sup>

- A. C. Mignerey,<sup>321,1</sup> K. Pedro,<sup>321,1</sup> Y. H. Shin,<sup>321,1</sup> A. Skuja,<sup>321,1</sup> M. B. Tonjes,<sup>321,1</sup> S. C. Tonwar,<sup>321,1</sup> A. Apyan,<sup>322,1</sup> R. Barberi,<sup>322,1</sup> A. Baty,<sup>322,1</sup> K. Bierwagen,<sup>322,1</sup> S. Brandt,<sup>322,1</sup> W. Buszka,<sup>322,1</sup> I. A. Cali,<sup>322,1</sup> L. Di Matteo,<sup>322,1</sup> G. Gomez Ceballos,<sup>322,1</sup> M. Goncharov,<sup>322,1</sup> D. Gulhan,<sup>322,1</sup> G. M. Innocenti,<sup>322,1</sup> M. Klute,<sup>322,1</sup> D. Kovalsky,<sup>322,1</sup> Y. S. Lai,<sup>322,1</sup> Y.-J. Lee,<sup>322,1</sup> A. Levin,<sup>322,1</sup> P. D. Luckey,<sup>322,1</sup> C. Mcginn,<sup>322,1</sup> X. Niu,<sup>322,1</sup> C. Paus,<sup>322,1</sup> D. Ralph,<sup>322,1</sup> C. Roland,<sup>322,1</sup> G. Roland,<sup>322,1</sup> G. S. F. Stephens,<sup>322,1</sup> K. Sumorok,<sup>322,1</sup> M. Varma,<sup>322,1</sup> D. Velicanu,<sup>322,1</sup> J. Veverka,<sup>322,1</sup> J. Wang,<sup>322,1</sup> T. W. Wang,<sup>322,1</sup> B. Wyslouch,<sup>322,1</sup> M. Yang,<sup>322,1</sup> V. Zhukova,<sup>322,1</sup> B. Dahmes,<sup>323,1</sup> A. Finkel,<sup>323,1</sup> A. Gude,<sup>323,1</sup> P. Hansen,<sup>323,1</sup> S. Kalafut,<sup>323,1</sup> S. C. Kao,<sup>323,1</sup> K. Klapoetke,<sup>323,1</sup> Y. Kubota,<sup>323,1</sup> Z. Lesko,<sup>323,1</sup> J. Mans,<sup>323,1</sup> S. Nourbakhsh,<sup>323,1</sup> N. Rückstuhl,<sup>323,1</sup> R. Rusack,<sup>323,1</sup> N. Tambe,<sup>323,1</sup> J. Turkevitch,<sup>323,1</sup> J. G. Acosta,<sup>324,1</sup> S. Oliveros,<sup>324,1</sup> E. Avdeeva,<sup>325,1</sup> K. Bloom,<sup>325,1</sup> S. Bose,<sup>325,1</sup> D. R. Claes,<sup>325,1</sup> A. Dominguez,<sup>325,1</sup> C. Fangmeier,<sup>325,1</sup> R. Gonzalez Suarez,<sup>325,1</sup> K. Kamaleddin,<sup>325,1</sup> J. Keller,<sup>325,1</sup> D. Knowlton,<sup>325,1</sup> I. Kravchenko,<sup>325,1</sup> J. Lazo-Flores,<sup>325,1</sup> F. Meier,<sup>325,1</sup> J. Monroe,<sup>325,1</sup> F. Ratnikow,<sup>326,1</sup> J. E. Siado,<sup>326,1</sup> G. R. Snow,<sup>326,1</sup> M. Alyari,<sup>326,1</sup> J. Dolen,<sup>326,1</sup> J. George,<sup>326,1</sup> A. Godshalk,<sup>326,1</sup> I. Iashvili,<sup>326,1</sup> J. Kaisen,<sup>326,1</sup> A. Kharchilava,<sup>326,1</sup> A. Kumar,<sup>326,1</sup> S. Rappoccio,<sup>326,1</sup> G. Alversen,<sup>327,1</sup> E. Barbeis,<sup>327,1</sup> D. Baumgartel,<sup>327,1</sup> M. Chasco,<sup>327,1</sup> A. Hortingtham,<sup>327,1</sup> A. Massironi,<sup>327,1</sup> D. M. Morse,<sup>327,1</sup> D. Nash,<sup>327,1</sup> T. Orimoto,<sup>327,1</sup> R. Teixeira De Lima,<sup>327,1</sup> D. Trocino,<sup>327,1</sup> R.-J. Wang,<sup>327,1</sup> D. Wood,<sup>327,1</sup> J. Zhang,<sup>327,1</sup> K. A. Hahn,<sup>328,1</sup> A. Kubik,<sup>328,1</sup> N. Mucia,<sup>328,1</sup> N. Odell,<sup>328,1</sup> B. Pollack,<sup>328,1</sup> A. Poznyakov,<sup>328,1</sup> M. Schmitt,<sup>328,1</sup> S. Stoyneva,<sup>328,1</sup> K. Sung,<sup>328,1</sup> M. Trovato,<sup>328,1</sup> M. Velasco,<sup>328,1</sup> S. Won,<sup>328,1</sup> A. Brinkerhoff,<sup>329,1</sup> N. Dev,<sup>329,1</sup> M. Hildreth,<sup>329,1</sup> C. Jessop,<sup>329,1</sup> D. J. Karmgard,<sup>329,1</sup> N. Kellams,<sup>329,1</sup> K. Lamont,<sup>329,1</sup> S. Lynch,<sup>329,1</sup> N. Marinelli,<sup>329,1</sup> F. Meng,<sup>329,1</sup> C. Mueller,<sup>329,1</sup> Y. Musienko,<sup>329,1</sup> T. Pearson,<sup>329,1</sup> M. Planer,<sup>329,1</sup> R. Ruchti,<sup>329,1</sup> S. Smith,<sup>329,1</sup> N. Valla,<sup>329,1</sup> M. Wayne,<sup>329,1</sup> M. Wolf,<sup>329,1</sup> A. Woodard,<sup>330,1</sup> L. Antonelli,<sup>330,1</sup> J. Brinson,<sup>330,1</sup> B. Bylsma,<sup>330,1</sup> L. S. Durkin,<sup>330,1</sup> S. Flowers,<sup>330,1</sup> A. Hart,<sup>330,1</sup> C. Hill,<sup>330,1</sup> R. Hughes,<sup>330,1</sup> K. Kotov,<sup>330,1</sup> T. Y. Liang,<sup>330,1</sup> B. Liu,<sup>330,1</sup> W. Luo,<sup>330,1</sup> D. Puigh,<sup>330,1</sup> M. Rodenburg,<sup>330,1</sup> B. L. Winer,<sup>330,1</sup> H. W. Wilson,<sup>330,1</sup> O. Driga,<sup>331,1</sup> P. Elmer,<sup>331,1</sup> J. Hardenbrook,<sup>331,1</sup> P. Hebdon,<sup>331,1</sup> S. A. Koay,<sup>331,1</sup> P. Lujan,<sup>331,1</sup> D. Marlow,<sup>331,1</sup> T. Medvedeva,<sup>331,1</sup> M. Mooney,<sup>331,1</sup> J. Olsen,<sup>331,1</sup> C. Palmer,<sup>331,1</sup> P. Piroue,<sup>331,1</sup> X. Quan,<sup>331,1</sup> H. Saka,<sup>331,1</sup> D. Stickland,<sup>331,1</sup> C. Tully,<sup>331,1</sup> J. S. Werner,<sup>331,1</sup> A. Zuranski,<sup>331,1</sup> V. E. Barnes,<sup>332,1</sup> D. Benedetti,<sup>332,1</sup> D. Bortoletto,<sup>332,1</sup> L. Gutay,<sup>332,1</sup> K. Jha,<sup>332,1</sup> M. Jones,<sup>332,1</sup> K. Jung,<sup>332,1</sup> M. Kress,<sup>332,1</sup> N. Leonardo,<sup>332,1</sup> D. H. Miller,<sup>332,1</sup> N. Neumeister,<sup>332,1</sup> F. Primavera,<sup>332,1</sup> B. C. Radburn-Smith,<sup>332,1</sup> X. Shi,<sup>332,1</sup> J. Shipsey,<sup>332,1</sup> D. Silver,<sup>332,1</sup> J. Sun,<sup>332,1</sup> A. Svatikovsky,<sup>332,1</sup> F. Wang,<sup>332,1</sup> W. Xie,<sup>332,1</sup> L. Xu,<sup>332,1</sup> J. Zablocki,<sup>332,1</sup> J. Stupak,<sup>333,1</sup> A. Adair,<sup>334,1</sup> B. Akgun,<sup>334,1</sup> Z. Chen,<sup>334,1</sup> K. M. Ecklund,<sup>334,1</sup> F. J. M. Geurts,<sup>334,1</sup> M. Guibal,<sup>334,1</sup> W. Li,<sup>334,1</sup> B. Michlin,<sup>334,1</sup> M. Northup,<sup>334,1</sup> B. P. Padley,<sup>334,1</sup> R. Redjimi,<sup>334,1</sup> J. Roberts,<sup>334,1</sup> J. Rorie,<sup>334,1</sup> Z. Tu,<sup>334,1</sup> J. Zabel,<sup>334,1</sup> B. Beitchart,<sup>335,1</sup> A. Bodek,<sup>335,1</sup> P. Barbour,<sup>335,1</sup> R. Demina,<sup>335,1</sup> Y. Eshaq,<sup>335,1</sup> T. Ferbel,<sup>335,1</sup> M. Galanti,<sup>335,1</sup> A. Garcia-Bellido,<sup>335,1</sup> P. Goldenzweig,<sup>335,1</sup> J. Han,<sup>335,1</sup> A. Harel,<sup>335,1</sup> O. Hindrichs,<sup>335,1</sup> S. Khukhunashvili,<sup>335,1</sup> G. Petrillo,<sup>335,1</sup> M. Verzetti,<sup>335,1</sup> L. Demortier,<sup>336,1</sup> S. Arora,<sup>337,1</sup> A. Barker,<sup>337,1</sup> J. P. Chou,<sup>337,1</sup> C. Contreras-Campana,<sup>337,1</sup> E. Contreras-Campana,<sup>337,1</sup> D. Duggan,<sup>337,1</sup> D. Ferencz,<sup>337,1</sup> Y. Gershtein,<sup>337,1</sup> R. Gray,<sup>337,1</sup> E. Halkiadakis,<sup>337,1</sup> D. Hidas,<sup>337,1</sup> E. Hughes,<sup>337,1</sup> S. Kaplan,<sup>337,1</sup> R. Kumawalkam-Elayavalli,<sup>337,1</sup> A. Lath,<sup>337,1</sup> S. Panwalker,<sup>337,1</sup> M. Park,<sup>337,1</sup> S. Salur,<sup>337,1</sup> S. Schnetzer,<sup>337,1</sup> D. Sheffield,<sup>337,1</sup> S. Somalwar,<sup>337,1</sup> R. Stone,<sup>337,1</sup> S. Thomas,<sup>337,1</sup> P. Thomassen,<sup>337,1</sup> M. Walker,<sup>337,1</sup> M. Woerner,<sup>338,1</sup> G. Riley,<sup>338,1</sup> K. Rose,<sup>338,1</sup> S. Spanier,<sup>338,1</sup> A. York,<sup>338,1</sup> O. Bouhal,<sup>339,1</sup> A. Castaneda Hernandez,<sup>339,1</sup> M. Dalchenko,<sup>339,1</sup> M. De Mattia,<sup>339,1</sup> A. Delgado,<sup>339,1</sup> S. Dildick,<sup>339,1</sup> R. Eusebi,<sup>339,1</sup> W. Flanagan,<sup>339,1</sup> J. Gilmore,<sup>339,1</sup> T. Kamon,<sup>339,1</sup> V. Krutelyov,<sup>339,1</sup> S. Montalvo,<sup>339,1</sup> R. Mueller,<sup>339,1</sup> I. Ospisken,<sup>339,1</sup> Y. Pakhotin,<sup>339,1</sup> R. Patel,<sup>339,1</sup> A. Perloff,<sup>339,1</sup> J. Roe,<sup>339,1</sup> A. Rose,<sup>339,1</sup> A. Safonov,<sup>339,1</sup> A. Tatarinov,<sup>339,1</sup> K. A. Ulmer,<sup>339,1</sup> N. Akchurin,<sup>340,1</sup> C. Cowden,<sup>340,1</sup> J. Damgov,<sup>340,1</sup> C. Dragoiu,<sup>340,1</sup> P. R. Duderio,<sup>340,1</sup> J. Falkner,<sup>340,1</sup> S. Kunori,<sup>340,1</sup> K. Lamichhane,<sup>340,1</sup> S. W. Lee,<sup>340,1</sup> T. Libeiro,<sup>340,1</sup> S. Undleeb,<sup>340,1</sup> I. Volobouev,<sup>340,1</sup> E. Appel,<sup>341,1</sup> A. G. Delanomy,<sup>341,1</sup> S. Greene,<sup>341,1</sup> A. Gurrola,<sup>341,1</sup> R. Janjan,<sup>341,1</sup> W. Johns,<sup>341,1</sup> C. Maguire,<sup>341,1</sup> Y. Mao,<sup>341,1</sup> A. Melo,<sup>341,1</sup> P. Sheldon,<sup>341,1</sup> B. Snook,<sup>341,1</sup> S. Tuo,<sup>341,1</sup> J. Velkovska,<sup>341,1</sup> Q. Xu,<sup>341,1</sup> M. W. Arenton,<sup>342,1</sup> S. Boule,<sup>342,1</sup> B. Cox,<sup>342,1</sup> B. Francis,<sup>342,1</sup> J. Goodell,<sup>342,1</sup> R. Hirosky,<sup>342,1</sup> A. Ledovskoy,<sup>342,1</sup> H. Li,<sup>342,1</sup> C. Lin,<sup>342,1</sup> C. Neu,<sup>342,1</sup> E. Wolfe,<sup>342,1</sup> J. Wood,<sup>342,1</sup> F. Xia,<sup>342,1</sup> C. Clarke,<sup>342,1</sup> R. Harr,<sup>342,1</sup> P. E. Karchin,<sup>343,1</sup> C. Kottachchi Kankanaage Don,<sup>343,1</sup> P. Lamichhane,<sup>343,1</sup> J. Sturdy,<sup>343,1</sup> D. A. Belknapp,<sup>344,1</sup> D. Carlsmith,<sup>344,1</sup> M. Cepeda,<sup>344,1</sup> A. Christian,<sup>344,1</sup> S. Daus,<sup>344,1</sup> J. Dodd,<sup>344,1</sup> S. Duric,<sup>344,1</sup> E. Fries,<sup>344,1</sup> B. Gomber,<sup>344,1</sup> R. Hall-Wilton,<sup>344,1</sup> M. Herndon,<sup>344,1</sup> A. Hervé,<sup>344,1</sup> P. Klabbens,<sup>344,1</sup> A. Lanaro,<sup>344,1</sup> A. Levine,<sup>344,1</sup> K. Long,<sup>344,1</sup> R. Loveless,<sup>344,1</sup> A. Mohapatra,<sup>344,1</sup> I. Ojalvo,<sup>344,1</sup> T. Perry,<sup>344,1</sup> G. A. Pierro,<sup>344,1</sup> G. Polese,<sup>344,1</sup> L. Ross,<sup>344,1</sup> T. Ruggles,<sup>344,1</sup> T. Sarangi,<sup>344,1</sup> A. Savin,<sup>344,1</sup> A. Sharma,<sup>344,1</sup> N. Smith,<sup>344,1</sup> W. H. Smith,<sup>344,1</sup> D. Taylor,<sup>344,1</sup> and N. Woods<sup>344,1</sup>

(ATLAS Collaboration)<sup>†</sup>  
(CMS Collaboration)<sup>‡</sup>

- <sup>1</sup>Department of Physics, University of Adelaide, Adelaide, Australia  
<sup>2</sup>Physics Department SUNY Albany, Albany, New York, USA  
<sup>3</sup>Department of Physics, University of Alberta, Edmonton, Alberta, Canada  
<sup>4</sup>Department of Physics, Ankara University, Ankara, Turkey  
<sup>5</sup>Istanbul Aydin University, Istanbul, Turkey  
<sup>6</sup>Division of Physics, TOBB University of Economics and Technology, Ankara, Turkey  
<sup>7</sup>LAPP, CNRS/IN2P3 and Université Savoie Mont Blanc, Annecy-le-Vieux, France  
<sup>8</sup>High Energy Physics Division, Argonne National Laboratory, Argonne, Illinois, USA  
<sup>9</sup>Department of Physics, University of Arizona, Tucson, Arizona, USA  
<sup>10</sup>Department of Physics, The University of Texas at Arlington, Arlington, Texas, USA  
<sup>11</sup>Physics Department, University of Athens, Athens, Greece  
<sup>12</sup>Physics Department, National Technical University of Athens, Zografou, Greece  
<sup>13</sup>Institut of Physics, Azerbaijan Academy of Sciences, Baku, Azerbaijan  
<sup>14</sup>Institut de Física d'Altes Energies and Departament de Física de la Universitat Autònoma de Barcelona, Barcelona, Spain  
<sup>15</sup>Institute of Physics, University of Belgrade, Belgrade, Serbia  
<sup>16</sup>Department for Physics and Technology, University of Bergen, Bergen, Norway  
<sup>17</sup>Albert Einstein Center for Fundamental Physics and Laboratory for High Energy Physics, University of Bern, Bern, Switzerland  
<sup>18</sup>School of Physics and Astronomy, University of Birmingham, Birmingham, United Kingdom  
<sup>19</sup>Department of Physics, Bogaziçi University, Istanbul, Turkey  
<sup>20</sup>Department of Physics, Dogus University, Istanbul, Turkey  
<sup>21</sup>Department of Physics Engineering, Gaziantepe University, Gaziantepe, Turkey  
<sup>22</sup>INFN Sezione di Bologna, Bologna, Italy  
<sup>23</sup>Dipartimento di Fisica e Astronomia, Università di Bologna, Bologna, Italy  
<sup>24</sup>Physikalisches Institut, University of Bonn, Bonn, Germany  
<sup>25</sup>Department of Physics, Boston University, Boston, Massachusetts, USA  
<sup>26</sup>Department of Physics, Brandeis University, Waltham, Massachusetts, USA  
<sup>27</sup>Universidade Federal do Rio De Janeiro COPPE/EEB, Rio de Janeiro, Brazil  
<sup>28</sup>Electrical Circuits Department, Federal University of Juiz de Fora (UFJF), Juiz de Fora, Brazil  
<sup>29</sup>Federal University of Sao Joao del Rei (UFSJ), Sao Joao del Rei, Brazil  
<sup>30</sup>Instituto de Física, Universidade de São Paulo, São Paulo, Brazil  
<sup>31</sup>Physics Department, Brookhaven National Laboratory, Upton, New York, USA  
<sup>32</sup>National Institute of Physics and Nuclear Engineering, Bucharest, Romania  
<sup>33</sup>National Institute for Research and Development of Isotopic and Molecular Technologies, Physics Department, Cluj Napoca, Romania  
<sup>34</sup>University Politehnica Bucharest, Bucharest, Romania  
<sup>35</sup>West University in Timisoara, Timisoara, Romania  
<sup>36</sup>Departamento de Física, Universidad de Buenos Aires, Buenos Aires, Argentina  
<sup>37</sup>Cavendish Laboratory, University of Cambridge, Cambridge, United Kingdom  
<sup>38</sup>Department of Physics, Carleton University, Ottawa, Ontario, Canada  
<sup>39</sup>CERN, Geneva, Switzerland  
<sup>40</sup>Enrico Fermi Institute, University of Chicago, Chicago, Illinois, USA  
<sup>41</sup>Departamento de Física, Pontificia Universidad Católica de Chile, Santiago, Chile  
<sup>42</sup>Departamento de Física, Universidad Técnica Federico Santa María, Valparaíso, Chile  
<sup>43</sup>Institute of High Energy Physics, Chinese Academy of Sciences, Beijing, China  
<sup>44</sup>Department of Modern Physics, University of Science and Technology of China, Anhui, China  
<sup>45</sup>Department of Physics, Nanjing University, Jiangsu, China  
<sup>46</sup>School of Physics, Shandong University, Shandong, China  
<sup>47</sup>Department of Physics and Astronomy, Shanghai Key Laboratory for Particle Physics and Cosmology, Shanghai Jiao Tong University, Shanghai, China  
<sup>48</sup>Physics Department, Tsinghua University, Beijing 100084, China  
<sup>49</sup>Laboratoire de Physique Corpusculaire, Clermont Université and Université Blaise Pascal and CNRS/IN2P3, Clermont-Ferrand, France  
<sup>50</sup>Nevis Laboratory, Columbia University, Irvington, New York, USA  
<sup>51</sup>Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark

- <sup>37a</sup>INFN Gruppo Collegato di Cosenza, Laboratori Nazionali di Frascati, Frascati, Italy  
<sup>37b</sup>Dipartimento di Fisica, Università della Calabria, Rende, Italy
- <sup>38a</sup>AGH University of Science and Technology, Faculty of Physics and Applied Computer Science, Krakow, Poland  
<sup>38b</sup>Marian Smoluchowski Institute of Physics, Jagiellonian University, Krakow, Poland  
<sup>39</sup>Institute of Nuclear Physics Polish Academy of Sciences, Krakow, Poland  
<sup>40</sup>Physics Department, Southern Methodist University, Dallas, Texas, USA  
<sup>41</sup>Physics Department, University of Texas at Dallas, Richardson, Texas, USA  
<sup>42</sup>DESY, Hamburg, Hamburg, Germany  
<sup>43</sup>Institut für Experimentelle Physik IV, Technische Universität Dortmund, Dortmund, Germany  
<sup>44</sup>Institut für Kern- und Teilchenphysik, Technische Universität Dresden, Dresden, Germany  
<sup>45</sup>Department of Physics, Duke University, Durham, North Carolina, USA  
<sup>46</sup>SUPA-School of Physics and Astronomy, University of Edinburgh, Edinburgh, United Kingdom  
<sup>47</sup>INFN Laboratori Nazionali di Frascati, Frascati, Italy  
<sup>48</sup>Fakultät für Mathematik und Physik, Albert-Ludwigs-Universität Freiburg, Freiburg, Germany  
<sup>49</sup>Section de Physique, Université de Genève, Geneva, Switzerland  
<sup>50</sup>INFN Sezione di Genova, Genova, Italy  
<sup>51b</sup>Dipartimento di Fisica, Università di Genova, Genova, Italy  
<sup>51c</sup>E. Andronikashvili Institute of Physics, I. Javakhishvili Tbilisi State University, Tbilisi, Georgia  
<sup>51d</sup>High Energy Physics Institute, Tbilisi State University, Tbilisi, Georgia  
<sup>52</sup>H Physikalisches Institut, Justus-Liebig-Universität Giessen, Giessen, Germany  
<sup>53</sup>SUPA-School of Physics and Astronomy, University of Glasgow, Glasgow, United Kingdom  
<sup>54</sup>H Physikalisches Institut, Georg-August-Universität, Göttingen, Germany  
<sup>55</sup>Laboratoire de Physique Subatomique et de Cosmologie, Université Grenoble-Alpes, CNRS/IN2P3, Grenoble, France  
<sup>56</sup>Department of Physics, Hampton University, Hampton, Virginia, USA  
<sup>57</sup>Laboratory for Particle Physics and Cosmology, Harvard University, Cambridge, Massachusetts, USA  
<sup>58</sup>Kirchhoff-Institut für Physik, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany  
<sup>59</sup>Physikalisches Institut, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany  
<sup>59c</sup>ZITI Institut für technische Informatik, Ruprecht-Karls-Universität Heidelberg, Mannheim, Germany  
<sup>60</sup>Faculty of Applied Information Science, Hiroshima Institute of Technology, Hiroshima, Japan  
<sup>61</sup>Department of Physics, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, China  
<sup>62</sup>Department of Physics, The University of Hong Kong, Hong Kong, China  
<sup>63</sup>Department of Physics, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, China  
<sup>64</sup>Department of Physics, Indiana University, Bloomington, Indiana, USA  
<sup>65</sup>Institut für Astro- und Teilchenphysik, Leopold-Franzens-Universität, Innsbruck, Austria  
<sup>66</sup>University of Iowa, Iowa City, Iowa, USA  
<sup>67</sup>Department of Physics and Astronomy, Iowa State University, Ames, Iowa, USA  
<sup>68</sup>Joint Institute for Nuclear Research, JINR Dubna, Dubna, Russia  
<sup>69</sup>KEK, High Energy Accelerator Research Organization, Tsukuba, Japan  
<sup>70</sup>Graduate School of Science, Kobe University, Kobe, Japan  
<sup>71</sup>Faculty of Science, Kyoto University, Kyoto, Japan  
<sup>72</sup>Kyoto University of Education, Kyoto, Japan  
<sup>73</sup>Department of Physics, Kyushu University, Fukuoka, Japan  
<sup>74</sup>Instituto de Física La Plata, Universidad Nacional de La Plata and CONICET, La Plata, Argentina  
<sup>75</sup>Physics Department, Lancaster University, Lancaster, United Kingdom  
<sup>76</sup>INFN Sezione di Lecce, Lecce, Italy  
<sup>77b</sup>Dipartimento di Matematica e Fisica, Università del Salento, Lecce, Italy  
<sup>78</sup>Oliver Lodge Laboratory, University of Liverpool, Liverpool, United Kingdom  
<sup>79</sup>Department of Physics, Jošef Stefan Institute and University of Ljubljana, Ljubljana, Slovenia  
<sup>80</sup>School of Physics and Astronomy, Queen Mary University of London, London, United Kingdom  
<sup>81</sup>Department of Physics, Royal Holloway University of London, Surrey, United Kingdom  
<sup>82</sup>Department of Physics and Astronomy, University College London, London, United Kingdom  
<sup>83</sup>Louisiana Tech University, Ruston, Louisiana, USA  
<sup>84</sup>Laboratoire de Physique Nucléaire et de Hautes Energies, UPMC and Université Paris-Diderot and CNRS/IN2P3, Paris, France  
<sup>85</sup>Fysiska institutionen, Lund universitet, Lund, Sweden  
<sup>86</sup>Departamento de Física Teórica C-15, Universidad Autónoma de Madrid, Madrid, Spain  
<sup>87</sup>Institut für Physik, Universität Mainz, Mainz, Germany  
<sup>88</sup>School of Physics and Astronomy, University of Manchester, Manchester, United Kingdom  
<sup>89</sup>CPPM, Aix-Marseille Université and CNRS/IN2P3, Marseille, France  
<sup>90</sup>Department of Physics, University of Massachusetts, Amherst, Massachusetts, USA  
<sup>91</sup>Department of Physics, McGill University, Montreal, Quebec, Canada

- <sup>33</sup>School of Physics, University of Melbourne, Victoria, Australia  
<sup>30</sup>Department of Physics, The University of Michigan, Ann Arbor, Michigan, USA  
<sup>31</sup>Department of Physics and Astronomy, Michigan State University, East Lansing, Michigan, USA  
<sup>32</sup>Dipartimento di Fisica, Università di Milano, Milano, Italy  
<sup>33</sup>B.I. Stepanov Institute of Physics, National Academy of Sciences of Belarus, Minsk, Republic of Belarus  
<sup>34</sup>National Scientific and Educational Centre for Particle and High Energy Physics, Minsk, Republic of Belarus  
<sup>35</sup>Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA  
<sup>36</sup>Group of Particle Physics, University of Montreal, Montreal, Quebec, Canada  
<sup>37</sup>P.N. Lebedev Institute of Physics, Academy of Sciences, Moscow, Russia  
<sup>38</sup>Institute for Theoretical and Experimental Physics (ITEP), Moscow, Russia  
<sup>39</sup>National Research Nuclear University MEPhI, Moscow, Russia  
<sup>40</sup>Skobeltsyn Institute of Nuclear Physics, M.V. Lomonosov Moscow State University, Moscow, Russia  
<sup>41</sup>Fakultät für Physik, Ludwig-Maximilians-Universität München, München, Germany  
<sup>42</sup>Max-Planck-Institut für Physik (Werner-Heisenberg-Institut), München, Germany  
<sup>43</sup>Nagasaki Institute of Applied Science, Nagasaki, Japan  
<sup>44</sup>Graduate School of Science and Kobayashi-Maskawa Institute, Nagoya University, Nagoya, Japan  
<sup>45</sup>INFN Sezione di Napoli, Napoli, Italy  
<sup>46</sup>Dipartimento di Fisica, Università di Napoli, Napoli, Italy  
<sup>47</sup>Department of Physics and Astronomy, University of New Mexico, Albuquerque, New Mexico, USA  
<sup>48</sup>Institute for Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen/Nikhef, Nijmegen, Netherlands  
<sup>49</sup>Nikhef National Institute for Subatomic Physics and University of Amsterdam, Amsterdam, Netherlands  
<sup>50</sup>Department of Physics, Northern Illinois University, DeKalb, Illinois, USA  
<sup>51</sup>Budker Institute of Nuclear Physics, SB RAS, Novosibirsk, Russia  
<sup>52</sup>Department of Physics, New York University, New York, New York, USA  
<sup>53</sup>The Ohio State University, Columbus, Ohio, USA  
<sup>54</sup>Faculty of Science, Okayama University, Okayama, Japan  
<sup>55</sup>Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma, Norman, Oklahoma, USA  
<sup>56</sup>Department of Physics, Oklahoma State University, Stillwater, Oklahoma, USA  
<sup>57</sup>Faculty of Mathematics, University of Paderborn, Paderborn, Germany  
<sup>58</sup>Center for High Energy Physics, University of Oregon, Eugene, Oregon, USA  
<sup>59</sup>LAL, Université Paris-Sud and CNRS/IN2P3, Orsay, France  
<sup>60</sup>Graduate School of Science, Osaka University, Osaka, Japan  
<sup>61</sup>Department of Physics, University of Oslo, Oslo, Norway  
<sup>62</sup>Department of Physics, Oxford University, Oxford, United Kingdom  
<sup>63</sup>INFN Sezione di Pavia, Pavia, Italy  
<sup>64</sup>Dipartimento di Fisica, Università di Pavia, Pavia, Italy  
<sup>65</sup>Department of Physics, University of Pennsylvania, Philadelphia, Pennsylvania, USA  
<sup>66</sup>National Research Centre "Kurchatov Institute" B.P.Konstantinov Petersburg Nuclear Physics Institute, St. Petersburg, Russia  
<sup>67</sup>INFN Sezione di Pisa, Pisa, Italy  
<sup>68</sup>Dipartimento di Fisica E. Fermi, Università di Pisa, Pisa, Italy  
<sup>69</sup>Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, Pennsylvania, USA  
<sup>70</sup>Laboratorio de Instrumentación e Física Experimental de Partículas-LIP, Lisboa, Portugal  
<sup>71</sup>Faculdade de Ciências, Universidade de Lisboa, Lisboa, Portugal  
<sup>72</sup>Department of Physics, University of Coimbra, Coimbra, Portugal  
<sup>73</sup>Centro de Física Nuclear da Universidade de Lisboa, Lisboa, Portugal  
<sup>74</sup>Departamento de Física, Universidade do Minho, Braga, Portugal  
<sup>75</sup>Departamento de Física Teórica y del Cosmos and CAFPE, Universidad de Granada, Granada (Spain), Portugal  
<sup>76</sup>Dep. Física and CEFITEC of Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Caparica, Portugal  
<sup>77</sup>Institute of Physics, Academy of Sciences of the Czech Republic, Praha, Czech Republic  
<sup>78</sup>Czech Technical University in Prague, Praha, Czech Republic  
<sup>79</sup>Faculty of Mathematics and Physics, Charles University in Prague, Praha, Czech Republic  
<sup>80</sup>State Research Center Institute for High Energy Physics, Protvino, Russia  
<sup>81</sup>Particle Physics Department, Rutherford Appleton Laboratory, Didcot, United Kingdom  
<sup>82</sup>INFN Sezione di Roma, Roma, Italy  
<sup>83</sup>Dipartimento di Fisica, Sapienza Università di Roma, Roma, Italy  
<sup>84</sup>INFN Sezione di Roma Tor Vergata, Roma, Italy  
<sup>85</sup>Dipartimento di Fisica, Università di Roma Tor Vergata, Roma, Italy  
<sup>86</sup>INFN Sezione di Roma Tre, Roma, Italy  
<sup>87</sup>Dipartimento di Matematica e Fisica, Università Roma Tre, Roma, Italy

- <sup>135a</sup>Faculté des Sciences Ain Chock, Réseau Universitaire de Physique des Hautes Energies-Université Hassan II, Casablanca, Morocco
- <sup>135b</sup>Centre National de l'Energie des Sciences Techniques Nucléaires, Rabat, Morocco
- <sup>135c</sup>Faculté des Sciences Semlalia, Université Cadi Ayyad, LPHEA-Marrakech, Morocco
- <sup>135d</sup>Faculté des Sciences, Université Mohamed Premier et LPTPM, Oujda, Morocco
- <sup>135e</sup>Faculté des sciences, Université Mohammed V-Agdal, Rabat, Morocco
- <sup>136</sup>DSM/IRFU (Institut de Recherches sur les Lois Fondamentales de l'Univers), CEA Saclay (Commissariat à l'Energie Atomique et aux Energies Alternatives), Gif-sur-Yvette, France
- <sup>137</sup>Santa Cruz Institute for Particle Physics, University of California, Santa Cruz, Santa Cruz, California, USA
- <sup>138</sup>Department of Physics, University of Washington, Seattle, Washington, USA
- <sup>139</sup>Department of Physics and Astronomy, University of Sheffield, Sheffield, United Kingdom
- <sup>140</sup>Department of Physics, Shinshu University, Nagano, Japan
- <sup>141</sup>Fachbereich Physik, Universität Siegen, Siegen, Germany
- <sup>142</sup>Department of Physics, Simon Fraser University, Burnaby, British Columbia, Canada
- <sup>143</sup>SLAC National Accelerator Laboratory, Stanford, California, USA
- <sup>144</sup>Faculty of Mathematics, Physics & Informatics, Comenius University, Bratislava, Slovak Republic
- <sup>145</sup>Department of Subnuclear Physics, Institute of Experimental Physics of the Slovak Academy of Sciences, Košice, Slovak Republic
- <sup>146</sup>Department of Physics, University of Cape Town, Cape Town, South Africa
- <sup>147</sup>Department of Physics, University of Johannesburg, Johannesburg, South Africa
- <sup>148</sup>School of Physics, University of the Witwatersrand, Johannesburg, South Africa
- <sup>149</sup>Department of Physics, Stockholm University, Sweden
- <sup>150</sup>The Oskar Klein Centre, Stockholm, Sweden
- <sup>151</sup>Physics Department, Royal Institute of Technology, Stockholm, Sweden
- <sup>152</sup>Departments of Physics & Astronomy, Stony Brook University, Stony Brook, New York, USA
- <sup>153</sup>Department of Physics and Astronomy, University of Sussex, Brighton, United Kingdom
- <sup>154</sup>School of Physics, University of Sydney, Sydney, Australia
- <sup>155</sup>Institute of Physics, Academia Sinica, Taipei, Taiwan
- <sup>156</sup>Department of Physics, Technion - Israel Institute of Technology, Haifa, Israel
- <sup>157</sup>Raymond and Beverly Sackler School of Physics and Astronomy, Tel Aviv University, Tel Aviv, Israel
- <sup>158</sup>Department of Physics, Aristotle University of Thessaloniki, Thessaloniki, Greece
- <sup>159</sup>International Center for Elementary Particle Physics and Department of Physics, The University of Tokyo, Tokyo, Japan
- <sup>160</sup>Graduate School of Science and Technology, Tokyo Metropolitan University, Tokyo, Japan
- <sup>161</sup>Department of Physics, Tokyo Institute of Technology, Tokyo, Japan
- <sup>162</sup>Department of Physics, University of Toronto, Toronto, Ontario, Canada
- <sup>163</sup>TRIUMF, Vancouver, British Columbia, Canada
- <sup>164</sup>Department of Physics and Astronomy, York University, Toronto, Ontario, Canada
- <sup>165</sup>Faculty of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Japan
- <sup>166</sup>Department of Physics and Astronomy, Tufts University, Medford, Massachusetts, USA
- <sup>167</sup>Centro de Investigaciones, Universidad Antonio Narino, Bogota, Colombia
- <sup>168</sup>Department of Physics and Astronomy, University of California Irvine, Irvine, California, USA
- <sup>169</sup>INFN Gruppo Collegato di Udine, Sezione di Trieste, Udine, Italy
- <sup>170</sup>ICTP, Trieste, Italy
- <sup>171</sup>Dipartimento di Chimica, Fisica e Ambiente, Università di Udine, Udine, Italy
- <sup>172</sup>Department of Physics, University of Illinois, Urbana, Illinois, USA
- <sup>173</sup>Department of Physics and Astronomy, University of Uppsala, Uppsala, Sweden
- <sup>174</sup>Department of Physics, University of British Columbia, Vancouver, British Columbia, Canada
- <sup>175</sup>Department of Physics and Astronomy, University of Victoria, Victoria, British Columbia, Canada
- <sup>176</sup>Department of Physics, University of Warwick, Coventry, United Kingdom
- <sup>177</sup>Waseda University, Tokyo, Japan
- <sup>178</sup>Department of Particle Physics, The Weizmann Institute of Science, Rehovot, Israel
- <sup>179</sup>Department of Physics, University of Wisconsin, Madison, Wisconsin, USA
- <sup>180</sup>Fakultät für Physik und Astronomie, Julius-Maximilians-Universität, Würzburg, Germany
- <sup>181</sup>Fachbereich C Physics, Bergische Universität Wuppertal, Wuppertal, Germany
- <sup>182</sup>Department of Physics, Yale University, New Haven, Connecticut, USA
- <sup>183</sup>Yerevan Physics Institute, Yerevan, Armenia
- <sup>184</sup>Centre de Calcul de l'Institut National de Physique Nucléaire et de Physique des Particules (IN2P3), Villeurbanne, France
- <sup>185</sup>Yerevan Physics Institute, Yerevan, Armenia
- <sup>186</sup>Institut für Hochenergiephysik der OeAW, Wien, Austria

- <sup>181</sup>National Centre for Particle and High Energy Physics, Minsk, Belarus  
<sup>182</sup>Universiteit Antwerpen, Antwerpen, Belgium  
<sup>183</sup>Vrije Universiteit Brussel, Brussel, Belgium  
<sup>184</sup>Université Libre de Bruxelles, Bruxelles, Belgium  
<sup>185</sup>Ghent University, Ghent, Belgium  
<sup>186</sup>Université Catholique de Louvain, Louvain-la-Neuve, Belgium  
<sup>187</sup>Université de Montréal, Montréal, Québec, Canada  
<sup>188</sup>Centro Brasileiro de Pesquisas Físicas, Rio de Janeiro, Brazil  
<sup>189</sup>Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Brazil  
<sup>190a</sup>Universidade Estadual Paulista, São Paulo, Brazil  
<sup>190b</sup>Universidade Federal do ABC, São Paulo, Brazil  
<sup>191</sup>Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria  
<sup>192</sup>University of Sofia, Sofia, Bulgaria  
<sup>193</sup>Institute of High Energy Physics, Beijing, China  
<sup>194</sup>State Key Laboratory of Nuclear Physics and Technology, Peking University, Beijing, China  
<sup>195</sup>Universidad de Los Andes, Bogotá, Colombia  
<sup>196</sup>University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, Split, Croatia  
<sup>197</sup>University of Split, Faculty of Science, Split, Croatia  
<sup>198</sup>Institute Rudjer Bosković, Zagreb, Croatia  
<sup>199</sup>University of Cyprus, Nicosia, Cyprus  
<sup>200</sup>Charles University, Prague, Czech Republic  
<sup>201</sup>Academy of Scientific Research and Technology of the Arab Republic of Egypt, Egyptian Network of High Energy Physics, Cairo, Egypt  
<sup>202</sup>National Institute of Chemical Physics and Biophysics, Tallinn, Estonia  
<sup>203</sup>Department of Physics, University of Helsinki, Helsinki, Finland  
<sup>204</sup>Helsinki Institute of Physics, Helsinki, Finland  
<sup>205</sup>Lappeenranta University of Technology, Lappeenranta, Finland  
<sup>206</sup>DSM/IRFU, CEA/Saclay, Gif-sur-Yvette, France  
<sup>207</sup>Laboratoire Leprince-Ringuet, Ecole Polytechnique IN2P3-CNRS, Palaiseau, France  
<sup>208</sup>Institut Pluridisciplinaire Hubert Curien, Université de Strasbourg, Université de Haute Alsace Mulhouse, CNRS/IN2P3, Strasbourg, France  
<sup>209</sup>Centre de Calcul de l'Institut National de Physique Nucléaire et de Physique des Particules, CNRS/IN2P3, Villeurbanne, France  
<sup>210</sup>Université de Lyon, Université Claude Bernard Lyon 1, CNRS-IN2P3, Institut de Physique Nucléaire de Lyon, Villeurbanne, France  
<sup>211</sup>Institute of High Energy Physics and Informationization, Tbilisi State University, Tbilisi, Georgia  
<sup>212</sup>RWTH Aachen University, I. Physikalisches Institut, Aachen, Germany  
<sup>213</sup>RWTH Aachen University, III. Physikalisches Institut A, Aachen, Germany  
<sup>214</sup>RWTH Aachen University, III. Physikalisches Institut B, Aachen, Germany  
<sup>215</sup>Deutsches Elektronen-Synchrotron, Hamburg, Germany  
<sup>216</sup>University of Hamburg, Hamburg, Germany  
<sup>217</sup>Institut für Experimentelle Kernphysik, Karlsruhe, Germany  
<sup>218</sup>Institute of Nuclear and Particle Physics (INPP), NCSR Demokritos, Aghia Paraskevi, Greece  
<sup>219</sup>University of Athens, Athens, Greece  
<sup>220</sup>University of Ioannina, Ioannina, Greece  
<sup>221</sup>Wigner Research Centre for Physics, Budapest, Hungary  
<sup>222</sup>Institute of Nuclear Research ATOMKI, Debrecen, Hungary  
<sup>223</sup>University of Debrecen, Debrecen, Hungary  
<sup>224</sup>National Institute of Science Education and Research, Bhubaneswar, India  
<sup>225</sup>Panjab University, Chandigarh, India  
<sup>226</sup>University of Delhi, Delhi, India  
<sup>227</sup>Saha Institute of Nuclear Physics, Kolkata, India  
<sup>228</sup>Bhabha Atomic Research Centre, Mumbai, India  
<sup>229</sup>Tata Institute of Fundamental Research, Mumbai, India  
<sup>230</sup>Indian Institute of Science Education and Research (IISER), Pune, India  
<sup>231</sup>Institute for Research in Fundamental Sciences (IPM), Tehran, Iran  
<sup>232</sup>University College Dublin, Dublin, Ireland  
<sup>233</sup>INFN Sezione di Bari, Bari, Italy  
<sup>234</sup>Università di Bari, Bari, Italy  
<sup>235</sup>Politecnico di Bari, Bari, Italy  
<sup>236</sup>INFN Sezione di Bologna, Bologna, Italy  
<sup>237</sup>Università di Bologna, Bologna, Italy

- <sup>235</sup>*INFN Sezione di Catania, Catania, Italy*  
<sup>236</sup>*Università di Catania, Catania, Italy*  
<sup>237</sup>*CSEPNM, Catania, Italy*  
<sup>238</sup>*INFN Sezione di Firenze, Firenze, Italy*  
<sup>239</sup>*Università di Firenze, Firenze, Italy*  
<sup>240</sup>*INFN Laboratori Nazionali di Frascati, Frascati, Italy*  
<sup>241</sup>*INFN Sezione di Genova, Genova, Italy*  
<sup>242</sup>*Università di Genova, Genova, Italy*  
<sup>243</sup>*INFN Sezione di Milano-Bicocca, Milano, Italy*  
<sup>244</sup>*Università di Milano-Bicocca, Milano, Italy*  
<sup>245</sup>*INFN Sezione di Napoli, Napoli, Italy*  
<sup>246</sup>*Università di Napoli "Federico II," Napoli, Italy*  
<sup>247</sup>*Università della Basilicata, Roma, Italy*  
<sup>248</sup>*Università G. Marconi, Roma, Italy*  
<sup>249</sup>*INFN Sezione di Padova, Padova, Italy*  
<sup>250</sup>*Università di Padova, Padova, Italy*  
<sup>251</sup>*INFN Sezione di Trento, Trento, Italy*  
<sup>252</sup>*Università di Trieste, Trieste, Italy*  
<sup>253</sup>*INFN Sezione di Pavia, Pavia, Italy*  
<sup>254</sup>*Università di Pavia, Pavia, Italy*  
<sup>255</sup>*INFN Sezione di Perugia, Perugia, Italy*  
<sup>256</sup>*Università di Perugia, Perugia, Italy*  
<sup>257</sup>*INFN Sezione di Pisa, Pisa, Italy*  
<sup>258</sup>*Università di Pisa, Pisa, Italy*  
<sup>259</sup>*Scuola Normale Superiore di Pisa, Pisa, Italy*  
<sup>260</sup>*INFN Sezione di Roma, Roma, Italy*  
<sup>261</sup>*Università di Roma, Roma, Italy*  
<sup>262</sup>*INFN Sezione di Torino, Novara, Italy*  
<sup>263</sup>*Università di Torino, Novara, Italy*  
<sup>264</sup>*Università del Piemonte Orientale, Novara, Italy*  
<sup>265</sup>*INFN Sezione di Trieste, Trieste, Italy*  
<sup>266</sup>*Università di Trieste, Trieste, Italy*  
<sup>267</sup>*Kangwon National University, Chunchon, Korea*  
<sup>268</sup>*Kyungpook National University, Daegu, Korea*  
<sup>269</sup>*Chonnam National University, Jeonju, Korea*  
<sup>270</sup>*Chonbuk National University, Jeonju, Korea*  
<sup>271</sup>*Chonnam National University, Institute for Universe and Elementary Particles, Kwangju, Korea*  
<sup>272</sup>*Korea University, Seoul, Korea*  
<sup>273</sup>*Seoul National University, Seoul, Korea*  
<sup>274</sup>*University of Seoul, Seoul, Korea*  
<sup>275</sup>*Sungkyunkwan University, Suwon, Korea*  
<sup>276</sup>*Vilnius University, Vilnius, Lithuania*  
<sup>277</sup>*National Centre for Particle Physics, Universiti Malaya, Kuala Lumpur, Malaysia*  
<sup>278</sup>*Centro de Investigación y de Estudios Avanzados del IPN, Mexico City, Mexico*  
<sup>279</sup>*Universidad Iberoamericana, Mexico City, Mexico*  
<sup>280</sup>*Benedictine Universidad Autónoma de Puebla, Puebla, Mexico*  
<sup>281</sup>*Universidad Autónoma de San Luis Potosí, San Luis Potosí, Mexico*  
<sup>282</sup>*University of Auckland, Auckland, New Zealand*  
<sup>283</sup>*University of Canterbury, Christchurch, New Zealand*  
<sup>284</sup>*National Centre for Physics, Quaid-I-Azam University, Islamabad, Pakistan*  
<sup>285</sup>*National Centre for Nuclear Research, Swierk, Poland*  
<sup>286</sup>*Institute of Experimental Physics, Faculty of Physics, University of Warsaw, Warsaw, Poland*  
<sup>287</sup>*Laboratório de Instrumentação e Física Experimental de Partículas, Lisboa, Portugal*  
<sup>288</sup>*Joint Institute for Nuclear Research, Dubna, Russia*  
<sup>289</sup>*Petersburg Nuclear Physics Institute, Gatchina (St. Petersburg), Russia*  
<sup>290</sup>*Institute for Nuclear Research, Moscow, Russia*  
<sup>291</sup>*Institute for Theoretical and Experimental Physics, Moscow, Russia*  
<sup>292</sup>*P.N. Lebedev Physical Institute, Moscow, Russia*  
<sup>293</sup>*Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Moscow, Russia*  
<sup>294</sup>*State Research Center of Russian Federation, Institute for High Energy Physics, Protvino, Russia*  
<sup>295</sup>*University of Belgrade, Faculty of Physics and Vinca Institute of Nuclear Sciences, Belgrade, Serbia*  
<sup>296</sup>*Centro de Investigaciones Energéticas Medioambientales y Tecnológicas (CIEMAT), Madrid, Spain*

- <sup>277</sup>Universidad Autónoma de Madrid, Madrid, Spain  
<sup>278</sup>Universidad de Oviedo, Oviedo, Spain  
<sup>279</sup>Instituto de Física de Cantabria (IFCA), CSIC-Universidad de Cantabria, Santander, Spain  
<sup>280</sup>CERN, European Organization for Nuclear Research, Geneva, Switzerland  
<sup>281</sup>Scherrer Institut, Villigen, Switzerland  
<sup>282</sup>Institute for Particle Physics, ETH Zurich, Zurich, Switzerland  
<sup>283</sup>Universität Zürich, Zurich, Switzerland  
<sup>284</sup>National Central University, Chung-Li, Taiwan  
<sup>285</sup>National Taiwan University (NTU), Taipei, Taiwan  
<sup>286</sup>Chulalongkorn University, Faculty of Science, Department of Physics, Bangkok, Thailand  
<sup>288</sup>Middle East Technical University, Physics Department, Ankara, Turkey  
<sup>289</sup>Bogazici University, Istanbul, Turkey  
<sup>290</sup>Istanbul Technical University, Istanbul, Turkey  
<sup>291</sup>Institute for Scintillation Materials of National Academy of Science of Ukraine, Kharkov, Ukraine  
<sup>292</sup>National Scientific Center, Kharkov Institute of Physics and Technology, Kharkov, Ukraine  
<sup>293</sup>University of Bristol, Bristol, United Kingdom  
<sup>294</sup>Rutherford Appleton Laboratory, Didcot, United Kingdom  
<sup>295</sup>Imperial College, London, United Kingdom  
<sup>296</sup>Brunei University, Uxbridge, United Kingdom  
<sup>297</sup>Baylor University, Waco, Texas, USA  
<sup>298</sup>The University of Alabama, Tuscaloosa, Alabama, USA  
<sup>299</sup>Boston University, Boston, Massachusetts, USA  
<sup>300</sup>Brown University, Providence, Rhode Island, USA  
<sup>301</sup>University of California, Davis, Davis, California, USA  
<sup>302</sup>University of California, Los Angeles, Los Angeles, California, USA  
<sup>303</sup>University of California, Riverside, Riverside, California, USA  
<sup>304</sup>University of California, San Diego, La Jolla, California, USA  
<sup>305</sup>University of California, Santa Barbara, Santa Barbara, California, USA  
<sup>306</sup>California Institute of Technology, Pasadena, California, USA  
<sup>307</sup>Carnegie Mellon University, Pittsburgh, Pennsylvania, USA  
<sup>308</sup>University of Colorado at Boulder, Boulder, Colorado, USA  
<sup>309</sup>Cornell University, Ithaca, New York, USA  
<sup>310</sup>Fermi National Accelerator Laboratory, Batavia, Illinois, USA  
<sup>311</sup>University of Florida, Gainesville, Florida, USA  
<sup>312</sup>Florida International University, Miami, Florida, USA  
<sup>313</sup>Florida State University, Tallahassee, Florida, USA  
<sup>314</sup>Florida Institute of Technology, Melbourne, Florida, USA  
<sup>315</sup>University of Illinois at Chicago (UIC), Chicago, Illinois, USA  
<sup>316</sup>The University of Iowa, Iowa City, Iowa, USA  
<sup>317</sup>Johns Hopkins University, Baltimore, Maryland, USA  
<sup>318</sup>The University of Kansas, Lawrence, Kansas, USA  
<sup>319</sup>Kansas State University, Manhattan, Kansas, USA  
<sup>320</sup>Lawrence Livermore National Laboratory, Livermore, California, USA  
<sup>321</sup>University of Maryland, College Park, Maryland, USA  
<sup>322</sup>Massachusetts Institute of Technology, Cambridge, Massachusetts, USA  
<sup>323</sup>University of Minnesota, Minneapolis, Minnesota, USA  
<sup>324</sup>University of Mississippi, Oxford, Mississippi, USA  
<sup>325</sup>University of Nebraska-Lincoln, Lincoln, Nebraska, USA  
<sup>326</sup>State University of New York at Buffalo, Buffalo, New York, USA  
<sup>327</sup>Northeastern University, Boston, Massachusetts, USA  
<sup>328</sup>Northwestern University, Evanston, Illinois, USA  
<sup>329</sup>University of Notre Dame, Notre Dame, Indiana, USA  
<sup>330</sup>The Ohio State University, Columbus, Ohio, USA  
<sup>331</sup>Princeton University, Princeton, New Jersey, USA  
<sup>332</sup>Purdue University, West Lafayette, Indiana, USA  
<sup>333</sup>Purdue University Calumet, Hammond, Indiana, USA  
<sup>334</sup>Rice University, Houston, Texas, USA  
<sup>335</sup>University of Rochester, Rochester, New York, USA  
<sup>336</sup>The Rockefeller University, New York, New York, USA

- <sup>337</sup>Rutgers, The State University of New Jersey, Piscataway, New Jersey, USA  
<sup>338</sup>University of Tennessee, Knoxville, Tennessee, USA  
<sup>339</sup>Texas A&M University, College Station, Maryland, USA  
<sup>340</sup>Texas Tech University, Lubbock, Texas, USA  
<sup>341</sup>Vanderbilt University, Nashville, Tennessee, USA  
<sup>342</sup>University of Virginia, Charlottesville, Virginia, USA  
<sup>343</sup>Wayne State University, Detroit, Michigan, USA  
<sup>344</sup>University of Wisconsin, Madison, Wisconsin, USA

<sup>b</sup>Deceased.

- <sup>b</sup>Also at Department of Physics, King's College London, London, United Kingdom.  
<sup>a</sup>Also at Institute of Physics, Azerbaijan Academy of Sciences, Baku, Azerbaijan.  
<sup>a</sup>Also at Novosibirsk State University, Novosibirsk, Russia.  
<sup>a</sup>Also at TRIUMF, Vancouver, BC, Canada.  
<sup>a</sup>Also at Department of Physics, California State University, Fresno, CA, USA.  
<sup>a</sup>Also at Department of Physics, University of Fribourg, Fribourg, Switzerland.  
<sup>a</sup>Also at Departamento de Física e Astronomia, Faculdade de Ciências, Universidade do Porto, Portugal.  
<sup>a</sup>Also at Tomsk State University, Tomsk, Russia.  
<sup>a</sup>Also at CPPM, Aix-Marseille Université and CNRS/IN2P3, Marseille, France.  
<sup>a</sup>Also at Università di Napoli Parthenope, Napoli, Italy.  
<sup>a</sup>Also at Institute of Particle Physics (IPP), Canada.  
<sup>a</sup>Also at Particle Physics Department, Rutherford Appleton Laboratory, Didcot, United Kingdom.  
<sup>a</sup>Also at Department of Physics, St. Petersburg State Polytechnical University, St. Petersburg, Russia.  
<sup>a</sup>Also at Louisiana Tech University, Ruston, LA, USA.  
<sup>a</sup>Also at Institut Català de Recerca i Estudis Avançats, ICREA, Barcelona, Spain.  
<sup>a</sup>Also at Department of Physics, National Tsing Hua University, Taiwan.  
<sup>a</sup>Also at Department of Physics, The University of Texas at Austin, Austin, TX, USA.  
<sup>a</sup>Also at Institute of Theoretical Physics, Ilia State University, Tbilisi, Georgia.  
<sup>a</sup>Also at CERN, Geneva, Switzerland.  
<sup>a</sup>Also at Georgian Technical University (GTU), Tbilisi, Georgia.  
<sup>a</sup>Also at Ochanomizu Academic Production, Ochanomizu University, Tokyo, Japan.  
<sup>a</sup>Also at Manhattan College, New York, NY, USA.  
<sup>a</sup>Also at Institute of Physics, Academia Sinica, Taipei, Taiwan.  
<sup>a</sup>Also at LAL, Université Paris-Sud and CNRS/IN2P3, Orsay, France.  
<sup>a</sup>Also at Academia Sinica Grid Computing, Institute of Physics, Academia Sinica, Taipei, Taiwan.  
<sup>a</sup>Also at School of Physics, Shandong University, Shandong, China.  
<sup>a</sup>Also at Moscow Institute of Physics and Technology State University, Dolgoprudny, Russia.  
<sup>a</sup>Also at Section de Physique, Université de Genève, Geneva, Switzerland.  
<sup>a</sup>Also at International School for Advanced Studies (SISSA), Trieste, Italy.  
<sup>a</sup>Also at Department of Physics and Astronomy, University of South Carolina, Columbia, SC, USA.  
<sup>a</sup>Also at School of Physics and Engineering, Sun Yat-sen University, Guangzhou, China.  
<sup>a</sup>Also at Faculty of Physics, M.V.Lomonosov Moscow State University, Moscow, Russia.  
<sup>a</sup>Also at National Research Nuclear University MEPhI, Moscow, Russia.  
<sup>a</sup>Also at Department of Physics, Stanford University, Stanford, CA, USA.  
<sup>a</sup>Also at Institute for Particle and Nuclear Physics, Wigner Research Centre for Physics, Budapest, Hungary.  
<sup>a</sup>Also at Department of Physics, The University of Michigan, Ann Arbor, MI, USA.  
<sup>a</sup>Also at Discipline of Physics, University of KwaZulu-Natal, Durban, South Africa.  
<sup>a</sup>Also at University of Malaya, Department of Physics, Kuala Lumpur, Malaysia.  
<sup>a</sup>Also at Vienna University of Technology, Vienna, Austria.  
<sup>a</sup>Also at CERN, European Organization for Nuclear Research, Geneva, Switzerland.  
<sup>a</sup>Also at State Key Laboratory of Nuclear Physics and Technology, Peking University, Beijing, China.  
<sup>a</sup>Also at Institut Pluridisciplinaire Hubert Curien, Université de Strasbourg, Université de Haute Alsace Mulhouse, CNRS/IN2P3, Strasbourg, France.  
<sup>a</sup>Also at National Institute of Chemical Physics and Biophysics, Tallinn, Estonia.  
<sup>a</sup>Also at Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Moscow, Russia.  
<sup>a</sup>Also at Universidade Estadual de Campinas, Campinas, Brazil.  
<sup>a</sup>Also at Centre National de la Recherche Scientifique (CNRS)-IN2P3, Paris, France.  
<sup>a</sup>Also at Laboratoire Leprince-Ringuet, Ecole Polytechnique, IN2P3-CNRS, Palaiseau, France.  
<sup>a</sup>Also at Joint Institute for Nuclear Research, Dubna, Russia.  
<sup>a</sup>Also at Ain Shams University, Cairo, Egypt.

- <sup>37</sup>Also at British University in Egypt, Cairo, Egypt.  
<sup>38</sup>Also at Helwan University, Cairo, Egypt.  
<sup>39</sup>Also at Suez University, Suez, Egypt.  
<sup>40</sup>Also at Cairo University, Cairo, Egypt.  
<sup>41</sup>Also at Fayoum University, El-Fayoum, Egypt.  
<sup>42</sup>Also at Université de Haute Alsace, Mulhouse, France.  
<sup>43</sup>Also at Brandenburg University of Technology, Cottbus, Germany.  
<sup>44</sup>Also at Institute of Nuclear Research ATOMKI, Debrecen, Hungary.  
<sup>45</sup>Also at Eötvös Loránd University, Budapest, Hungary.  
<sup>46</sup>Also at University of Debrecen, Debrecen, Hungary.  
<sup>47</sup>Also at Wigner Research Centre for Physics, Budapest, Hungary.  
<sup>48</sup>Also at University of Visva-Bharati, Santiniketan, India.  
<sup>49</sup>Also at King Abdulaziz University, Jeddah, Saudi Arabia.  
<sup>50</sup>Also at University of Ruhuna, Matara, Sri Lanka.  
<sup>51</sup>Also at Isfahan University of Technology, Isfahan, Iran.  
<sup>52</sup>Also at University of Tehran, Department of Engineering Science, Tehran, Iran.  
<sup>53</sup>Also at Plasma Physics Research Center, Science and Research Branch, Islamic Azad University, Tehran, Iran.  
<sup>54</sup>Also at Università degli Studi di Siena, Siena, Italy.  
<sup>55</sup>Also at Purdue University, West Lafayette, IN, USA.  
<sup>56</sup>Also at International Islamic University of Malaysia, Kuala Lumpur, Malaysia.  
<sup>57</sup>Also at Consejo Nacional de Ciencia y Tecnología, Mexico, Mexico.  
<sup>58</sup>Also at Institute for Nuclear Research, Moscow, Russia.  
<sup>59</sup>Also at Institute of High Energy Physics and Informatology, Tbilisi State University, Tbilisi, Georgia.  
<sup>60</sup>Also at St. Petersburg State Polytechnical University, St. Petersburg, Russia.  
<sup>61</sup>Also at National Research Nuclear University "Moscow Engineering Physics Institute" (MEPhI), Moscow, Russia.  
<sup>62</sup>Also at California Institute of Technology, Pasadena, CA, USA.  
<sup>63</sup>Also at Faculty of Physics, University of Belgrade, Belgrade, Serbia.  
<sup>64</sup>Also at Facoltà di Ingegneria, Università di Roma, Roma, Italy.  
<sup>65</sup>Also at National Technical University of Athens, Athens, Greece.  
<sup>66</sup>Also at Scuola Normale e Sezione dell'INFN, Pisa, Italy.  
<sup>67</sup>Also at University of Athens, Athens, Greece.  
<sup>68</sup>Also at Warsaw University of Technology, Institute of Electronic Systems, Warsaw, Poland.  
<sup>69</sup>Also at Institute for Theoretical and Experimental Physics, Moscow, Russia.  
<sup>70</sup>Also at Albert Einstein Center for Fundamental Physics, Bern, Switzerland.  
<sup>71</sup>Also at Adiyaman University, Adiyaman, Turkey.  
<sup>72</sup>Also at Mersin University, Mersin, Turkey.  
<sup>73</sup>Also at Cag University, Mersin, Turkey.  
<sup>74</sup>Also at Piri Reis University, İstanbul, Turkey.  
<sup>75</sup>Also at Gaziosmanpasa University, Tokat, Turkey.  
<sup>76</sup>Also at Ozyegin University, Istanbul, Turkey.  
<sup>77</sup>Also at Izmir Institute of Technology, Izmir, Turkey.  
<sup>78</sup>Also at Mimar Sinan University, İstanbul, İstanbul, Turkey.  
<sup>79</sup>Also at Marmara University, İstanbul, Turkey.  
<sup>80</sup>Also at Yildiz Technical University, İstanbul, Turkey.  
<sup>81</sup>Also at Hacettepe University, Ankara, Turkey.  
<sup>82</sup>Also at Rutherford Appleton Laboratory, Didcot, United Kingdom.  
<sup>83</sup>Also at School of Physics and Astronomy, University of Southampton, Southampton, United Kingdom.  
<sup>84</sup>Also at Instituto de Astrofísica de Canarias, La Laguna, Spain.  
<sup>85</sup>Also at Utah Valley University, Orem, UT, USA.  
<sup>86</sup>Also at University of Belgrade, Faculty of Physics and Vinca Institute of Nuclear Sciences, Belgrade, Serbia.  
<sup>87</sup>Also at Argonne National Laboratory, Argonne, IL, USA.  
<sup>88</sup>Also at Erzincan University, Erzincan, Turkey.  
<sup>89</sup>Also at Texas A&M University at Qatar, Doha, Qatar.  
<sup>90</sup>Also at Kyungpook National University, Daegu, Korea.

# Fragile Families Challenge

# Fragile Families Challenge

A scientific mass collaboration combining

# Fragile Families Challenge

A scientific mass collaboration combining

- ▶ predictive modeling,

# Fragile Families Challenge

A scientific mass collaboration combining

- ▶ predictive modeling,
- ▶ causal inference,

# Fragile Families Challenge

A scientific mass collaboration combining

- ▶ predictive modeling,
- ▶ causal inference,
- ▶ and qualitative interviews

## Fragile Families Challenge

A scientific mass collaboration combining

- ▶ predictive modeling,
- ▶ causal inference,
- ▶ and qualitative interviews

to improve the lives of disadvantaged children in the US.

# FF Fragile Families

& Child Wellbeing Study  
PRINCETON | COLUMBIA



- ▶ Birth cohort panel study
- ▶ ≈ 5,000 children born in 20 U.S. cities
- ▶ Oversample of non-marital births
- ▶ Followed from birth through age 15

**Key research question:** What can be done to improve the life chances of disadvantaged children?

Hundreds of papers and dozens of dissertations

<http://crcw.princeton.edu/publications/publications.asp>

## Published Articles

<b>Authors</b>	<b>Date</b>	<b>Title / Link</b>
Brianne Pragg, Chris Knoester	Forthcoming	"Parental Leave Use Among Disadvantaged Fathers" <i>Journal of Family Issues</i> .
Jessica Hardie, Kristin Turney	Forthcoming	"The Intergenerational Consequences of Parental Health Limitations" <i>Journal of Marriage and Family</i> .
Robin Hognas, Heidi Williams	Forthcoming	"Maternal Kinship Involvement and Father Identity in Fragile Families" <i>Journal of Family and Economic Issues</i> .
Manuel Jiménez, Roy Wade, Ofira Schwartz-Soicher, Yong Lin, Nancy Reichman	Forthcoming	"Adverse Childhood Experiences and ADHD Diagnosis at Age 9 in a National Urban Sample" <i>Academic Pediatrics</i> .
Samara Gunter	Forthcoming	"Dynamics of Urban Informal Labor Supply in the United States" <i>Social Science Quarterly</i> .
Juan Shao-Chiu, Heather Washington, Megan Kurlychek	Forthcoming	"Breaking the Intergenerational Cycle: Partner violence, child-parent attachment, and children's aggressive behaviors" <i>Journal of Interpersonal Violence</i> .
Youngmin Yi, Kristin Turney, Christopher Wildeman	Forthcoming	"Mental Health Among Jail and Prison Inmates" <i>American Journal of Men's Health</i> .
Michael McFarland, Sara McLanahan, Bridget Goosby, Nancy Reichman	Forthcoming	"Grandparents' Education and Infant Health: Pathways Across Generations" <i>Journal of Marriage and Family</i> .
Christian King	Forthcoming	"Food Insecurity and Housing Instability in Vulnerable Families" <i>Review of Economics of the Household</i> .
Wan-Yi Chen, Yookyong Lee	Forthcoming	"The Impact of Community Violence, Personal Victimization, and Paternal Support on Maternal Harsh Parenting" <i>Journal of Community Psychology</i> .
Marcia Carlson, Alicia VanOrman	Forthcoming	"Trajectories of relationship supportiveness after childbirth: Does marriage matter?" <i>Social Science Research</i> .
Jared Durtschi, Kristy Soloski, Jonathan Kimmes	Forthcoming	"The Dyadic Effects of Supportive Coparenting and Parental Stress on Relationship Quality Across the Transition to Parenthood" <i>Journal of Marital and Family Therapy</i> .
Anne Martin, Rebecca Ryan, Elizabeth Riina, Jeannie Brooks-Gunn	Forthcoming	"Coreidential Father Transitions and Biological Parents' Coparenting Quality in Early and Middle Childhood" <i>Journal of Family Issues</i> .
Lawrence Berger, Sarah Font, Kristen Slack, Jane Waldfogel	Forthcoming	"Income and child maltreatment in unmarried families: evidence from the earned income tax credit" <i>Review of Economics of the Household</i> .
Sung-Bong Cho, Ming Cui, Amy Claridge	Forthcoming	"Cohabiting parents' marriage plans and marriage realization: Gender differences, couple agreement, and longitudinal effects" <i>Journal of Social and Personal Relationships</i> .
M. Blake Berryhill	Forthcoming	"Single mothers' home-based school involvement: a longitudinal analysis" <i>Journal of Family Studies</i> .
Colin Flood, Karen Sheehan, Marie Crandall	Forthcoming	"Predictors of Emergency Department Utilization Among Children in Vulnerable Families" <i>Pediatric Emergency Care</i> .
Sarah James, Lauren Hale	Forthcoming	"Sleep Duration and Child Well-Being: A Nonlinear Association" <i>Journal of Clinical Child &amp; Adolescent Psychology</i> .

Paula Fomby	Forthcoming	"Motherhood in Complex Families" <i>Journal of Family Issues</i>
Glenn Walters	Forthcoming	"Parent and Child Reports of Animal Cruelty and their Correlations with Parent and Child Reports of Child Delinquency" <i>Psychology, Crime &amp; Law</i>
Cong Zhang, Catherine Cubbin, Qinying Ci	Forthcoming	"Parenting stress and mother-child playful interaction: the role of emotional support" <i>Journal of Family Studies</i>
Kei Nomaguchi, Susan Brown, Tanya M. Leyman	Forthcoming	"Fathers' Participation in Parenting and Maternal Parenting Stress: Variation by Relationship Status" <i>Journal of Family Issues</i>
Tenah Hunt, Lawrence Berger, Kristen Slack	Forthcoming	"Adverse childhood experiences and behavioral problems in middle childhood" <i>Child Abuse &amp; Neglect</i>
Jessica Su, Rachel Dunifon	Forthcoming	"Nonstandard Work Schedules and Private Safety Nets Among Working Mothers" <i>Journal of Marriage and Family</i>
Jay Fagan, Mollie Cherson	Forthcoming	"Maternal Gatekeeping: The Associations Among Facilitation, Encouragement, and Low-Income Fathers' Engagement With Young Children" <i>Journal of Family Issues</i>
Branden McLeod	Forthcoming	"Paternal dimensions and complexities: Understanding the relationships between parental dyads and fathers' involvement among Black fathers with criminal records" <i>Journal of Family Social Work</i>
M. Blake Berryhill, Jared Durtschi	Forthcoming	"Understanding Single Mothers' Parenting Stress Trajectories" <i>Marriage &amp; Family Review</i>
Robert Morris	2017	* Mitigating the Effects of Parental Incarceration through Social Intervention: A Longitudinal and Comparative Analysis of the Efficacy of Big Brothers Big Sisters" <i>Journal of Applied Social Science</i> , 11(1): 25 - 47.
Melissa Radey	2017	"Unmarried Mothers' Postnatal School Enrollment: The Role and Intersection of Demographic and Socioeconomic Characteristics" <i>Journal of Social Service Research</i> , 43(1): 115-128.
Paula Fomby, Cynthia Osborne	2017	"Family Instability, Multipartner Fertility, and Behavior in Middle Childhood" <i>Journal of Marriage and Family</i> , 79(1): 75-93.
Kei Nomaguchi, Wendi Johnson, Mallory Minter, Lindsey Aldrich	2017	"Clarifying the Association Between Mother-Father Relationship Aggression and Parenting" <i>Journal of Marriage and Family</i> , 79(1): 161-178.
Kristen Sobba, Brenda Prochaska, Emily Berthelot	2017	"Maternal incarceration penalty: an examination of the effect of maternal conviction and incarceration on childhood delinquency" <i>Journal of Criminal Psychology</i> , 7(1): 29 - 46.
Kimberly Turner, Maureen Waller	2017	"Indebted Relationships: Child Support Arrears and Nonresident Fathers' Involvement With Children" <i>Journal of Marriage and Family</i> , 79(1): 24-43.
Amelia Branigan	2017	"(How) Does Obesity Harm Academic Performance? (How) Does Obesity Harm Academic Performance? Stratification at the Intersection of Race, Sex, and Body Size in Elementary and High School" <i>Sociology of Education</i> , 90(1): 25-46.
Lauren McClain, Susan Brown	2017	"The Roles of Fathers' Involvement and Coparenting in Relationship Quality among Cohabiting and Married Parents" <i>Sex Roles</i> , 76(5): 334-345.
Robyn Powell, Susan Parish	2017	"Behavioural and cognitive outcomes in young children of mothers with intellectual impairments" <i>Journal of Intellectual Disability Research</i> , 61(1): 50-61.

William Schneider, Jane Waldfogel, Jeanne Brooks-Gunn	2017	"The Great Recession and risk for child abuse and neglect" <i>Children and Youth Services Review</i> , 72: 71-81.
Kristin Turney	2017	"The Unequal Consequences of Mass Incarceration for Children" <i>Demography</i> , 54: 1.
Raymond Petren	2017	"Paternal Multiple Partner Fertility and Environmental Chaos Among Unmarried Nonresident Fathers" <i>Journal of Social Service Research</i> , 43(1): 100-114.
Christian King	2017	"Soft drink consumption and child behaviour problems: the role of food insecurity and sleep patterns" <i>Public Health Nutrition</i> , 20(2): 266-273.
Marcia Carlson, Alicia VanOrman, Kimberly Turner	2017	"Fathers' Investments of Money and Time Across Residential Contexts" <i>Journal of Marriage and Family</i> , 79(1): 10-23.
Niel Wilmot, Kim Dauner	2017	"Examination of the influence of social capital on depression in fragile families" <i>Journal of Epidemiology and Community Health</i> , 71(3): 296-302.
Cole Ratcliffe, Aaron Norton, Jared Durtschi	2016	"Early Romantic Relationships Linked With Improved Child Behavior 8 Years Later" <i>Journal of Family Issues</i> , 37(5): 717-735.
Kei Nomaguchi, Wendi Johnson	2016	"Parenting Stress among Low-Income and Working-Class Fathers: The Role of Employment" <i>Journal of Family Issues</i> , 37(11): 1535-1557.
Robin Högnäs, Jason Thomas	2016	"Birds of a Feather Have Babies Together? Family Structure Homogamy and Union Stability Among Cohabiting Parents" <i>Journal of Family Issues</i> , 37(1): 29-52.
Anna Haskins	2016	"Beyond Boys' Bad Behavior: Paternal Incarceration and Cognitive Development in Middle Childhood" <i>Social Forces</i> , 95(2): 861-892.
Tammy Chang, Michelle Moniz, Melissa Piegle, Ananda Sen, Matthew Davis, Caroline Richardson	2016	"Characteristics of Adolescents at Risk for Excess Weight Gain During Pregnancy" <i>Obstetrics &amp; Gynecology</i> , 127.
Anthony Isacco, Richard Hofscher, Sonia Molloy	2016	"An Examination of Fathers' Mental Health Help Seeking: A Brief Report" <i>American Journal of Men's Health</i> , 10(6): NP33-NP38.
Deadric Williams, Jacob Cheadle	2016	"Economic Hardship, Parents' Depression, and Relationship Distress among Couples With Young Children" <i>Society and Mental Health</i> , 6(2): 73-89.
Erin Fletcher	2016	"Match Quality and Maternal Investments in Children" <i>Review of Economics of the Household</i> , 14(1): 83-102.
Amanda Geller, Kate Jaeger, Garrett Pace	2016	"Surveys, Records, and the Study of Incarceration in Families" <i>Annals of the American Academy of Political and Social Sciences</i> , 665(1): 22-43.
Christopher Wildeman, Kristin Turney, Youngmin Yi	2016	"Paternal Incarceration and Family Functioning: Variation Across Federal, State, and Local Facilities" <i>The ANNALS of the American Academy of Political and Social Science</i> , 665(1): 80-97.
Hope Corman, Marah Curtis, Kelly Noonan, Nancy Reichman	2016	"Maternal Depression as a Risk Factor for Children's Inadequate Housing Conditions" <i>Social Science and Medicine</i> , 149: 76-83.
Manuel Jimenez, Roy Wade, Yong Lin, Lesley Morrow, Nancy Reichman	2016	"Adverse Experiences in Early Childhood and Kindergarten Outcomes" <i>Pediatrics</i> , 137(2): 1-9.
Cedric Taylor, Dilshani Sarathchandra	2016	"Migrant Selectivity or Cultural Buffering? Investigating the Black Immigrant Health Advantage in Low Birth Weight" <i>Journal of Immigrant and Minority Health</i> , 18(2): 390-396.
Robyn Powell, Susan Parish, Ilhom Akobirshoev	2016	"Health of Young Children Whose Mothers Have Intellectual Disability" <i>American Journal on Intellectual and Developmental Disabilities</i> , 121(4): 281-294.

Kristin Turney, Daniel Schneider	2016	"Incarceration and Household Asset Ownership" <i>Demography</i> , 53(6): 2075-2103.
Yiwen Cao, Kathryn Maguire-Jack	2016	"Interactions with community members and institutions: Preventive pathways for child maltreatment" <i>Child Abuse &amp; Neglect</i> , 62: 111-121.
William Schneider	2016	"Relationship Transitions and the Risk for Child Maltreatment" <i>Demography</i> , 53(6): 1771-1800.
Louis Donnelly, Sara McLanahan, Jeanne Brooks-Gunn, Irwin Garfinkel, Brandon Wagner, Wade Jacobsen, Sarah Gold, Lauren Gaydosh	2016	"Cohesive Neighborhoods Where Social Expectations Are Shared May Have Positive Impact On Adolescent Mental Health" <i>Health Affairs</i> , 35(11): 2083-2091.
M. Blake Berryhill	2016	"Mothers' Parenting Stress and Engagement: Mediating Role of Parental Competence" <i>Marriage &amp; Family Review</i> , 52(5): 461-480.
Tyrone Cheng, Celia Lo	2016	"Racial Disparities in Children's Health: A Longitudinal Analysis of Mothers Based on the Multiple Disadvantage Model" <i>Journal of Community Health</i> , 41(4): 753-760.
Daniel Schneider, Kristen Harknett, Sara McLanahan	2016	"Intimate Partner Violence in the Great Recession" <i>Demography</i> , 53(2): 471-505.
Ashley Munger, Sandra Hofferth, Stephanie Grutzmacher	2016	"The Role of the Supplemental Nutrition Assistance Program in the Relationship Between Food Insecurity and Probability of Maternal Depression" <i>Journal of Hunger &amp; Environmental Nutrition</i> , 11(2): 147-161.
Edward Vargas, Maureen Pirog	2016	"Mixed-Status Families and WIC Uptake: The Effects of Risk of Deportation on Program Use" <i>Social Science Quarterly</i> , 97(3): 555-572.
Lanlan Xu, Maureen Pirog, Edward Vargas	2016	"Child support and mixed-status families: an analysis using the Fragile Families and Child Wellbeing Study" <i>Social Science Research</i> , 60: 249-265.
Angela Rachidi	2016	"Child care assistance and nonstandard work schedules" <i>Children and Youth Services Review</i> , 65: 104-111.
Todd Jensen, Garrett Pace	2016	"Stepfather Involvement and Stepfather-Child Relationship Quality: Race and Parental Marital Status as Moderators" <i>Journal of Marital and Family Therapy</i> , 42(4): 659-672.
Jessica Lucero, Sojung Lim, Anna Maria Santiago	2016	"Changes in Economic Hardship and Intimate Partner Violence: A Family Stress Framework" <i>Journal of Family and Economic Issues</i> , 37(3): 395-406.
Richard Petts	2016	"Religious homogamy, race/ethnicity, and parents' relationship stability" <i>Sociological Focus</i> , 49(3): 163-179.
Rachel Razza, Anne Martin, Jeanne Brooks-Gunn	2016	"Links Between Motor Control and Classroom Behaviors: Moderation by Low Birth Weight" <i>Journal of Child and Family Studies</i> , 25(8): 2423-2434.
Kari Adamsons, Kay Pasley	2016	"Parents' Fathering Identity Standards and Later Father Involvement" <i>Journal of Family Issues</i> , 37(2): 221-244.
Joy Piontak	2016	"Household Composition and Maternal Depression: Examining the Role of Multigenerational Households" <i>Journal of Family Issues</i> , 37(7): 947-969.
Natasha Pilkauskas, Jane Waldfogel, Jeanne Brooks-Gunn	2016	"Maternal labor force participation and differences by education in an urban birth cohort study - 1998-2010" <i>Demographic Research</i> , 34(14): 407-420.
Natasha Pilkauskas, Rachel Dunifon	2016	"Understanding Grandfamilies: Characteristics of Grandparents, Nonresident Parents, and Children" <i>Journal of Marriage and Family</i> , 78(3): 623-633.

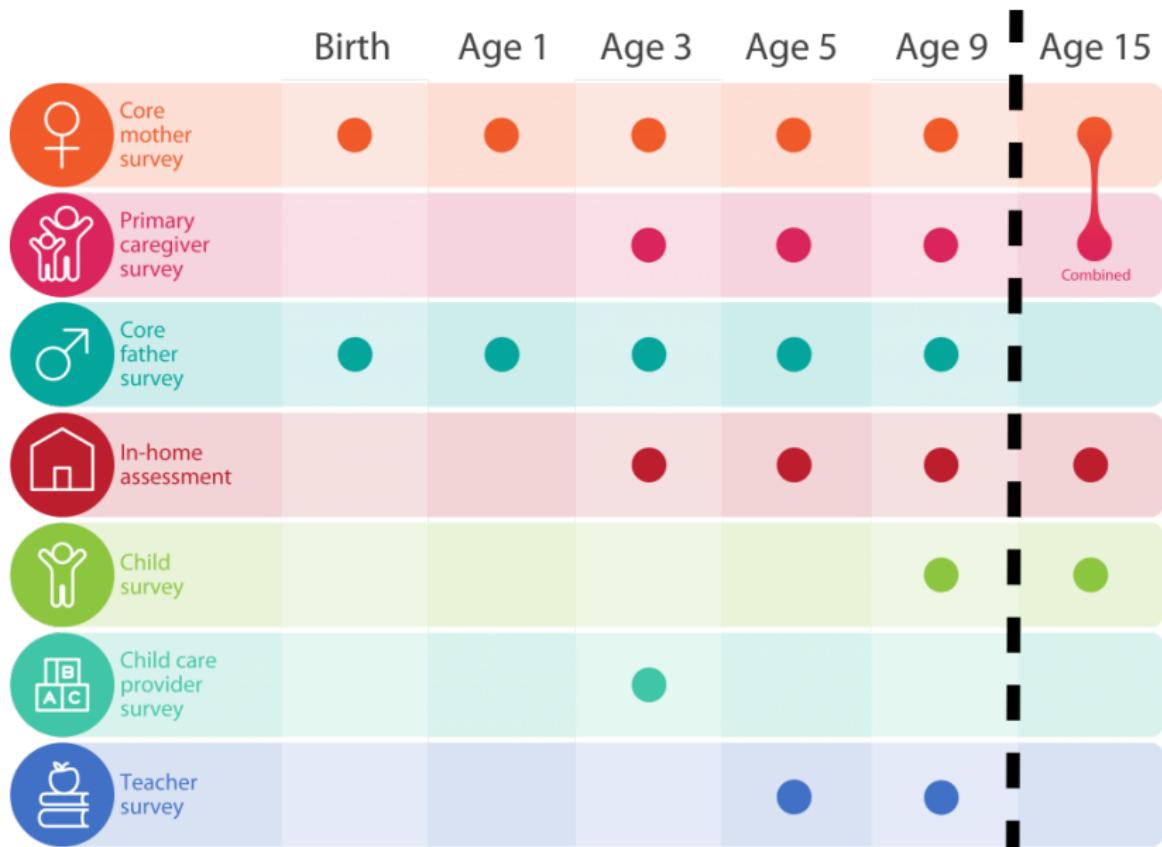
Robynn Cox, Sally Wallace	2016	"Identifying the link between food security and incarceration" <i>Southern Economic Journal</i> , 82(4): 1062-1077.
Sarah Halpern-Meekin, Kristin Turney	2016	"Relationship Churning and Parenting Stress Among Mothers and Fathers" <i>Journal of Marriage and Family</i> , 78(3): 715-729.
Tracey Woodard, Jennifer Copp	2016	"Maternal incarceration and children's delinquent involvement: The role of sibling relationships" <i>Children and Youth Services Review</i> , 70: 340-348.
Inna Altschul, Shawna Lee, Elizabeth Gershoff	2016	"Hugs, Not Hits: Warmth and Spanking as Predictors of Child Social Competence" <i>Journal of Marriage and Family</i> , 78(3): 695-714.
Tianca Crocker, Yolanda Padilla	2016	"Living On the Edge: Access to Liquid Assets as a Determinant of Unmarried Urban Mothers' Life Satisfaction" <i>Families in Society: The Journal of Contemporary Social Services</i> , 97(2): 132-141.
Lucy Markson, Michael Lamb, Friedrich Losel	2016	"The impact of contextual family risks on prisoners' children's behavioural outcomes and the potential protective role of family functioning moderators" <i>European Journal of Developmental Psychology</i> , 13(3): 325-340.
Julie Ma	2016	"Neighborhood and parenting both matter: The role of neighborhood collective efficacy and maternal spanking in early behavior problems" <i>Children and Youth Services Review</i> , 70: 250-260.
Brenden Beck, Anthony Buttaro, Mary Clare Lennon	2016	"Home moves and child wellbeing in the first five years of life in the United States" <i>Longitudinal and Life Course Studies: International Journal</i> , 7(3).

Social Scientists ←→ Data Scientists

Social Scientists  $\longleftrightarrow$  Data Scientists

$\hat{\beta}$  &  $\hat{y}$

	Birth	Age 1	Age 3	Age 5	Age 9
 Core mother survey	●	●	●	●	●
 Primary caregiver survey			●	●	●
 Core father survey	●	●	●	●	●
 In-home assessment			●	●	●
 Child survey					●
 Child care provider survey			●		
 Teacher survey				●	●



5,000 families

Birth to age 9  
12,000 features

Age 15  
1,500 features

5,000 families

Birth to age 9  
12,000 features

Age 15  
6 key outcomes



Continuous outcomes:

- ▶ GPA
- ▶ Grit
- ▶ Material hardship

Binary outcomes:

- ▶ Housing eviction
- ▶ Layoff of a caregiver
- ▶ Job training for a caregiver

## Fragile Families Challenge:

1. common task method

## Fragile Families Challenge:

1. common task method
2. use submissions to do cool stuff

## Common task method

- ▶ common data
- ▶ common metric
- ▶ evaluation on held-out test data

“secret sauce” of machine learning (Donoho 2015)

$$\hat{y} = \hat{f}_1(x)$$

$$\hat{y} = \hat{f}_2(x)$$

$$\hat{y} = \hat{f}_3(x)$$

$$\begin{aligned}\hat{y} &= \hat{f}_1(x) \\ \hat{y} &= \hat{f}_2(x) \\ \hat{y} &= \hat{f}_3(x)\end{aligned}$$

Community model

$$\hat{f}_c\left(\hat{f}_1(x), \hat{f}_2(x), \hat{f}_3(x)\right)$$

$$\hat{y} = \hat{f}_1(x)$$

$$\hat{y} = \hat{f}_2(x)$$

$$\hat{y} = \hat{f}_3(x)$$

Community model

$$\hat{w}_1\hat{f}_1(x) + \hat{w}_2\hat{f}_2(x) + \hat{w}_3\hat{f}_3(x)$$

What's so special about this community model?

Use community model to

- ▶ look for “dark matter”
- ▶ estimate causal effects

Use community model to

- ▶ look for “dark matter”<sup>1</sup>
- ▶ estimate causal effects

---

<sup>1</sup>Learn more at

<http://www.fragilefamilieschallenge.org/unmeasured-factors/>

Most social science models have poor predictive performance.  
Why?

Most social science models have poor predictive performance.  
Why?

- ▶ poor measurement

Most social science models have poor predictive performance.  
Why?

- ▶ poor measurement
- ▶ wrong functional form

Most social science models have poor predictive performance.  
Why?

- ▶ poor measurement
- ▶ wrong functional form
- ▶ “dark matter”

Look for dark matter:

- ▶ Interview kids and families that are beating the odds (and not)

Look for dark matter:

- ▶ Interview kids and families that are beating the odds (and not)
- ▶ Three continuous outcomes: GPA, Material Hardship, Grit

Look for dark matter:

- ▶ Interview kids and families that are beating the odds (and not)
- ▶ Three continuous outcomes: GPA, Material Hardship, Grit
- ▶ Machine learning in the service of in-depth interviews

Use community model to

- ▶ look for “dark matter”
- ▶ estimate causal effects

Use community model to

- ▶ look for “dark matter”
- ▶ estimate causal effects<sup>2</sup>

---

<sup>2</sup>Learn more at

<http://www.fragilefamilieschallenge.org/causal-inference/>

# E V I C T E D



POVERTY AND PROFIT IN  
THE AMERICAN CITY

MATTHEW DESMOND

Does eviction **cause** children's outcomes to be worse?

Does eviction **cause** children's outcomes to be worse?

Or is eviction just **associated with** worse outcomes because those who are evicted are already disadvantaged in other ways?

Causal inference from observational data is hard but important

Causal inference from observational data is hard but important

- ▶ Selection on observables

Causal inference from observational data is hard but important

- ▶ Selection on observables
- ▶ Perfectly match two kids who are identical except whether they were evicted or not

Causal inference from observational data is hard but important

- ▶ Selection on observables
- ▶ Perfectly match two kids who are identical except whether they were evicted or not
- ▶ Propensity score matching (roughly, one dimensional matching)

Causal inference from observational data is hard but important

- ▶ Selection on observables
- ▶ Perfectly match two kids who are identical except whether they were evicted or not
- ▶ Propensity score matching (roughly, one dimensional matching)
- ▶ Community model produces propensity scores used for matching

Causal inference from observational data is hard but important

- ▶ Selection on observables
- ▶ Perfectly match two kids who are identical except whether they were evicted or not
- ▶ Propensity score matching (roughly, one dimensional matching)
- ▶ Community model produces propensity scores used for matching
- ▶ Sensitivity analysis

Causal inference from observational data is hard but important

- ▶ Selection on observables
- ▶ Perfectly match two kids who are identical except whether they were evicted or not
- ▶ Propensity score matching (roughly, one dimensional matching)
- ▶ Community model produces propensity scores used for matching
- ▶ Sensitivity analysis
- ▶ In-depth interviews to check assumption of selection on observables

Use community model to

- ▶ look for “dark matter”
- ▶ estimate causal effects

In order to enable future research,  
at the end of the Challenge,  
we will open-source all submitted  
predictions, code, and narrative explanations.

## How to participate

[www.fragilefamilieschallenge.org](http://www.fragilefamilieschallenge.org)

## Introducing the outcome variables

GPA<sup>3</sup>

---

<sup>3</sup>Learn more at <http://www.fragilefamilieschallenge.org/gpa/>

GPA<sup>3</sup>

How do kids beat the odds academically?

---

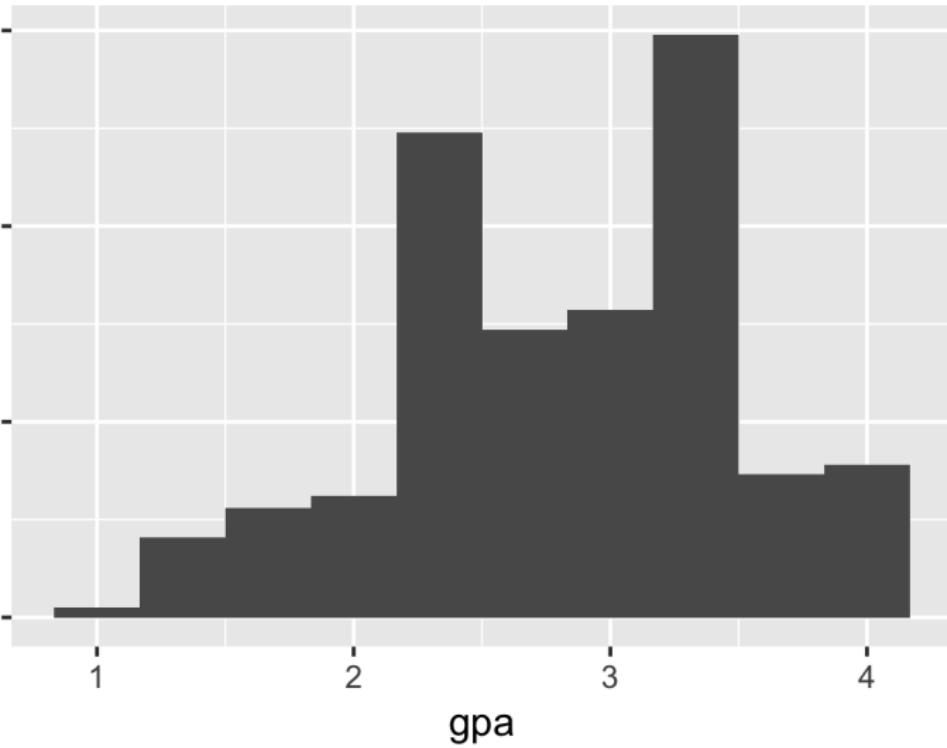
<sup>3</sup>Learn more at <http://www.fragilefamilieschallenge.org/gpa/>

# GPA<sup>4</sup>

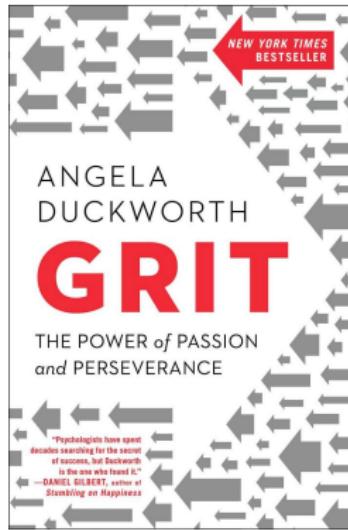
B20. At the {most recent grading period/last grading period in the spring} what was your grade in ...

	A	B	C	D OR LOWE R	NO GRADE OR PASS/FAIL	REF	DK	N/A HOMESCHOoled
B20A English or language arts? ..	1	2	3	4	5	-1	-2	7 → GO TO B22A
B20B Math? .....	1	2	3	4	5	-1	-2	7 → GO TO B22A
B20C History or social studies? ..	1	2	3	4	5	-1	-2	7 → GO TO B22A
B20D Science? .....	1	2	3	4	5	-1	-2	7 → GO TO B22A

<sup>4</sup>This variable is reverse-coded in the data file so that higher values represent higher GPAs.

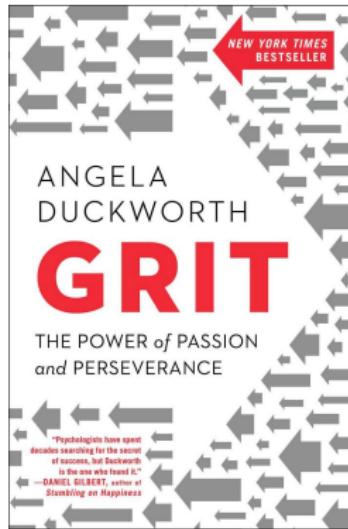


“Grit” predicts success, possibly more than IQ.<sup>5</sup>



<sup>5</sup>Learn more at <http://www.fragilefamilieschallenge.org/grit/>

“Grit” predicts success, possibly more than IQ.<sup>5</sup>



What makes some kids gritty?

<sup>5</sup>Learn more at <http://www.fragilefamilieschallenge.org/grit/>

# Grit<sup>6</sup>

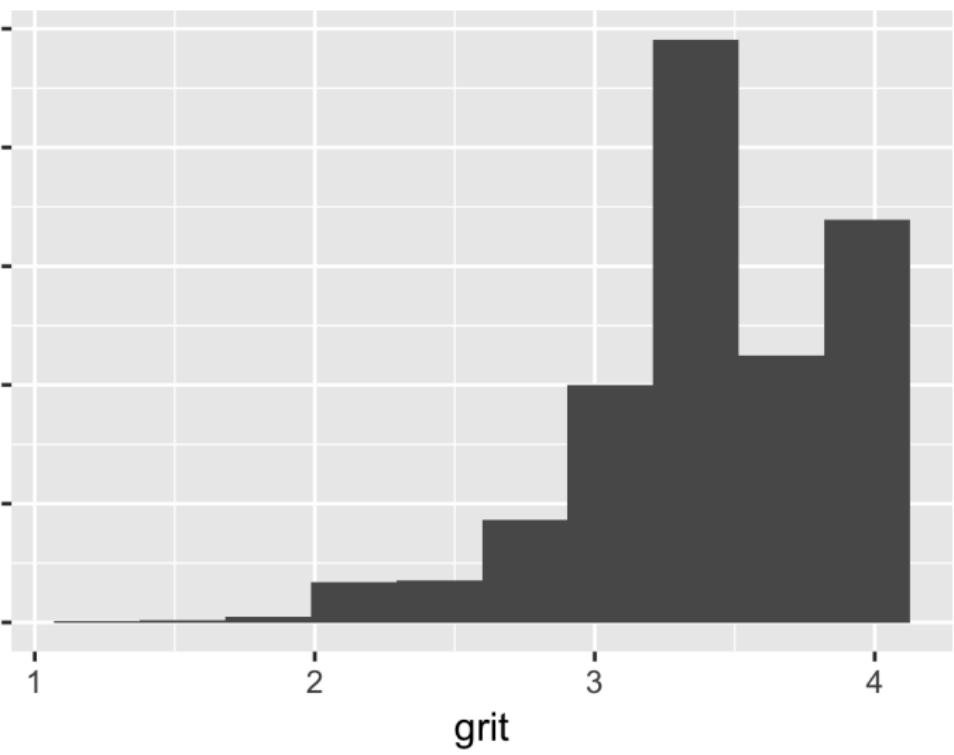
- D2. Thinking about how you have behaved or felt during the past four weeks, please tell me whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the following statements.

PROBE: Thinking about the past four weeks, do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with this statement?

	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	REF	DK
D2I. I keep at my schoolwork until I am done with it.....	1	2	3	4	-1	-2
D2K. Once I make a plan to get something done, I stick to it.....	1	2	3	4	-1	-2
D2M. I finish whatever I begin.....	1	2	3	4	-1	-2
D2V. I am a hard worker	1	2	3	4	-1	-2

---

<sup>6</sup>This variable is reverse-coded in the data file so that higher values represent more grit.



## Material hardship<sup>7</sup>

---

<sup>7</sup>Learn more at

<http://www.fragilefamilieschallenge.org/material-hardship/>

## Material hardship<sup>7</sup>

What unmeasured predictors are associated with families unexpectedly escaping severe deprivation?

---

<sup>7</sup>Learn more at

<http://www.fragilefamilieschallenge.org/material-hardship/>

## Material hardship<sup>7</sup>

What unmeasured predictors are associated with families unexpectedly escaping severe deprivation?

What sends families unexpectedly into deep poverty?

---

<sup>7</sup>Learn more at

<http://www.fragilefamilieschallenge.org/material-hardship/>

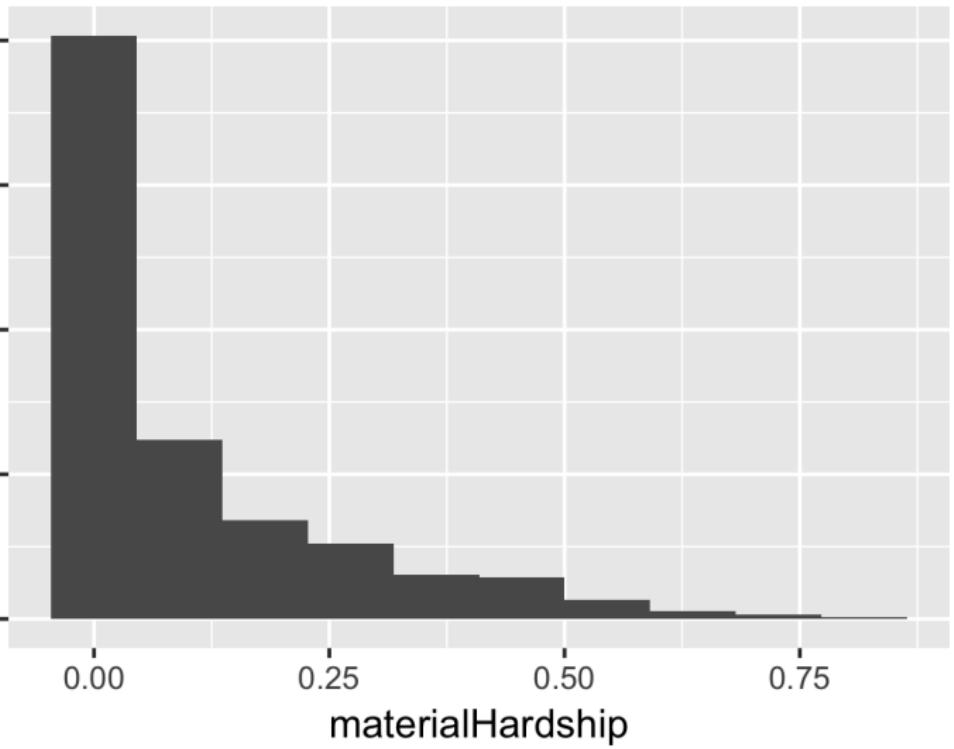
# Material hardship

We are also interested in some of the problems that families face making ends meet. In the past twelve months, did you do any of the following because there wasn't enough money?

		YES	NO	REF	DK
J37.	In the past twelve months, did you receive free food or meals?	1	2	-1	-2
J38.	In the past twelve months, were you ever hungry, but didn't eat because you couldn't afford enough food?	1	2	-1	-2
J39.	In the past twelve months, did you ever not pay the full amount of rent or mortgage payments?	1	2	-1	-2
J40.	In the past twelve months, were you evicted from your home or apartment for not paying the rent or mortgage?	1	2	-1	-2
J41.	In the past twelve months, did you not pay the full amount of gas, oil, or electricity bill?	1	2	-1	-2
J42.	In the past twelve months, was your gas or electric services ever turned off, or the heating oil company did not deliver oil, because there wasn't enough money to pay the bills?	1	2	-1	-2
J43.	In the past twelve months, did you borrow money from friends or family to help pay bills?	1	2	-1	-2
J44.	In the past twelve months, did you move in with other people even for a little while because of financial problems?	1	2	-1	-2

# Material hardship

J45.	In the past twelve months, did you stay at a shelter, in an abandoned building, an automobile or any other place not meant for regular housing, even for one night?	1	2	-1	-2
J46.	In the past twelve months, was there anyone in your household who needed to see a doctor or go to the hospital but couldn't go because of the cost?	1	2	-1	-2
J47.	In the past twelve months, was your telephone service (mobile or land line) cancelled or disconnected by the telephone company because there wasn't enough money to pay the bill?	1	2	-1	-2



## Eviction<sup>8</sup>

---

<sup>8</sup>Learn more at <http://www.fragilefamilieschallenge.org/eviction/>

<sup>9</sup>Note: You will just create propensity scores for eviction given background variables; causal inference comes in the second stage of the Challenge when outcomes are measured several years from now.

## Eviction<sup>8</sup>

Does housing eviction **cause** worse outcomes as kids transition to adulthood?<sup>9</sup>

---

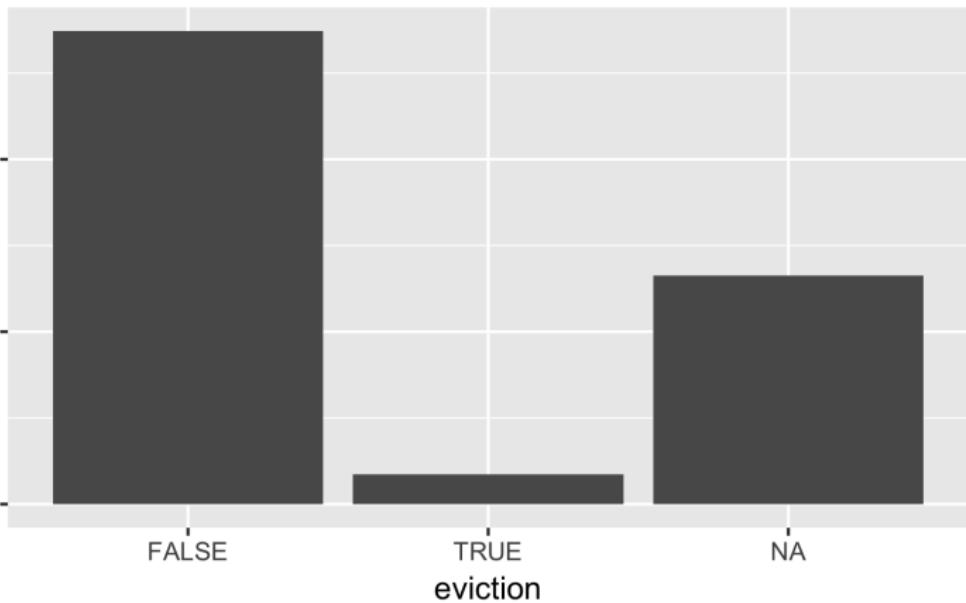
<sup>8</sup>Learn more at <http://www.fragilefamilieschallenge.org/eviction/>

<sup>9</sup>Note: You will just create propensity scores for eviction given background variables; causal inference comes in the second stage of the Challenge when outcomes are measured several years from now.

# Eviction

J51. Since {MONTH AND YEAR COHORT CITY FIELDDED IN YR 9}, were you evicted from your home or apartment for not paying the rent or mortgage?

YES .....	1
NO .....	2
REFUSED .....	-1
DON'T KNOW .....	-2



## Caregiver layoff<sup>10</sup>

---

<sup>10</sup>Learn more at <http://www.fragilefamilieschallenge.org/layoff/>

<sup>11</sup>Note: You will just create propensity scores for caregiver layoff given background variables; causal inference comes in the second stage of the Challenge when outcomes are measured several years from now.

## Caregiver layoff<sup>10</sup>

Does layoff of a caregiver **cause** collateral damage for kids?<sup>11</sup>

---

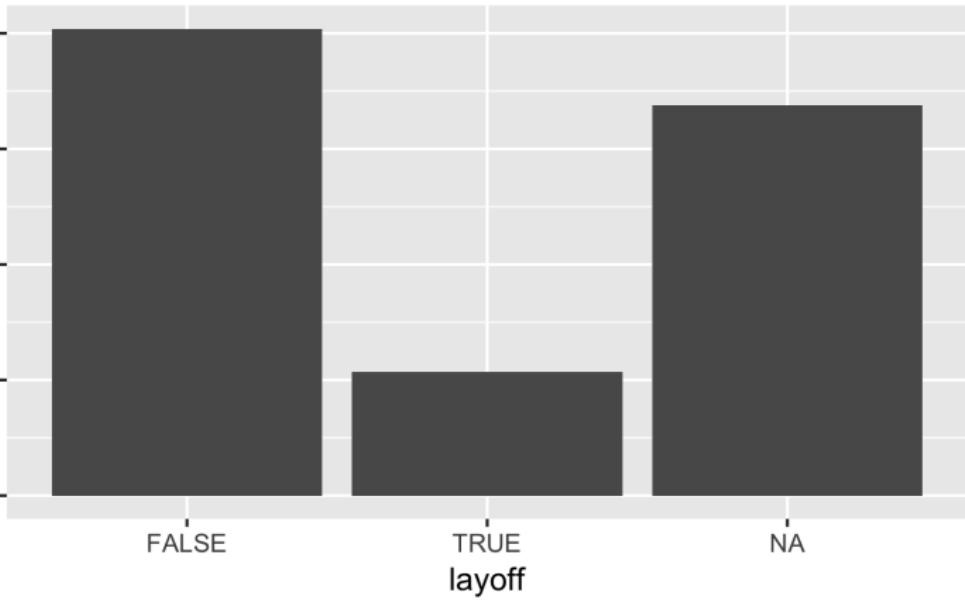
<sup>10</sup>Learn more at <http://www.fragilefamilieschallenge.org/layoff/>

<sup>11</sup>Note: You will just create propensity scores for caregiver layoff given background variables; causal inference comes in the second stage of the Challenge when outcomes are measured several years from now.

# Caregiver layoff

K13. Since {MONTH AND YEAR COHORT CITY FIELDDED IN YR 9}, have you been laid off from your employer for any time?

- |                  |    |
|------------------|----|
| YES .....        | 1  |
| NO.....          | 2  |
| REFUSED.....     | -1 |
| DON'T KNOW ..... | -2 |



## Job training<sup>12</sup>

---

<sup>12</sup>Learn more at

<http://www.fragilefamilieschallenge.org/job-training/>

<sup>13</sup>Note: You will just create propensity scores for job training given background variables; causal inference comes in the second stage of the Challenge when outcomes are measured several years from now.

## Job training<sup>12</sup>

Does job training for a caregiver **cause** collateral benefits for children?<sup>13</sup>

---

<sup>12</sup>Learn more at

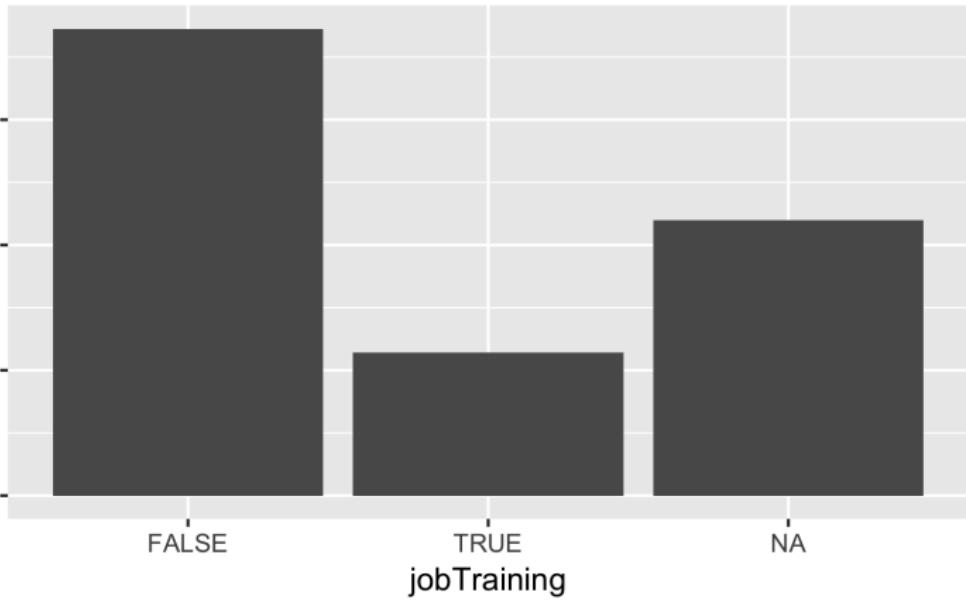
<http://www.fragilefamilieschallenge.org/job-training/>

<sup>13</sup>Note: You will just create propensity scores for job training given background variables; causal inference comes in the second stage of the Challenge when outcomes are measured several years from now.

# Caregiver job training

K4. Since {MONTH AND YEAR COHORT CITY FIELDDED IN YR 9}, have you taken any classes to improve your job skills, such as computer training or literacy classes?

- |                  |     |
|------------------|-----|
| YES .....        | .1  |
| NO .....         | .2  |
| REFUSED .....    | -.1 |
| DON'T KNOW ..... | -.2 |



How do I know what the variables are?

- ▶ Blog post: <http://www.fragilefamilieschallenge.org/survey-documentation/>
- ▶ Fragile Families and Child Wellbeing Study website:  
<http://www.fragilefamilies.princeton.edu/>

# FF Fragile Families & Child Wellbeing Study PRINCETON | COLUMBIA



Search... 

Home

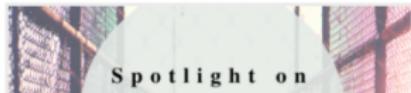
About

People

Publications

Data and Documentation

Contact



Spotlight on

Spotlight on FFCWS and Incarceration  
Research

Recent publications using the Fragile Families & Child  
Wellbeing Study provide a broader understanding of the effects

## General Documentation

Baseline

Year 1

[Links to](#)Year 3 [documentation](#) for each wave

Year 5

Year 9

Year 15

FAQ

## Data and Documentation

### Data

Data are free to download from Princeton University's [Office of Population Research \(OPR\) data archive](#).

Currently, there are five waves of publicly available data including baseline and Year 1, Year 3, Year 5, and Year 9 follow-ups. In order to protect the confidentiality of survey respondents, geographic identifiers, medical records data, contextual data (i.e., census tract characteristics), macroeconomic indicators, and genetic biomarkers are not available in the public use data files. Researchers may apply for these data via a [restricted use contract](#).

### Documentation

General Documentation

Baseline

Year 1

Year 3

Year 5

**Year 9**

Year 15

FAQ

Data Alerts

Contract Data

## Year 9

The Year 9 follow-up wave of data collection took place from 2007 to 2010, which makes the data useful for researchers interested in the effects of the Great Recession on children and families. It is different from previous waves because the home visit was integral to the wave procedures. In previous waves, we conducted core interviews before proceeding to the in-home components. At year 9, our initial interview was with the child's primary caregiver (usually the mother) and we scheduled a home visit at the time of that initial interview. As part of the home visit, we interviewed focal children for the first time. We attempted teacher surveys through the mail. Similar to previous waves, we have core interviews with mothers and fathers. Restricted Data at this wave include [census tract characteristics](#) of mother and father residences, [macroeconomic indicators](#), administrative data on children's [school characteristics](#), and [genetic](#) data from saliva samples from the mother and focal child.

### PRIMARY CAREGIVER

[Primary Caregiver Survey](#)

[Primary Caregiver Self-Administered](#)

### SCALES

[Scales documentation](#)

### MOTHER

[Questionnaire](#)

[Codebook](#)

**Each survey has  
a questionnaire  
and  
a codebook**

### FATHER

[Questionnaire](#)

[Codebook](#)

### CHILD

[Child Survey](#)

[Home Visit Workbook](#)

[Interviewer Observations](#)

[Codebook](#)

### TEACHER

[Questionnaire](#)

[Codebook](#)

## Questionnaire:

### BOX A3A2

IF PCG=BIOFATHER IN THE PCG IDENTIFIER IN THE SCREENER,  
GO TO A3C.

ELSE IF PCG= NON-PARENT AND RELATIONSHIP = MATERNAL  
GRANDPARENT(S), PATERNAL GRANDPARENT(S), OTHER  
RELATIVES OR FRIEND IN THE PCG IDENTIFIER IN THE  
SCREENER, GO TO A3B1A.

ELSE IF PCG=NON-PARENT AND RELATIONSHIP=FOSTER CARE  
IN THE PCG IDENTIFIER IN THE SCREENER, GO TO A3B.

ELSE IF PCG=NON-PARENT AND RELATIONSHIP = OTHER,  
SPECIFY IN THE PCG IDENTIFIER IN THE SCREENER, GO TO  
A3B1A.

ELSE IF PCG= "NOT MOTHER" IN THE PCG IDENTIFIER GO TO  
A3D.

A3B. Are {CHILD}'s foster parents related to you?

YES .....	1
NO .....	2
REFUSED.....	-1
DON'T KNOW.....	-2

In the corresponding codebook, we see the count of respondents who gave each answer:

```
m5a3b                                         A1B. Child's foster parents related to you

type: numeric (byte)
label: BM_72F

range: [-9,2]                               units: 1
unique values: 5                           missing : 0/4898

tabulation: Freq.   Numeric  Label
            1383      -9  -9 Not in wave
            3499      -6  -6 Skip
              6      -3  -3 Missing
              1      -2  -2 Don't know
              9       2     2 no
```

In the corresponding codebook, we see the count of respondents who gave each answer:

```
m5a3b                                         A1B. Child's foster parents related to you

type: numeric (byte)
label: BM_72F

range: [-9,2]                               units: 1
unique values: 5                           missing : 0/4898

tabulation: Freq.   Numeric  Label
            1383      -9    -9 Not in wave
            3499      -6    -6 Skip
              6      -3    -3 Missing
              1      -2    -2 Don't know
              9       2      2 no
```

Things to note here:

In the corresponding codebook, we see the count of respondents who gave each answer:

```
m5a3b                                         A3B. Child's foster parents related to you

type: numeric (byte)
label: BM_72F

range: [-9,2]                               units: 1
unique values: 5                           missing : 0/4898

tabulation: Freq.   Numeric  Label
            1383      -9    -9 Not in wave
            3499      -6    -6 Skip
              6      -3    -3 Missing
              1      -2    -2 Don't know
              9       2      2 no
```

Things to note here:

- ▶ The question referred to in the questionnaire as A3B is called m5a3b in the codebook.

In the corresponding codebook, we see the count of respondents who gave each answer:

```
m5a3b                                         A3B. Child's foster parents related to you

type: numeric (byte)
label: BM_72F

range: [-9,2]                               units: 1
unique values: 5                           missing : 0/4898

tabulation: Freq.   Numeric  Label
            1383     -9    -9 Not in wave
            3499     -6    -6 Skip
              6     -3    -3 Missing
              1     -2    -2 Don't know
              9      2      2 no
```

Things to note here:

- ▶ The question referred to in the questionnaire as A3B is called m5a3b in the codebook.
- ▶ There are missing codes.

The general structure of the variable names is

[prefix for questionnaire type][wave number][question number]

# Variable prefixes<sup>14</sup>

Common prefixes:

Prefix	Meaning
m	Mother
f	Father
h or hv	Home visit
p	Primary caregiver
k	Kid (interview with the child)
kind_	Kindergarten teacher
t	Teacher
ffcc_[something]	Child care surveys. For a full list of the [something] see <a href="#">this documentation</a> .

---

<sup>14</sup>For more info, see

<http://www.fragilefamilieschallenge.org/survey-documentation/>

## Constructed variables

- ▶ Some variables are **constructed** from several questions.
- ▶ These tend to be important.
- ▶ These variables add the additional prefix **c** to the front of the variable name.
- ▶ For instance, cm1ethrace indicates constructed mother's wave 1 race/ethnicity.

## Wave numbers $\neq$ child ages

Wave number	Approximate child age
1	0, often called "baseline"
2	1
3	3
4	5
5	9

## Common missing codes<sup>15</sup>

- ▶ -9 Not in wave - Did not participate in survey/data collection component
- ▶ -6 Valid skip - Intentionally not asked question; question does not apply to respondent or response known based on prior information.
- ▶ -2 Don't know - Respondent asked question; responded "Don't Know".
- ▶ -1 Refuse - Respondent asked question; refused to answer question
- ▶ NA also used occasionally

---

<sup>15</sup>For more complete list and explanation, see  
<http://www.fragilefamilieschallenge.org/missing-data/>

# Getting the data

1. Apply (<http://www.fragilefamilieschallenge.org/apply/>)
2. Complete terms and conditions

# Building a submission

Submissions include:

1. Predictions
2. Code
3. Narrative explanation

Submission preparation instructions:

[www.fragilefamilieschallenge.org/upload-your-contribution/](http://www.fragilefamilieschallenge.org/upload-your-contribution/)

# Get on the leaderboard

codalab.fragilefamilieschallenge.org

← → ⌂ codalab.fragilefamilieschallenge.org/#results

Fragile Families Help Sign Up Sign In

Download CSV

Results							
#	User	GPA ▲	Grit ▲	Material hardship ▲	Eviction ▲	Layoff ▲	Job training ▲
1	wjlei1990	0.36854 (1)	0.21896 (3)	0.02436 (1)	0.05341 (7)	0.17435 (5)	0.20224 (3)
2	OldDriverffc	0.37099 (2)	0.22979 (18)	0.02471 (2)	0.05341 (7)	0.17435 (5)	0.20224 (3)
3	yjpeng	0.37120 (3)	0.21759 (2)	0.02493 (3)	0.05223 (2)	0.17048 (1)	0.20169 (2)
4	hamidrezaomidvar	0.37136 (4)	0.22191 (13)	0.02523 (5)	0.05227 (3)	0.18784 (7)	0.21409 (7)
5	t.f.schaffner	0.37143 (5)	0.21755 (1)	0.02499 (4)	0.05660 (8)	0.22453 (9)	0.27736 (9)
6	andrewor	0.37143 (5)	0.21755 (1)	0.02499 (4)	0.06038 (10)	0.26792 (13)	0.30755 (13)
7	pc12	0.37583 (6)	6.18762 (29)	0.03536 (24)	0.94340 (18)	0.77547 (19)	0.72264 (18)
8	mannyg	0.37789 (7)	0.21997 (7)	0.02880 (17)	0.05341 (7)	0.17435 (5)	0.20224 (3)
9	ppz	0.37810 (8)	0.23896 (19)	0.02859 (14)	0.12830 (16)	0.30755 (15)	0.36981 (16)
10	lazs	0.38407 (9)	0.22054 (9)	0.02877 (16)	0.05660 (8)	0.22453 (9)	0.27736 (9)
11	miloyola	0.38644 (10)	0.21969 (4)	0.02880 (17)	0.05341 (7)	0.17435 (5)	0.20224 (3)
12	agalle	0.38846 (11)	0.22137 (11)	0.02740 (8)	0.05341 (7)	0.17435 (5)	0.20224 (3)
13	weggert	0.38868 (12)	0.24682 (21)	0.02546 (6)	0.05660 (8)	0.24528 (12)	0.29245 (11)
14	jeremyfreese	0.39077 (13)	0.22060 (10)	0.02803 (12)	0.05295 (5)	0.17379 (4)	0.20132 (1)

Powered by Codalab v0.1.1

# Share ideas in the forum

[codalab.fragilefamilieschallenge.org](https://codalab.fragilefamilieschallenge.org/)

The screenshot shows a web browser displaying the Fragile Families Challenge Forum at [codalab.fragilefamilieschallenge.org/forums/17/](https://codalab.fragilefamilieschallenge.org/). The page title is "Forums". The main content area is titled "Fragile Families Challenge Forum". It features a table with one row, representing a single forum topic:

Title	Started by	Date created	Latest post	Posts
Intro to the forum	ilundberg	Feb 18, 2017	1 month, 1 week	1

Navigation icons are visible at the bottom of the page.

In order to enable future research,  
at the end of the Challenge,  
we will open-source all submitted  
predictions, code, and narrative explanations.

## Why participate?

## Why participate?

- ▶ care about the goals of the project

## Why participate?

- ▶ care about the goals of the project
- ▶ learn new skills

## Why participate?

- ▶ care about the goals of the project
- ▶ learn new skills
- ▶ get involved in scientific research

## Why participate?

- ▶ care about the goals of the project
- ▶ learn new skills
- ▶ get involved in scientific research
- ▶ win prizes

## Why participate?

- ▶ care about the goals of the project
- ▶ learn new skills
- ▶ get involved in scientific research
- ▶ win prizes
- ▶ publish papers

## Why participate?

- ▶ care about the goals of the project
- ▶ learn new skills
- ▶ get involved in scientific research
- ▶ win prizes
- ▶ publish papers
- ▶ have fun

[www.fragilefamilieschallenge.org](http://www.fragilefamilieschallenge.org)

## Questions?

- ▶ Email: [fragilefamilieschallenge@gmail.com](mailto:fragilefamilieschallenge@gmail.com)
- ▶ Blog: [www.fragilefamilieschallenge.org/blog-posts/](http://www.fragilefamilieschallenge.org/blog-posts/)
- ▶ Github: [www.github.com/fragilefamilieschallenge](http://www.github.com/fragilefamilieschallenge)
- ▶ Forum: [codalab.fragilefamilieschallenge.org](http://codalab.fragilefamilieschallenge.org)