

Erratum: Search for the $HH \rightarrow b\bar{b}b\bar{b}$ process via vector-boson fusion production using proton-proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector



The ATLAS collaboration

E-mail: atlas.publications@cern.ch

ERRATUM TO: [JHEP07\(2020\)108](#)

ARXIV EPRINT: [2001.05178](#)

One correction is noted for the paper. A wrong cross-section was used for the theory prediction in figure 6 due to not taking into account the VHH contamination properly in the rescaling formula for the signal samples. The change in the theory prediction leads to stricter exclusion limits on the di-vector-boson-di-Higgs-boson coupling modifier κ_{2V} . The observed excluded region corresponds to $\kappa_{2V} < -0.43$ and $\kappa_{2V} > 2.56$, while the expected exclusion is $\kappa_{2V} < -0.55$ and $\kappa_{2V} > 2.72$.

Open Access. This article is distributed under the terms of the Creative Commons Attribution License ([CC-BY 4.0](#)), which permits any use, distribution and reproduction in any medium, provided the original author(s) and source are credited.

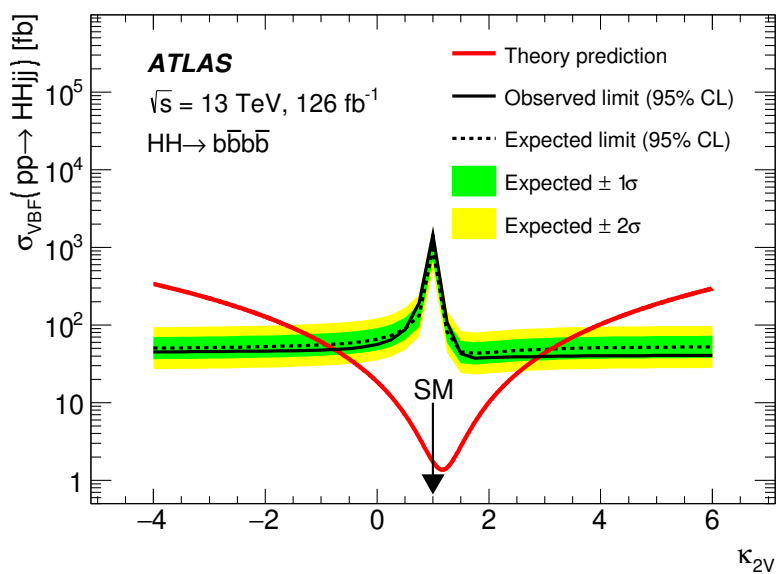


Figure 6. Observed and expected 95% CL upper limits on the production cross-section for non-resonant HH production via VBF as a function of the di-vector-boson-di-Higgs-boson coupling modifier κ_{2V} . The theory prediction of the cross-section as a function of κ_{2V} is also shown. More details on the predicted cross-section can be found in section 3.

The ATLAS collaboration

G. Aad¹⁰², B. Abbott¹²⁹, D.C. Abbott¹⁰³, A. Abed Abud^{71a,71b}, K. Abeling⁵³,
D.K. Abhayasinghe⁹⁴, S.H. Abidi¹⁶⁷, O.S. AbouZeid⁴⁰, N.L. Abraham¹⁵⁶, H. Abramowicz¹⁶¹,
H. Abreu¹⁶⁰, Y. Abulaiti⁶, B.S. Acharya^{67a,67b,o}, B. Achkar⁵³, S. Adachi¹⁶³, L. Adam¹⁰⁰,
C. Adam Bourdarios⁵, L. Adamczyk^{84a}, L. Adamek¹⁶⁷, J. Adelman¹²¹, M. Adersberger¹¹⁴,
A. Adiguzel^{12c}, S. Adorni⁵⁴, T. Adye¹⁴⁴, A.A. Affolder¹⁴⁶, Y. Afik¹⁶⁰, C. Agapopoulou⁶⁵,
M.N. Agaras³⁸, A. Aggarwal¹¹⁹, C. Agheorghiesei^{27c}, J.A. Aguilar-Saavedra^{140f,140a,aj},
F. Ahmadov⁸⁰, W.S. Ahmed¹⁰⁴, X. Ai¹⁸, G. Aielli^{74a,74b}, S. Akatsuka⁸⁶, T.P.A. Åkesson⁹⁷,
E. Akilli⁵⁴, A.V. Akimov¹¹¹, K. Al Houry⁶⁵, G.L. Alberghi^{23b,23a}, J. Albert¹⁷⁶,
M.J. Alconada Verzini¹⁶¹, S. Alderweireldt³⁶, M. Aleksa³⁶, I.N. Aleksandrov⁸⁰, C. Alexa^{27b},
D. Alexandre¹⁹, T. Alexopoulos¹⁰, A. Alfonsi¹²⁰, F. Alfonsi^{23b,23a}, M. Alhroob¹²⁹, B. Ali¹⁴²,
M. Aliev¹⁵⁵, G. Alimonti^{69a}, J. Alison³⁷, S.P. Alkire¹⁴⁸, C. Allaire⁶⁵, B.M.M. Allbrooke¹⁵⁶,
B.W. Allen¹³², P.P. Allport²¹, A. Aloisio^{70a,70b}, A. Alonso⁴⁰, F. Alonso⁸⁹, C. Alpigiani¹⁴⁸,
A.A. Alshehri⁵⁷, M. Alvarez Estevez⁹⁹, D. Álvarez Piqueras¹⁷⁴, M.G. Alvigi^{70a,70b},
Y. Amaral Coutinho^{81b}, A. Ambler¹⁰⁴, L. Ambroz¹³⁵, C. Amelung²⁶, D. Amidei¹⁰⁶,
S.P. Amor Dos Santos^{140a}, S. Amoroso⁴⁶, C.S. Amrouche⁵⁴, F. An⁷⁹, C. Anastopoulos¹⁴⁹,
N. Andari¹⁴⁵, T. Andeen¹¹, C.F. Anders^{61b}, J.K. Anders²⁰, A. Andreazza^{69a,69b}, V. Andrei^{61a},
C.R. Anelli¹⁷⁶, S. Angelidakis³⁸, A. Angerami³⁹, A.V. Anisenkov^{122b,122a}, A. Annovi^{72a},
C. Antel^{61a}, M.T. Anthony¹⁴⁹, E. Antipov¹³⁰, M. Antonelli⁵¹, D.J.A. Antrim¹⁷¹, F. Anulli^{73a},
M. Aoki⁸², J.A. Aparisi Pozo¹⁷⁴, L. Aperio Bella^{15a}, G. Arabidze¹⁰⁷, J.P. Araque^{140a},
V. Araujo Ferraz^{81b}, R. Araujo Pereira^{81b}, C. Arcangeletti⁵¹, A.T.H. Arce⁴⁹, F.A. Arduh⁸⁹,
J-F. Arguin¹¹⁰, S. Argyropoulos⁷⁸, J.-H. Arling⁴⁶, A.J. Armbruster³⁶, A. Armstrong¹⁷¹,
O. Arnaez¹⁶⁷, H. Arnold¹²⁰, Z.P. Arrubarrena Tame¹¹⁴, G. Artoni¹³⁵, S. Artz¹⁰⁰, S. Asai¹⁶³,
N. Asbah⁵⁹, E.M. Asimakopoulou¹⁷², L. Asquith¹⁵⁶, J. Assahsah^{35d}, K. Assamagan²⁹,
R. Astalos^{28a}, R.J. Atkin^{33a}, M. Atkinson¹⁷³, N.B. Atlay¹⁹, H. Atmani⁶⁵, K. Augsten¹⁴²,
G. Avolio³⁶, R. Avramidou^{60a}, M.K. Ayoub^{15a}, A.M. Azoulay^{168b}, G. Azuelos^{110,aw},
H. Bachacou¹⁴⁵, K. Bachas^{68a,68b}, M. Backes¹³⁵, F. Backman^{45a,45b}, P. Bagnaia^{73a,73b},
M. Bahmani⁸⁵, H. Bahrasemani¹⁵², A.J. Bailey¹⁷⁴, V.R. Bailey¹⁷³, J.T. Baines¹⁴⁴, M. Bajic⁴⁰,
C. Bakalis¹⁰, O.K. Baker¹⁸³, P.J. Bakker¹²⁰, D. Bakshi Gupta⁸, S. Balaji¹⁵⁷, E.M. Baldin^{122b,122a},
P. Balek¹⁸⁰, F. Balli¹⁴⁵, W.K. Balunas¹³⁵, J. Balz¹⁰⁰, E. Banas⁸⁵, A. Bandyopadhyay²⁴,
Sw. Banerjee^{181,j}, A.A.E. Bannoura¹⁸², L. Barak¹⁶¹, W.M. Barbe³⁸, E.L. Barberio¹⁰⁵,
D. Barberis^{55b,55a}, M. Barbero¹⁰², G. Barbour⁹⁵, T. Barillari¹¹⁵, M-S. Barisits³⁶, J. Barkeloo¹³²,
T. Barklow¹⁵³, R. Barnea¹⁶⁰, S.L. Barnes^{60c}, B.M. Barnett¹⁴⁴, R.M. Barnett¹⁸,
Z. Barnovska-Blenessy^{60a}, A. Baroncelli^{60a}, G. Barone²⁹, A.J. Barr¹³⁵, L. Barranco Navarro^{45a,45b},
F. Barreiro⁹⁹, J. Barreiro Guimarães da Costa^{15a}, S. Barsov¹³⁸, R. Bartoldus¹⁵³, G. Bartolini¹⁰²,
A.E. Barton⁹⁰, P. Bartos^{28a}, A. Basalae⁴⁶, A. Bassalat^{65,aq}, M.J. Basso¹⁶⁷, R.L. Bates⁵⁷,
S. Batlamous^{35e}, J.R. Batley³², B. Batool¹⁵¹, M. Battaglia¹⁴⁶, M. Bause^{73a,73b}, F. Bauer¹⁴⁵,
K.T. Bauer¹⁷¹, H.S. Bawa^{31,m}, J.B. Beacham⁴⁹, T. Beau¹³⁶, P.H. Beauchemin¹⁷⁰, F. Becherer⁵²,
P. Bechtel²⁴, H.C. Beck⁵³, H.P. Beck^{20,s}, K. Becker⁵², M. Becker¹⁰⁰, C. Becot⁴⁶, A. Beddall^{12d},
A.J. Beddall^{12a}, V.A. Bednyakov⁸⁰, M. Bedognetti¹²⁰, C.P. Bee¹⁵⁵, T.A. Beermann¹⁸²,
M. Begalli^{81b}, M. Begel²⁹, A. Behera¹⁵⁵, J.K. Behr⁴⁶, F. Beisiegel²⁴, A.S. Bell⁹⁵, G. Bella¹⁶¹,
L. Bellagamba^{23b}, A. Bellerive³⁴, P. Bellos⁹, K. Beloborodov^{122b,122a}, K. Belotskiy¹¹²,
N.L. Belyaev¹¹², D. Benckekroun^{35a}, N. Benekos¹⁰, Y. Benhammou¹⁶¹, D.P. Benjamin⁶,
M. Benoit⁵⁴, J.R. Bensinger²⁶, S. Bentvelsen¹²⁰, L. Beresford¹³⁵, M. Beretta⁵¹, D. Berge⁴⁶,
E. Bergeas Kuutmann¹⁷², N. Berger⁵, B. Bergmann¹⁴², L.J. Bergsten²⁶, J. Beringer¹⁸,
S. Berlendis⁷, G. Bernardi¹³⁶, C. Bernius¹⁵³, F.U. Bernlochner²⁴, T. Berry⁹⁴, P. Berta¹⁰⁰,
C. Bertella^{15a}, I.A. Bertram⁹⁰, O. Bessidskaia Bylund¹⁸², N. Besson¹⁴⁵, A. Bethani¹⁰¹,

S. Bethke¹¹⁵, A. Betti⁴², A.J. Bevan⁹³, J. Beyer¹¹⁵, D.S. Bhattacharya¹⁷⁷, P. Bhattarai²⁶,
 R. Bi¹³⁹, R.M. Bianchi¹³⁹, O. Biebel¹¹⁴, D. Biedermann¹⁹, R. Bielski³⁶, K. Bierwagen¹⁰⁰,
 N.V. Biesuz^{72a,72b}, M. Biglietti^{75a}, T.R.V. Billoud¹¹⁰, M. Bindi⁵³, A. Bingul^{12d}, C. Bini^{73a,73b},
 S. Biondi^{23b,23a}, M. Birman¹⁸⁰, T. Bisanz⁵³, J.P. Biswal¹⁶¹, D. Biswas^{181,j}, A. Bitadze¹⁰¹,
 C. Bittrich⁴⁸, K. Bjørke¹³⁴, K.M. Black²⁵, T. Blazek^{28a}, I. Bloch⁴⁶, C. Blocker²⁶, A. Blue⁵⁷,
 U. Blumenschein⁹³, G.J. Bobbink¹²⁰, V.S. Bobrovnikov^{122b,122a}, S.S. Bocchetta⁹⁷, A. Bocci⁴⁹,
 D. Boerner⁴⁶, D. Bogavac¹⁴, A.G. Bogdanchikov^{122b,122a}, C. Boehm^{45a}, V. Boisvert⁹⁴,
 P. Bokan^{53,172}, T. Bold^{84a}, A.S. Boldyrev¹¹³, A.E. Bolz^{61b}, M. Bomben¹³⁶, M. Bona⁹³,
 J.S. Bonilla¹³², M. Boonekamp¹⁴⁵, C.D. Booth⁹⁴, H.M. Borecka-Bielska⁹¹, A. Borisov¹²³,
 G. Borissov⁹⁰, J. Bortfeldt³⁶, D. Bortoletto¹³⁵, D. Boscherini^{23b}, M. Bosman¹⁴,
 J.D. Bossio Sola¹⁰⁴, K. Bouaouda^{35a}, J. Boudreau¹³⁹, E.V. Bouhova-Thacker⁹⁰, D. Boumediene³⁸,
 S.K. Boutle⁵⁷, A. Boveia¹²⁷, J. Boyd³⁶, D. Boye^{33c,ar}, I.R. Boyko⁸⁰, A.J. Bozson⁹⁴, J. Bracinik²¹,
 N. Brahimy¹⁰², G. Brandt¹⁸², O. Brandt³², F. Braren⁴⁶, B. Brau¹⁰³, J.E. Brau¹³²,
 W.D. Breaden Madden⁵⁷, K. Brendlinger⁴⁶, L. Brenner⁴⁶, R. Brenner¹⁷², S. Bressler¹⁸⁰,
 B. Brickwedde¹⁰⁰, D.L. Briglin²¹, D. Britton⁵⁷, D. Britzger¹¹⁵, I. Brock²⁴, R. Brock¹⁰⁷,
 G. Brooijmans³⁹, W.K. Brooks^{147d}, E. Brost¹²¹, J.H. Broughton²¹, P.A. Bruckman de Renstrom⁸⁵,
 D. Bruncko^{28b}, A. Bruni^{23b}, G. Bruni^{23b}, L.S. Bruni¹²⁰, S. Bruno^{74a,74b}, M. Bruschi^{23b},
 N. Bruscinò¹³⁹, P. Bryant³⁷, L. Bryngemark⁹⁷, T. Buanes¹⁷, Q. Buat³⁶, P. Buchholz¹⁵¹,
 A.G. Buckley⁵⁷, I.A. Budagov⁸⁰, M.K. Bugge¹³⁴, F. Bühner⁵², O. Bulekov¹¹², T.J. Burch¹²¹,
 S. Burdin⁹¹, C.D. Burgard¹²⁰, A.M. Burger¹³⁰, B. Burghgrave⁸, J.T.P. Burr⁴⁶, C.D. Burton¹¹,
 J.C. Burzynski¹⁰³, V. Büscher¹⁰⁰, E. Buschmann⁵³, P.J. Bussey⁵⁷, J.M. Butler²⁵, C.M. Buttar⁵⁷,
 J.M. Butterworth⁹⁵, P. Butti³⁶, W. Buttinger³⁶, C.J. Buxo Vazquez¹⁰⁷, A. Buzatu¹⁵⁸,
 A.R. Buzykaev^{122b,122a}, G. Cabras^{23b,23a}, S. Cabrera Urbán¹⁷⁴, D. Caforio⁵⁶, H. Cai¹⁷³,
 V.M.M. Cairo¹⁵³, O. Cakir^{4a}, N. Calace³⁶, P. Calafiura¹⁸, A. Calandri¹⁰², G. Calderini¹³⁶,
 P. Calfayan⁶⁶, G. Callea⁵⁷, L.P. Caloba^{81b}, A. Caltabiano^{74a,74b}, S. Calvente Lopez⁹⁹,
 D. Calvet³⁸, S. Calvet³⁸, T.P. Calvet¹⁵⁵, M. Calvetti^{72a,72b}, R. Camacho Toro¹³⁶, S. Camarda³⁶,
 D. Camarero Munoz⁹⁹, P. Camarri^{74a,74b}, D. Cameron¹³⁴, R. Caminal Armadans¹⁰³,
 C. Camincher³⁶, S. Campana³⁶, M. Campanelli⁹⁵, A. Camplani⁴⁰, A. Campoverde¹⁵¹,
 V. Canale^{70a,70b}, A. Canesse¹⁰⁴, M. Cano Bret^{60c}, J. Cantero¹³⁰, T. Cao¹⁶¹, Y. Cao¹⁷³,
 M.D.M. Capeans Garrido³⁶, M. Capua^{41b,41a}, R. Cardarelli^{74a}, F. Cardillo¹⁴⁹, G. Carducci^{41b,41a},
 I. Carli¹⁴³, T. Carli³⁶, G. Carlino^{70a}, B.T. Carlson¹³⁹, L. Carminati^{69a,69b}, R.M.D. Carney^{45a,45b},
 S. Caron¹¹⁹, E. Carquin^{147d}, S. Carrá⁴⁶, J.W.S. Carter¹⁶⁷, M.P. Casado^{14,e}, A.F. Casha¹⁶⁷,
 D.W. Casper¹⁷¹, R. Castelijin¹²⁰, F.L. Castillo¹⁷⁴, V. Castillo Gimenez¹⁷⁴, N.F. Castro^{140a,140e},
 A. Catinaccio³⁶, J.R. Catmore¹³⁴, A. Cattai³⁶, J. Caudron²⁴, V. Cavaliere²⁹, E. Cavallaro¹⁴,
 M. Cavalli-Sforza¹⁴, V. Cavasinni^{72a,72b}, E. Celebi^{12b}, F. Ceradini^{75a,75b}, L. Cerda Alberich¹⁷⁴,
 K. Cerny¹³¹, A.S. Cerqueira^{81a}, A. Cerri¹⁵⁶, L. Cerrito^{74a,74b}, F. Cerutti¹⁸, A. Cervelli^{23b,23a},
 S.A. Cetin^{12b}, Z. Chadi^{35a}, D. Chakraborty¹²¹, S.K. Chan⁵⁹, W.S. Chan¹²⁰, W.Y. Chan⁹¹,
 J.D. Chapman³², B. Chargeishvili^{159b}, D.G. Charlton²¹, T.P. Charman⁹³, C.C. Chau³⁴, S. Che¹²⁷,
 S. Chekanov⁶, S.V. Chekulaev^{168a}, G.A. Chelkov^{80,ao}, M.A. Chelstowska³⁶, B. Chen⁷⁹,
 C. Chen^{60a}, C.H. Chen⁷⁹, H. Chen²⁹, J. Chen^{60a}, J. Chen³⁹, S. Chen¹³⁷, S.J. Chen^{15c},
 X. Chen^{15b,av}, Y. Chen⁸³, Y.-H. Chen⁴⁶, H.C. Cheng^{63a}, H.J. Cheng^{15a}, A. Cheplakov⁸⁰,
 E. Cheremushkina¹²³, R. Cherkaoui El Moursli^{35e}, E. Cheu⁷, K. Cheung⁶⁴, T.J.A. Chevalérias¹⁴⁵,
 L. Chevalier¹⁴⁵, V. Chiarella⁵¹, G. Chiarelli^{72a}, G. Chiodini^{68a}, A.S. Chisholm²¹, A. Chitan^{27b},
 I. Chiu¹⁶³, Y.H. Chiu¹⁷⁶, M.V. Chizhov⁸⁰, K. Choi⁶⁶, A.R. Chomont^{73a,73b}, S. Chouridou¹⁶²,
 Y.S. Chow¹²⁰, M.C. Chu^{63a}, X. Chu^{15a,15d}, J. Chudoba¹⁴¹, A.J. Chuinard¹⁰⁴, J.J. Chwastowski⁸⁵,
 L. Chytka¹³¹, D. Cieri¹¹⁵, K.M. Ciesla⁸⁵, D. Cinca⁴⁷, V. Cindro⁹², I.A. Cioară^{27b}, A. Ciocio¹⁸,
 F. Ciroto^{70a,70b}, Z.H. Citron^{180,k}, M. Citterio^{69a}, D.A. Ciubotaru^{27b}, B.M. Ciungu¹⁶⁷,
 A. Clark⁵⁴, M.R. Clark³⁹, P.J. Clark⁵⁰, C. Clement^{45a,45b}, Y. Coadou¹⁰², M. Cokal^{67a,67c},

A. Coccaro^{55b}, J. Cochran⁷⁹, H. Cohen¹⁶¹, A.E.C. Coimbra³⁶, L. Colasurdo¹¹⁹, B. Cole³⁹,
 A.P. Colijn¹²⁰, J. Collot⁵⁸, P. Conde Muno^{140a,f}, E. Coniavitis⁵², S.H. Connell^{33c},
 I.A. Connelly⁵⁷, S. Constantinescu^{27b}, F. Conventi^{70a,ax}, A.M. Cooper-Sarkar¹³⁵, F. Cormier¹⁷⁵,
 K.J.R. Cormier¹⁶⁷, L.D. Corpe⁹⁵, M. Corradi^{73a,73b}, E.E. Corrigan⁹⁷, F. Corriveau^{104,af},
 M.J. Costa¹⁷⁴, F. Costanza⁵, D. Costanzo¹⁴⁹, G. Cowan⁹⁴, J.W. Cowley³², J. Crane¹⁰¹,
 K. Cranmer¹²⁵, S.J. Crawley⁵⁷, R.A. Creager¹³⁷, S. Crepe-Renaudin⁵⁸, F. Crescioli¹³⁶,
 M. Cristinziani²⁴, V. Croft¹²⁰, G. Crosetti^{41b,41a}, A. Cueto⁵, T. Cuhadar Donszelmann¹⁴⁹,
 A.R. Cukierman¹⁵³, W.R. Cunningham⁵⁷, S. Czekierda⁸⁵, P. Czodrowski³⁶,
 M.J. Da Cunha Sargedas De Sousa^{60b}, J.V. Da Fonseca Pinto^{81b}, C. Da Via¹⁰¹, W. Dabrowski^{84a},
 T. Dado^{28a}, S. Dahbi^{35e}, T. Dai¹⁰⁶, C. Dallapiccola¹⁰³, M. Dam⁴⁰, G. D'amen²⁹,
 V. D'Amico^{75a,75b}, J. Damp¹⁰⁰, J.R. Dandoy¹³⁷, M.F. Daneri³⁰, N.P. Dang^{181,j}, N.S. Dann¹⁰¹,
 M. Danninger¹⁷⁵, V. Dao³⁶, G. Darbo^{55b}, O. Dartsis⁵, A. Dattagupta¹³², T. Daubney⁴⁶,
 S. D'Auria^{69a,69b}, W. Davey²⁴, C. David⁴⁶, T. Davidek¹⁴³, D.R. Davis⁴⁹, I. Dawson¹⁴⁹, K. De⁸,
 R. De Asmundis^{70a}, M. De Beurs¹²⁰, S. De Castro^{23b,23a}, S. De Cecco^{73a,73b}, N. De Groot¹¹⁹,
 P. de Jong¹²⁰, H. De la Torre¹⁰⁷, A. De Maria^{15c}, D. De Pedis^{73a}, A. De Salvo^{73a},
 U. De Sanctis^{74a,74b}, M. De Santis^{74a,74b}, A. De Santo¹⁵⁶, K. De Vasconcelos Corga¹⁰²,
 J.B. De Vivie De Regie⁶⁵, C. Debenedetti¹⁴⁶, D.V. Dedovich⁸⁰, A.M. Deiana⁴²,
 M. Del Gaudio^{41b,41a}, J. Del Peso⁹⁹, Y. Delabat Diaz⁴⁶, D. Delgove⁶⁵, F. Deliot^{145,r},
 C.M. Delitzsch⁷, M. Della Pietra^{70a,70b}, D. Della Volpe⁵⁴, A. Dell'Acqua³⁶, L. Dell'Asta^{74a,74b},
 M. Delmastro⁵, C. Delporte⁶⁵, P.A. Delsart⁵⁸, D.A. DeMarco¹⁶⁷, S. Demers¹⁸³, M. Demichev⁸⁰,
 G. Demontigny¹¹⁰, S.P. Denisov¹²³, D. Denysiuk¹²⁰, L. D'Eramo¹³⁶, D. Derendarz⁸⁵,
 J.E. Derkaoui^{35d}, F. Derue¹³⁶, P. Dervan⁹¹, K. Desch²⁴, C. Deterre⁴⁶, K. Dette¹⁶⁷, C. Deutsch²⁴,
 M.R. Devesa³⁰, P.O. Deviveiros³⁶, A. Dewhurst¹⁴⁴, F.A. Di Bello⁵⁴, A. Di Ciaccio^{74a,74b},
 L. Di Ciaccio⁵, W.K. Di Clemente¹³⁷, C. Di Donato^{70a,70b}, A. Di Girolamo³⁶,
 G. Di Gregorio^{72a,72b}, B. Di Micco^{75a,75b}, R. Di Nardo¹⁰³, K.F. Di Petrillo⁵⁹, R. Di Sipio¹⁶⁷,
 D. Di Valentino³⁴, C. Diaconu¹⁰², F.A. Dias⁴⁰, T. Dias Do Vale^{140a}, M.A. Diaz^{147a},
 J. Dickinson¹⁸, E.B. Diehl¹⁰⁶, J. Dietrich¹⁹, S. Dez Cornell⁴⁶, A. Dimitrievska¹⁸, W. Ding^{15b},
 J. Dingfelder²⁴, F. Dittus³⁶, F. Djama¹⁰², T. Djobava^{159b}, J.I. Djuvsland¹⁷, M.A.B. Do Vale^{81c},
 M. Dobre^{27b}, D. Dodsworth²⁶, C. Doglioni⁹⁷, J. Dolejsi¹⁴³, Z. Dolezal¹⁴³, M. Donadelli^{81d},
 B. Dong^{60c}, J. Donini³⁸, A. D'onofrio⁹³, M. D'Onofrio⁹¹, J. Dopke¹⁴⁴, A. Doria^{70a}, M.T. Dova⁸⁹,
 A.T. Doyle⁵⁷, E. Drechsler¹⁵², E. Dreyer¹⁵², T. Dreyer⁵³, A.S. Drobac¹⁷⁰, D. Du^{60b}, Y. Duan^{60b},
 F. Dubinin¹¹¹, M. Dubovsky^{28a}, A. Dubreuil⁵⁴, E. Duchovni¹⁸⁰, G. Duckeck¹¹⁴, A. Ducourthial¹³⁶,
 O.A. Ducu¹¹⁰, D. Duda¹¹⁵, A. Dudarev³⁶, A.C. Dudder¹⁰⁰, E.M. Duffield¹⁸, L. Duffot⁶⁵,
 M. Duhrssen³⁶, C. Dulsen¹⁸², M. Dumancic¹⁸⁰, A.E. Dumitriu^{27b}, A.K. Duncan⁵⁷, M. Dunford^{61a},
 A. Duperrin¹⁰², H. Duran Yildiz^{4a}, M. Duren⁵⁶, A. Durglishvili^{159b}, D. Duschinger⁴⁸, B. Dutta⁴⁶,
 D. Duvnjak¹, G.I. Dyckes¹³⁷, M. Dyndal³⁶, S. Dysch¹⁰¹, B.S. Dziedzic⁸⁵, K.M. Ecker¹¹⁵,
 R.C. Edgar¹⁰⁶, M.G. Eggleston⁴⁹, T. Eifert³⁶, G. Eigen¹⁷, K. Einsweiler¹⁸, T. Ekelof¹⁷²,
 H. El Jarrari^{35e}, M. El Kacimi^{35c}, R. El Kosseifi¹⁰², V. Ellajosyula¹⁷², M. Ellert¹⁷²,
 F. Ellinghaus¹⁸², A.A. Elliot⁹³, N. Ellis³⁶, J. Elmsheuser²⁹, M. Elsing³⁶, D. Emelianov¹⁴⁴,
 A. Emerman³⁹, Y. Enari¹⁶³, M.B. Epland⁴⁹, J. Erdmann⁴⁷, A. Ereditato²⁰, M. Errenst³⁶,
 M. Escalier⁶⁵, C. Escobar¹⁷⁴, O. Estrada Pastor¹⁷⁴, E. Etzion¹⁶¹, H. Evans⁶⁶, A. Ezhilov¹³⁸,
 F. Fabbri⁵⁷, L. Fabbri^{23b,23a}, V. Fabiani¹¹⁹, G. Facini⁹⁵, R.M. Faisca Rodrigues Pereira^{140a},
 R.M. Fakhruddinov¹²³, S. Falciano^{73a}, P.J. Falke⁵, S. Falke⁵, J. Faltova¹⁴³, Y. Fang^{15a}, Y. Fang^{15a},
 G. Fanourakis⁴⁴, M. Fanti^{69a,69b}, M. Faraj^{67a,67c,u}, A. Farbin⁸, A. Farilla^{75a}, E.M. Farina^{71a,71b},
 T. Farooque¹⁰⁷, S. Farrell¹⁸, S.M. Farrington⁵⁰, P. Farthouat³⁶, F. Fassi^{35e}, P. Fassnacht³⁶,
 D. Fassouliotis⁹, M. Faucci Giannelli⁵⁰, W.J. Fawcett³², L. Fayard⁶⁵, O.L. Fedin^{138,p},
 W. Fedorko¹⁷⁵, A. Fehr²⁰, M. Feickert⁴², L. Feligioni¹⁰², A. Fell¹⁴⁹, C. Feng^{60b}, E.J. Feng³⁶,
 M. Feng⁴⁹, M.J. Fenton⁵⁷, A.B. Fenyuk¹²³, J. Ferrando⁴⁶, A. Ferrante¹⁷³, A. Ferrari¹⁷²,

P. Ferrari¹²⁰, R. Ferrari^{71a}, D.E. Ferreira de Lima^{61b}, A. Ferrer¹⁷⁴, D. Ferrere⁵⁴, C. Ferretti¹⁰⁶,
 F. Fiedler¹⁰⁰, A. Filipič⁹², F. Filthaut¹¹⁹, K.D. Finelli²⁵, M.C.N. Fiolhais^{140a,140c,a}, L. Fiorini¹⁷⁴,
 F. Fischer¹¹⁴, W.C. Fisher¹⁰⁷, I. Fleck¹⁵¹, P. Fleischmann¹⁰⁶, R.R.M. Fletcher¹³⁷, T. Flick¹⁸²,
 B.M. Flierl¹¹⁴, L. Flores¹³⁷, L.R. Flores Castillo^{63a}, F.M. Follega^{76a,76b}, N. Fomin¹⁷, J.H. Foo¹⁶⁷,
 G.T. Forcolin^{76a,76b}, A. Formica¹⁴⁵, F.A. Förster¹⁴, A.C. Forti¹⁰¹, A.G. Foster²¹, M.G. Foti¹³⁵,
 D. Fournier⁶⁵, H. Fox⁹⁰, P. Francavilla^{72a,72b}, S. Francescato^{73a,73b}, M. Franchini^{23b,23a},
 S. Franchino^{61a}, D. Francis³⁶, L. Franconi²⁰, M. Franklin⁵⁹, A.N. Fray⁹³, P.M. Freeman²¹,
 B. Freund¹¹⁰, W.S. Freund^{81b}, E.M. Freundlich⁴⁷, D.C. Frizzell¹²⁹, D. Froidevaux³⁶, J.A. Frost¹³⁵,
 C. Fukunaga¹⁶⁴, E. Fullana Torregrosa¹⁷⁴, E. Fumagalli^{55b,55a}, T. Fusayasu¹¹⁶, J. Fuster¹⁷⁴,
 A. Gabrielli^{23b,23a}, A. Gabrielli¹⁸, G.P. Gach^{84a}, S. Gadatsch⁵⁴, P. Gadow¹¹⁵, G. Gagliardi^{55b,55a},
 L.G. Gagnon¹¹⁰, C. Galea^{27b}, B. Galhardo^{140a}, G.E. Gallardo¹³⁵, E.J. Gallas¹³⁵, B.J. Gallop¹⁴⁴,
 G. Galster⁴⁰, R. Gamboa Goni⁹³, K.K. Gan¹²⁷, S. Ganguly¹⁸⁰, J. Gao^{60a}, Y. Gao⁵⁰, Y.S. Gao^{31,m},
 C. García¹⁷⁴, J.E. García Navarro¹⁷⁴, J.A. García Pascual^{15a}, C. Garcia-Argos⁵²,
 M. Garcia-Sciveres¹⁸, R.W. Gardner³⁷, N. Garelli¹⁵³, S. Gargiulo⁵², V. Garonne¹³⁴,
 A. Gaudiello^{55b,55a}, G. Gaudio^{71a}, I.L. Gavrilenko¹¹¹, A. Gavriilyuk¹²⁴, C. Gay¹⁷⁵, G. Gaycken⁴⁶,
 E.N. Gazis¹⁰, A.A. Geanta^{27b}, C.M. Gee¹⁴⁶, C.N.P. Gee¹⁴⁴, J. Geisen⁵³, M. Geisen¹⁰⁰,
 C. Gemme^{55b}, M.H. Genest⁵⁸, C. Geng¹⁰⁶, S. Gentile^{73a,73b}, S. George⁹⁴, T. Gerasis⁴⁴,
 L.O. Gerlach⁵³, P. Gessinger-Befurt¹⁰⁰, G. Gessner⁴⁷, S. Ghasemi¹⁵¹, M. Ghasemi Bostanabad¹⁷⁶,
 A. Ghosh⁶⁵, A. Ghosh⁷⁸, B. Giacobbe^{23b}, S. Giagu^{73a,73b}, N. Giangiacomi^{23b,23a}, P. Giannetti^{72a},
 A. Giannini^{70a,70b}, G. Giannini¹⁴, S.M. Gibson⁹⁴, M. Gignac¹⁴⁶, D. Gillberg³⁴, G. Gilles¹⁸²,
 D.M. Gingrich^{3,aw}, M.P. Giordani^{67a,67c}, F.M. Giorgi^{23b}, P.F. Giraud¹⁴⁵, G. Giugliarelli^{67a,67c},
 D. Giugni^{69a}, F. Giuli^{74a,74b}, S. Gkaitatzis¹⁶², I. Gkialas^{9,h}, E.L. Gkoukousis¹⁴,
 P. Gkoutoumis¹⁰, L.K. Gladilin¹¹³, C. Glasman⁹⁹, J. Glatzer¹⁴, P.C.F. Glaysher⁴⁶, A. Glazov⁴⁶,
 G.R. Gledhill¹³², M. Goblirsch-Kolb²⁶, D. Godin¹¹⁰, S. Goldfarb¹⁰⁵, T. Golling⁵⁴, D. Golubkov¹²³,
 A. Gomes^{140a,140b}, R. Goncalves Gama⁵³, R. Gonçalo^{140a}, G. Gonella⁵², L. Gonella²¹,
 A. Gongadze⁸⁰, F. Gonnella²¹, J.L. Gonski⁵⁹, S. González de la Hoz¹⁷⁴, S. Gonzalez-Sevilla⁵⁴,
 G.R. Gonzalvo Rodriguez¹⁷⁴, L. Goossens³⁶, P.A. Gorbounov¹²⁴, H.A. Gordon²⁹, B. Gorini³⁶,
 E. Gorini^{68a,68b}, A. Gorišek⁹², A.T. Goshaw⁴⁹, M.I. Gostkin⁸⁰, C.A. Gottardo¹¹⁹, M. Gouighri^{35b},
 D. Goujdami^{35c}, A.G. Goussiou¹⁴⁸, N. Govender^{33c}, C. Goy⁵, E. Gozani¹⁶⁰, I. Grabowska-Bold^{84a},
 E.C. Graham⁹¹, J. Gramling¹⁷¹, E. Gramstad¹³⁴, S. Grancagnolo¹⁹, M. Grandi¹⁵⁶,
 V. Gratchev¹³⁸, P.M. Gravila^{27f}, F.G. Gravili^{68a,68b}, C. Gray⁵⁷, H.M. Gray¹⁸, C. Grefe²⁴,
 K. Gregersen⁹⁷, I.M. Gregor⁴⁶, P. Grenier¹⁵³, K. Grevtsov⁴⁶, C. Grieco¹⁴, N.A. Grieser¹²⁹,
 A.A. Grillo¹⁴⁶, K. Grimm^{31,1}, S. Grinstein^{14,aa}, J.-F. Grivaz⁶⁵, S. Groh¹⁰⁰, E. Gross¹⁸⁰,
 J. Grosse-Knetter⁵³, Z.J. Grout⁹⁵, C. Grud¹⁰⁶, A. Grummer¹¹⁸, L. Guan¹⁰⁶, W. Guan¹⁸¹,
 J. Guenther³⁶, A. Guerguichon⁶⁵, J.G.R. Guerrero Rojas¹⁷⁴, F. Guescini¹¹⁵, D. Guest¹⁷¹,
 R. Gugel⁵², T. Guillemin⁵, S. Guindon³⁶, U. Gul⁵⁷, J. Guo^{60c}, W. Guo¹⁰⁶, Y. Guo^{60a,t}, Z. Guo¹⁰²,
 R. Gupta⁴⁶, S. Gurbuz^{12c}, G. Gustavino¹²⁹, M. Guth⁵², P. Gutierrez¹²⁹, C. Gutsche⁹⁵,
 C. Guyot¹⁴⁵, C. Gwenlan¹³⁵, C.B. Gwilliam⁹¹, A. Haas¹²⁵, C. Haber¹⁸, H.K. Hadavand⁸,
 N. Haddad^{35e}, A. Hade^{60a}, S. Hageböck³⁶, M. Haleem¹⁷⁷, J. Haley¹³⁰, G. Halladjian¹⁰⁷,
 G.D. Hallewell¹⁰², K. Hamacher¹⁸², P. Hamal¹³¹, K. Hamano¹⁷⁶, H. Hamdaoui^{35e},
 G.N. Hamity¹⁴⁹, K. Han^{60a,z}, L. Han^{60a}, S. Han^{15a}, Y.F. Han¹⁶⁷, K. Hanagaki^{82,x}, M. Hance¹⁴⁶,
 D.M. Handl¹¹⁴, B. Haney¹³⁷, R. Hankache¹³⁶, E. Hansen⁹⁷, J.B. Hansen⁴⁰, J.D. Hansen⁴⁰,
 M.C. Hansen²⁴, P.H. Hansen⁴⁰, E.C. Hanson¹⁰¹, K. Hara¹⁶⁹, T. Harenberg¹⁸², S. Harkusha¹⁰⁸,
 P.F. Harrison¹⁷⁸, N.M. Hartmann¹¹⁴, Y. Hasegawa¹⁵⁰, A. Hasib⁵⁰, S. Hassani¹⁴⁵, S. Haug²⁰,
 R. Hauser¹⁰⁷, L.B. Havener³⁹, M. Havranek¹⁴², C.M. Hawkes²¹, R.J. Hawkins³⁶, D. Hayden¹⁰⁷,
 C. Hayes¹⁵⁵, R.L. Hayes¹⁷⁵, C.P. Hays¹³⁵, J.M. Hays⁹³, H.S. Hayward⁹¹, S.J. Haywood¹⁴⁴,
 F. He^{60a}, M.P. Heath⁵⁰, V. Hedberg⁹⁷, L. Heelan⁸, S. Heer²⁴, K.K. Heidegger⁵², W.D. Heidorn⁷⁹,
 J. Heilman³⁴, S. Heim⁴⁶, T. Heim¹⁸, B. Heinemann^{46,as}, J.J. Heinrich¹³², L. Heinrich³⁶,

C. Heinz⁵⁶, J. Hejbal¹⁴¹, L. Helary^{61b}, A. Held¹⁷⁵, S. Hellesund¹³⁴, C.M. Helling¹⁴⁶,
 S. Hellman^{45a,45b}, C. Helsens³⁶, R.C.W. Henderson⁹⁰, Y. Heng¹⁸¹, S. Henkelmann¹⁷⁵,
 A.M. Henriques Correia³⁶, G.H. Herbert¹⁹, H. Herde²⁶, V. Herget¹⁷⁷, Y. Hernández Jiménez^{33e},
 H. Herr¹⁰⁰, M.G. Herrmann¹¹⁴, T. Herrmann⁴⁸, G. Herten⁵², R. Hertenberger¹¹⁴, L. Hervás³⁶,
 T.C. Herwig¹³⁷, G.G. Hesketh⁹⁵, N.P. Hessey^{168a}, A. Higashida¹⁶³, S. Higashino⁸²,
 E. Higón-Rodríguez¹⁷⁴, K. Hildebrand³⁷, E. Hill¹⁷⁶, J.C. Hill³², K.K. Hill²⁹, K.H. Hiller⁴⁶,
 S.J. Hillier²¹, M. Hils⁴⁸, I. Hinchliffe¹⁸, F. Hinterkeuser²⁴, M. Hirose¹³³, S. Hirose⁵²,
 D. Hirschbuehl¹⁸², B. Hiti⁹², O. Hladik¹⁴¹, D.R. Hlaluku^{33e}, X. Hoad⁵⁰, J. Hobbs¹⁵⁵, N. Hod¹⁸⁰,
 M.C. Hodgkinson¹⁴⁹, A. Hoecker³⁶, F. Hoenig¹¹⁴, D. Hohn⁵², D. Hohov⁶⁵, T.R. Holmes³⁷,
 M. Holzbock¹¹⁴, L.B.A.H. Hommels³², S. Honda¹⁶⁹, T.M. Hong¹³⁹, J.C. Honig⁵², A. Hönle¹¹⁵,
 B.H. Hooberman¹⁷³, W.H. Hopkins⁶, Y. Horii¹¹⁷, P. Horn⁴⁸, L.A. Horyn³⁷, S. Hou¹⁵⁸,
 A. Houmada^{35a}, J. Howarth¹⁰¹, J. Hoya⁸⁹, M. Hrabovsky¹³¹, J. Hrdinka⁷⁷, I. Hristova¹⁹,
 J. Hrivnac⁶⁵, A. Hrynevich¹⁰⁹, T. Hryn'ova⁵, P.J. Hsu⁶⁴, S.-C. Hsu¹⁴⁸, Q. Hu²⁹, S. Hu^{60c},
 Y.F. Hu^{15a,15d}, D.P. Huang⁹⁵, Y. Huang^{60a}, Y. Huang^{15a}, Z. Hubacek¹⁴², F. Hubaut¹⁰²,
 M. Huebner²⁴, F. Huegging²⁴, T.B. Huffman¹³⁵, M. Huhtinen³⁶, R.F.H. Hunter³⁴, P. Huo¹⁵⁵,
 A.M. Hupe³⁴, N. Huseynov^{80,ah}, J. Huston¹⁰⁷, J. Huth⁵⁹, R. Hyneman¹⁰⁶, S. Hyrych^{28a},
 G. Iacobucci⁵⁴, G. Iakovidis²⁹, I. Ibragimov¹⁵¹, L. Iconomidou-Fayard⁶⁵, Z. Idrissi^{35e}, P. Iengo³⁶,
 R. Ignazzi⁴⁰, O. Igonkina^{120,ac,*}, R. Iguchi¹⁶³, T. Iizawa⁵⁴, Y. Ikegami⁸², M. Ikeno⁸², D. Iliadis¹⁶²,
 N. Ilic^{119,167,af}, F. Iltzsche⁴⁸, G. Introzzi^{71a,71b}, M. Iodice^{75a}, K. Iordanidou^{168a},
 V. Ippolito^{73a,73b}, M.F. Isacson¹⁷², M. Ishino¹⁶³, W. Islam¹³⁰, C. Issever^{19,46}, S. Istin¹⁶⁰,
 F. Ito¹⁶⁹, J.M. Iturbe Ponce^{63a}, R. Iuppa^{76a,76b}, A. Ivina¹⁸⁰, H. Iwasaki⁸², J.M. Izen⁴³, V. Izzo^{70a},
 P. Jacka¹⁴¹, P. Jackson¹, R.M. Jacobs²⁴, B.P. Jaeger¹⁵², V. Jain², G. Jäkel¹⁸², K.B. Jakobi¹⁰⁰,
 K. Jakobs⁵², T. Jakoubek¹⁴¹, J. Jamieson⁵⁷, K.W. Janas^{84a}, R. Jansky⁵⁴, J. Janssen²⁴,
 M. Janus⁵³, P.A. Janus^{84a}, G. Jarlskog⁹⁷, N. Javadov^{80,ah}, T. Javůrek³⁶, M. Javurkova⁵²,
 F. Jeanneau¹⁴⁵, L. Jeanty¹³², J. Jejelava^{159a,ai}, A. Jelinskas¹⁷⁸, P. Jenni^{52,b}, J. Jeong⁴⁶,
 N. Jeong⁴⁶, S. Jézéquel⁵, H. Ji¹⁸¹, J. Jia¹⁵⁵, H. Jiang⁷⁹, Y. Jiang^{60a}, Z. Jiang^{153,q}, S. Jiggins⁵²,
 F.A. Jimenez Morales³⁸, J. Jimenez Pena¹¹⁵, S. Jin^{15c}, A. Jinaru^{27b}, O. Jinnouchi¹⁶⁵, H. Jivan^{33e},
 P. Johansson¹⁴⁹, K.A. Johns⁷, C.A. Johnson⁶⁶, K. Jon-And^{45a,45b}, R.W.L. Jones⁹⁰, S.D. Jones¹⁵⁶,
 S. Jones⁷, T.J. Jones⁹¹, J. Jongmanns^{61a}, P.M. Jorge^{140a}, J. Jovicevic³⁶, X. Ju¹⁸,
 J.J. Junggeburth¹¹⁵, A. Juste Rozas^{14,aa}, A. Kaczmarska⁸⁵, M. Kado^{73a,73b}, H. Kagan¹²⁷,
 M. Kagan¹⁵³, A. Kahn³⁹, C. Kahra¹⁰⁰, T. Kaji¹⁷⁹, E. Kajomovitz¹⁶⁰, C.W. Kalderon⁹⁷,
 A. Kaluza¹⁰⁰, A. Kamenshchikov¹²³, M. Kaneda¹⁶³, L. Kanjir⁹², Y. Kano¹¹⁷, V.A. Kantserov¹¹²,
 J. Kanzaki⁸², L.S. Kaplan¹⁸¹, D. Kar^{33e}, K. Karava¹³⁵, M.J. Kareem^{168b}, S.N. Karpov⁸⁰,
 Z.M. Karpova⁸⁰, V. Kartvelishvili⁹⁰, A.N. Karyukhin¹²³, L. Kashif¹⁸¹, R.D. Kass¹²⁷,
 A. Kastanas^{45a,45b}, C. Kato^{60d,60c}, J. Katzy⁴⁶, K. Kawade¹⁵⁰, K. Kawagoe⁸⁸, T. Kawaguchi¹¹⁷,
 T. Kawamoto¹⁶³, G. Kawamura⁵³, E.F. Kay¹⁷⁶, V.F. Kazanin^{122b,122a}, R. Keeler¹⁷⁶, R. Kehoe⁴²,
 J.S. Keller³⁴, E. Kellermann⁹⁷, D. Kelsey¹⁵⁶, J.J. Kempster²¹, J. Kendrick²¹, K.E. Kennedy³⁹,
 O. Kepka¹⁴¹, S. Kersten¹⁸², B.P. Kerševan⁹², S. Ketabchi Haghighat¹⁶⁷, M. Khader¹⁷³,
 F. Khalil-Zada¹³, M. Khandoga¹⁴⁵, A. Khanov¹³⁰, A.G. Kharlamov^{122b,122a},
 T. Kharlamova^{122b,122a}, E.E. Khoda¹⁷⁵, A. Khodinov¹⁶⁶, T.J. Khoo⁵⁴, E. Khramov⁸⁰,
 J. Khubua^{159b}, S. Kido⁸³, M. Kiehn⁵⁴, C.R. Kilby⁹⁴, Y.K. Kim³⁷, N. Kimura⁹⁵, O.M. Kind¹⁹,
 B.T. King^{91,*}, D. Kirchmeier⁴⁸, J. Kirk¹⁴⁴, A.E. Kiryunin¹¹⁵, T. Kishimoto¹⁶³, D.P. Kisliuk¹⁶⁷,
 V. Kitali⁴⁶, O. Kivernyk⁵, T. Klapdor-Kleingrothaus⁵², M. Klassen^{61a}, M.H. Klein¹⁰⁶, M. Klein⁹¹,
 U. Klein⁹¹, K. Kleinknecht¹⁰⁰, P. Klimek¹²¹, A. Klimentov²⁹, T. Klingl²⁴, T. Klioutchnikova³⁶,
 F.F. Klitzner¹¹⁴, P. Kluit¹²⁰, S. Kluth¹¹⁵, E. Kneringer⁷⁷, E.B.F.G. Knoop¹⁰², A. Knue⁵²,
 D. Kobayashi⁸⁸, T. Kobayashi¹⁶³, M. Kobel⁴⁸, M. Kocian¹⁵³, P. Kodys¹⁴³, P.T. Koenig²⁴,
 T. Koffas³⁴, N.M. Köhler³⁶, T. Koi¹⁵³, M. Kolb^{61b}, I. Koletsou⁵, T. Komarek¹³¹, T. Kondo⁸²,
 N. Kondrashova^{60c}, K. Köneke⁵², A.C. König¹¹⁹, T. Kono¹²⁶, R. Konoplich^{125,an},

V. Konstantinides⁹⁵, N. Konstantinidis⁹⁵, B. Konya⁹⁷, R. Kopeliansky⁶⁶, S. Koperny^{84a}, K. Korcyl⁸⁵, K. Kordas¹⁶², G. Koren¹⁶¹, A. Korn⁹⁵, I. Korolkov¹⁴, E.V. Korolkova¹⁴⁹, N. Korotkova¹¹³, O. Kortner¹¹⁵, S. Kortner¹¹⁵, T. Kosek¹⁴³, V.V. Kostyukhin¹⁶⁶, A. Kotskechagia⁶⁵, A. Kotwal⁴⁹, A. Koulouris¹⁰, A. Kourkoumeli-Charalampidi^{71a,71b}, C. Kourkouvelis⁹, E. Kourlitis¹⁴⁹, V. Kouskoura²⁹, A.B. Kowalewska⁸⁵, R. Kowalewski¹⁷⁶, C. Kozakai¹⁶³, W. Kozanecki¹⁴⁵, A.S. Kozhin¹²³, V.A. Kramarenko¹¹³, G. Kramberger⁹², D. Krasnopevtsev^{60a}, M.W. Krasny¹³⁶, A. Krasznahorkay³⁶, D. Krauss¹¹⁵, J.A. Kremer^{84a}, J. Kretzschmar⁹¹, P. Krieger¹⁶⁷, F. Krieter¹¹⁴, A. Krishnan^{61b}, K. Krizka¹⁸, K. Kroeninger⁴⁷, H. Kroha¹¹⁵, J. Kroll¹⁴¹, J. Kroll¹³⁷, K.S. Krowpman¹⁰⁷, J. Krstic¹⁶, U. Kruchonak⁸⁰, H. Krüger²⁴, N. Krumnack⁷⁹, M.C. Kruse⁴⁹, J.A. Krzysiak⁸⁵, T. Kubota¹⁰⁵, O. Kuchinskaia¹⁶⁶, S. Kuday^{4b}, J.T. Kuechler⁴⁶, S. Kuehn³⁶, A. Kugel^{61a}, T. Kuhl⁴⁶, V. Kukhtin⁸⁰, R. Kukla¹⁰², Y. Kulchitsky^{108,ak}, S. Kuleshov^{147d}, Y.P. Kulinich¹⁷³, M. Kuna⁵⁸, T. Kunigo⁸⁶, A. Kupco¹⁴¹, T. Kupfer⁴⁷, O. Kuprash⁵², H. Kurashige⁸³, L.L. Kurchaninov^{168a}, Y.A. Kurochkin¹⁰⁸, A. Kurova¹¹², M.G. Kurth^{15a,15d}, E.S. Kuwertz³⁶, M. Kuze¹⁶⁵, A.K. Kvam¹⁴⁸, J. Kvita¹³¹, T. Kwan¹⁰⁴, A. La Rosa¹¹⁵, L. La Rotonda^{41b,41a}, F. La Ruffa^{41b,41a}, C. Lacasta¹⁷⁴, F. Lacava^{73a,73b}, D.P.J. Lack¹⁰¹, H. Lacker¹⁹, D. Lacour¹³⁶, E. Ladygin⁸⁰, R. Lafaye⁵, B. Laforge¹³⁶, T. Lagouri^{33e}, S. Lai⁵³, S. Lammers⁶⁶, W. Lampl⁷, C. Lampoudis¹⁶², E. Lançon²⁹, U. Landgraf⁵², M.P.J. Landon⁹³, M.C. Lanfermann⁵⁴, V.S. Lang⁴⁶, J.C. Lange⁵³, R.J. Langenberg³⁶, A.J. Lankford¹⁷¹, F. Lanni²⁹, K. Lantzsich²⁴, A. Lanza^{71a}, A. Lapertosa^{55b,55a}, S. Laplace¹³⁶, J.F. Laporte¹⁴⁵, T. Lari^{69a}, F. Lasagni Manghi^{23b,23a}, M. Lassnig³⁶, T.S. Lau^{63a}, A. Laudrain⁶⁵, A. Laurier³⁴, M. Lavorgna^{70a,70b}, S.D. Lawlor⁹⁴, M. Lazzaroni^{69a,69b}, B. Le¹⁰⁵, E. Le Guirriec¹⁰², M. LeBlanc⁷, T. LeCompte⁶, F. Ledroit-Guillon⁵⁸, A.C.A. Lee⁹⁵, C.A. Lee²⁹, G.R. Lee¹⁷, L. Lee⁵⁹, S.C. Lee¹⁵⁸, S.J. Lee³⁴, S. Lee⁷⁹, B. Lefebvre^{168a}, H.P. Lefebvre⁹⁴, M. Lefebvre¹⁷⁶, F. Legger¹¹⁴, C. Leggett¹⁸, K. Lehmann¹⁵², N. Lehmann¹⁸², G. Lehmann Miotto³⁶, W.A. Leight⁴⁶, A. Leisos^{162,y}, M.A.L. Leite^{81d}, C.E. Leitgeb¹¹⁴, R. Leitner¹⁴³, D. Lellouch^{180,*}, K.J.C. Leney⁴², T. Lenz²⁴, B. Lenzi³⁶, R. Leone⁷, S. Leone^{72a}, C. Leonidopoulos⁵⁰, A. Leopold¹³⁶, G. Lerner¹⁵⁶, C. Leroy¹¹⁰, R. Les¹⁶⁷, C.G. Lester³², M. Levchenko¹³⁸, J. Levêque⁵, D. Levin¹⁰⁶, L.J. Levinson¹⁸⁰, D.J. Lewis²¹, B. Li^{15b}, B. Li¹⁰⁶, C-Q. Li^{60a}, F. Li^{60c}, H. Li^{60a}, H. Li^{60b}, J. Li^{60c}, K. Li¹⁵³, L. Li^{60c}, M. Li^{15a,15d}, Q. Li^{15a,15d}, Q.Y. Li^{60a}, S. Li^{60d,60c}, X. Li⁴⁶, Y. Li⁴⁶, Z. Li^{60b}, Z. Liang^{15a}, B. Liberti^{74a}, A. Liblong¹⁶⁷, K. Lie^{63c}, S. Lim²⁹, C.Y. Lin³², K. Lin¹⁰⁷, T.H. Lin¹⁰⁰, R.A. Linck⁶⁶, J.H. Lindon²¹, A.L. Lioni⁵⁴, E. Lipeles¹³⁷, A. Lipniacka¹⁷, M. Lisovsky^{61b}, T.M. Liss^{173,au}, A. Lister¹⁷⁵, A.M. Litke¹⁴⁶, J.D. Little⁸, B. Liu⁷⁹, B.L. Liu⁶, H.B. Liu²⁹, H. Liu¹⁰⁶, J.B. Liu^{60a}, J.K.K. Liu¹³⁵, K. Liu¹³⁶, M. Liu^{60a}, P. Liu¹⁸, Y. Liu^{15a,15d}, Y.L. Liu¹⁰⁶, Y.W. Liu^{60a}, M. Livan^{71a,71b}, A. Lleres⁵⁸, J. Llorente Merino¹⁵², S.L. Lloyd⁹³, C.Y. Lo^{63b}, F. Lo Sterzo⁴², E.M. Lobodzinska⁴⁶, P. Loch⁷, S. Loffredo^{74a,74b}, T. Lohse¹⁹, K. Lohwasser¹⁴⁹, M. Lokajicek¹⁴¹, J.D. Long¹⁷³, R.E. Long⁹⁰, L. Longo³⁶, K.A. Looper¹²⁷, J.A. Lopez^{147d}, I. Lopez Paz¹⁰¹, A. Lopez Solis¹⁴⁹, J. Lorenz¹¹⁴, N. Lorenzo Martinez⁵, M. Losada^{22a}, P.J. Lösel¹¹⁴, A. Lösle⁵², X. Lou⁴⁶, X. Lou^{15a}, A. Lounis⁶⁵, J. Love⁶, P.A. Love⁹⁰, J.J. Lozano Bahilo¹⁷⁴, M. Lu^{60a}, Y.J. Lu⁶⁴, H.J. Lubatti¹⁴⁸, C. Luci^{73a,73b}, A. Lucotte⁵⁸, C. Luedtke⁵², F. Luehring⁶⁶, I. Luise¹³⁶, L. Luminari^{73a}, B. Lund-Jensen¹⁵⁴, M.S. Lutz¹⁰³, D. Lynn²⁹, H. Lyons⁹¹, R. Lysak¹⁴¹, E. Lytken⁹⁷, F. Lyu^{15a}, V. Lyubushkin⁸⁰, T. Lyubushkina⁸⁰, H. Ma²⁹, L.L. Ma^{60b}, Y. Ma^{60b}, G. Maccarrone⁵¹, A. Macchiolo¹¹⁵, C.M. Macdonald¹⁴⁹, J. Machado Miguens¹³⁷, D. Madaffari¹⁷⁴, R. Madar³⁸, W.F. Mader⁴⁸, N. Madysa⁴⁸, J. Maeda⁸³, T. Maeno²⁹, M. Maerker⁴⁸, A.S. Maevskiy¹¹³, V. Magerl⁵², N. Magini⁷⁹, D.J. Mahon³⁹, C. Maidantchik^{81b}, T. Maier¹¹⁴, A. Maio^{140a,140b,140d}, K. Maj^{84a}, O. Majersky^{28a}, S. Majewski¹³², Y. Makida⁸², N. Makovec⁶⁵, B. Malaescu¹³⁶, Pa. Malecki⁸⁵, V.P. Maleev¹³⁸, F. Malek⁵⁸, U. Mallik⁷⁸, D. Malon⁶, C. Malone³², S. Maltezos¹⁰, S. Mal'ukov⁸⁰, J. Mamuzic¹⁷⁴, G. Mancini⁵¹, I. Mandić⁹², L. Manhaes de Andrade Filho^{81a},

I.M. Maniatis¹⁶², J. Manjarres Ramos⁴⁸, K.H. Mankinen⁹⁷, A. Mann¹¹⁴, A. Manousos⁷⁷,
 B. Mansoulie¹⁴⁵, I. Manthos¹⁶², S. Manzoni¹²⁰, A. Marantis¹⁶², G. Marceca³⁰, L. Marchese¹³⁵,
 G. Marchiori¹³⁶, M. Marcisovsky¹⁴¹, L. Marcoccia^{74a,74b}, C. Marcon⁹⁷, C.A. Marin Tobon³⁶,
 M. Marjanovic¹²⁹, Z. Marshall¹⁸, M.U.F. Martensson¹⁷², S. Marti-Garcia¹⁷⁴, C.B. Martin¹²⁷,
 T.A. Martin¹⁷⁸, V.J. Martin⁵⁰, B. Martin dit Latour¹⁷, L. Martinelli^{75a,75b}, M. Martinez^{14,aa},
 V.I. Martinez Outschoorn¹⁰³, S. Martin-Haugh¹⁴⁴, V.S. Martoiu^{27b}, A.C. Martyniuk⁹⁵,
 A. Marzin³⁶, S.R. Maschek¹¹⁵, L. Masetti¹⁰⁰, T. Mashimo¹⁶³, R. Mashinistov¹¹¹, J. Masik¹⁰¹,
 A.L. Maslennikov^{122b,122a}, L. Massa^{74a,74b}, P. Massarotti^{70a,70b}, P. Mastrandrea^{72a,72b},
 A. Mastroberardino^{41b,41a}, T. Masubuchi¹⁶³, D. Matakias¹⁰, A. Matic¹¹⁴, P. Mättig²⁴,
 J. Maurer^{27b}, B. Maček⁹², D.A. Maximov^{122b,122a}, R. Mazini¹⁵⁸, I. Maznas¹⁶², S.M. Mazza¹⁴⁶,
 S.P. Mc Kee¹⁰⁶, T.G. McCarthy¹¹⁵, W.P. McCormack¹⁸, E.F. McDonald¹⁰⁵, J.A. Mcfayden³⁶,
 G. Mchedlidze^{159b}, M.A. McKay⁴², K.D. McLean¹⁷⁶, S.J. McMahan¹⁴⁴, P.C. McNamara¹⁰⁵,
 C.J. McNicol¹⁷⁸, R.A. McPherson^{176,af}, J.E. Mdhluli^{33e}, Z.A. Meadows¹⁰³, S. Meehan³⁶,
 T. Megy⁵², S. Mehlhase¹¹⁴, A. Mehta⁹¹, T. Meideck⁵⁸, B. Meirose⁴³, D. Melini¹⁷⁴,
 B.R. Mellado Garcia^{33e}, J.D. Mellenthin⁵³, M. Melo^{28a}, F. Meloni⁴⁶, A. Melzer²⁴, S.B. Menary¹⁰¹,
 E.D. Mendes Gouveia^{140a,140e}, L. Meng³⁶, X.T. Meng¹⁰⁶, S. Menke¹¹⁵, E. Meoni^{41b,41a},
 S. Mergelmeyer¹⁹, S.A.M. Merkt¹³⁹, C. Merlassino²⁰, P. Mermoud⁵⁴, L. Merola^{70a,70b},
 C. Meroni^{69a}, O. Meshkov^{113,111}, J.K.R. Meshreki¹⁵¹, A. Messina^{73a,73b}, J. Metcalfe⁶,
 A.S. Mete¹⁷¹, C. Meyer⁶⁶, J. Meyer¹⁶⁰, J-P. Meyer¹⁴⁵, H. Meyer Zu Theenhausen^{61a}, F. Miano¹⁵⁶,
 M. Michetti¹⁹, R.P. Middleton¹⁴⁴, L. Mijović⁵⁰, G. Mikenberg¹⁸⁰, M. Mikesikova¹⁴¹, M. Mikuž⁹²,
 H. Mildner¹⁴⁹, M. Milesi¹⁰⁵, A. Milic¹⁶⁷, D.A. Millar⁹³, D.W. Miller³⁷, A. Milov¹⁸⁰,
 D.A. Milstead^{45a,45b}, R.A. Mina^{153,q}, A.A. Minaenko¹²³, M. Miñano Moya¹⁷⁴, I.A. Minashvili^{159b},
 A.I. Mincer¹²⁵, B. Mindur^{84a}, M. Mineev⁸⁰, Y. Minegishi¹⁶³, L.M. Mir¹⁴, A. Mirto^{68a,68b},
 K.P. Mistry¹³⁷, T. Mitani¹⁷⁹, J. Mitrevski¹¹⁴, V.A. Mitsou¹⁷⁴, M. Mittal^{60c}, O. Miu¹⁶⁷,
 A. Miucci²⁰, P.S. Miyagawa¹⁴⁹, A. Mizukami⁸², J.U. Mjörnmark⁹⁷, T. Mkrtchyan¹⁸⁴,
 M. Mlynarikova¹⁴³, T. Moa^{45a,45b}, K. Mochizuki¹¹⁰, P. Mogg⁵², S. Mohapatra³⁹, R. Moles-Valls²⁴,
 M.C. Mondragon¹⁰⁷, K. Mönig⁴⁶, J. Monk⁴⁰, E. Monnier¹⁰², A. Montalbano¹⁵²,
 J. Montejo Berlingen³⁶, M. Montella⁹⁵, F. Monticelli⁸⁹, S. Monzani^{69a}, N. Morange⁶⁵,
 D. Moreno^{22a}, M. Moreno Llácer¹⁷⁴, C. Moreno Martinez¹⁴, P. Morettini^{55b}, M. Morgenstern¹²⁰,
 S. Morgenstern⁴⁸, D. Mori¹⁵², M. Morii⁵⁹, M. Morinaga¹⁷⁹, V. Morisbak¹³⁴, A.K. Morley³⁶,
 G. Mornacchi³⁶, A.P. Morris⁹⁵, L. Morvaj¹⁵⁵, P. Moschovakos³⁶, B. Moser¹²⁰, M. Mosidze^{159b},
 T. Moskalets¹⁴⁵, H.J. Moss¹⁴⁹, J. Moss^{31,n}, E.J.W. Moyse¹⁰³, S. Muanza¹⁰², J. Mueller¹³⁹,
 R.S.P. Mueller¹¹⁴, D. Muenstermann⁹⁰, G.A. Mullier⁹⁷, D.P. Mungo^{69a,69b},
 J.L. Munoz Martinez¹⁴, F.J. Munoz Sanchez¹⁰¹, P. Murin^{28b}, W.J. Murray^{178,144},
 A. Murrone^{69a,69b}, M. Muškinja¹⁸, C. Mwewa^{33a}, A.G. Myagkov^{123,ao}, J. Myers¹³², M. Myska¹⁴²,
 B.P. Nachman¹⁸, O. Nackenhorst⁴⁷, A.Nag Nag⁴⁸, K. Nagai¹³⁵, K. Nagano⁸², Y. Nagasaka⁶²,
 M. Nagel⁵², J.L. Nagle²⁹, E. Nagy¹⁰², A.M. Nairz³⁶, Y. Nakahama¹¹⁷, K. Nakamura⁸²,
 T. Nakamura¹⁶³, I. Nakano¹²⁸, H. Nanjo¹³³, F. Napolitano^{61a}, R.F. Naranjo Garcia⁴⁶,
 R. Narayan⁴², I. Naryshkin¹³⁸, T. Naumann⁴⁶, G. Navarro^{22a}, P.Y. Nechaeva¹¹¹, F. Nechansky⁴⁶,
 T.J. Neep²¹, A. Negri^{71a,71b}, M. Negrini^{23b}, C. Nellist⁵³, M.E. Nelson¹³⁵, S. Nemecek¹⁴¹,
 P. Nemethy¹²⁵, M. Nessi^{36,d}, M.S. Neubauer¹⁷³, M. Neumann¹⁸², P.R. Newman²¹, Y.S. Ng¹⁹,
 Y.W.Y. Ng¹⁷¹, B. Ngair^{35e}, H.D.N. Nguyen¹⁰², T. Nguyen Manh¹¹⁰, E. Nibigira³⁸,
 R.B. Nickerson¹³⁵, R. Nicolaidou¹⁴⁵, D.S. Nielsen⁴⁰, J. Nielsen¹⁴⁶, N. Nikiforou¹¹,
 V. Nikolaenko^{123,ao}, I. Nikolic-Audit¹³⁶, K. Nikolopoulos²¹, P. Nilsson²⁹, H.R. Nindhito⁵⁴,
 Y. Ninomiya⁸², A. Nisati^{73a}, N. Nishu^{60c}, R. Nisius¹¹⁵, I. Nitsche⁴⁷, T. Nitta¹⁷⁹, T. Nobe¹⁶³,
 Y. Noguchi⁸⁶, I. Nomidis¹³⁶, M.A. Nomura²⁹, M. Nordberg³⁶, N. Norjoharuddeen¹³⁵, T. Novak⁹²,
 O. Novgorodova⁴⁸, R. Novotny¹⁴², L. Nozka¹³¹, K. Ntekas¹⁷¹, E. Nurse⁹⁵, F.G. Oakham^{34,aw},
 H. Oberlack¹¹⁵, J. Ocariz¹³⁶, A. Ochi⁸³, I. Ochoa³⁹, J.P. Ochoa-Ricoux^{147a}, K. O'Connor²⁶,

S. Oda⁸⁸, S. Odaka⁸², S. Oerdek⁵³, A. Ogrodnik^{84a}, A. Oh¹⁰¹, S.H. Oh⁴⁹, C.C. Ohm¹⁵⁴,
 H. Oide¹⁶⁵, M.L. Ojeda¹⁶⁷, H. Okawa¹⁶⁹, Y. Okazaki⁸⁶, M.W. O’Keefe⁹¹, Y. Okumura¹⁶³,
 T. Okuyama⁸², A. Olariu^{27b}, L.F. Oleiro Seabra^{140a}, S.A. Olivares Pino^{147a},
 D. Oliveira Damazio²⁹, J.L. Oliver¹, M.J.R. Olsson¹⁷¹, A. Olszewski⁸⁵, J. Olszowska⁸⁵,
 D.C. O’Neil¹⁵², A.P. O’neill¹³⁵, A. Onofre^{140a,140e}, P.U.E. Onyisi¹¹, H. Oppen¹³⁴, M.J. Oreglia³⁷,
 G.E. Orellana⁸⁹, D. Orestano^{75a,75b}, N. Orlando¹⁴, R.S. Orr¹⁶⁷, V. O’Shea⁵⁷, R. Ospanov^{60a},
 G. Otero y Garzon³⁰, H. Otono⁸⁸, P.S. Ott^{61a}, M. Ouchrif^{35d}, J. Ouellette²⁹, F. Ould-Saada¹³⁴,
 A. Ouraou¹⁴⁵, Q. Ouyang^{15a}, M. Owen⁵⁷, R.E. Owen²¹, V.E. Ozcan^{12c}, N. Ozturk⁸, J. Pacalt¹³¹,
 H.A. Pacey³², K. Pachal⁴⁹, A. Pacheco Pages¹⁴, C. Padilla Aranda¹⁴, S. Pagan Griso¹⁸,
 M. Paganini¹⁸³, G. Palacino⁶⁶, S. Palazzo⁵⁰, S. Palestini³⁶, M. Palka^{84b}, D. Pallin³⁸,
 I. Panagoulas¹⁰, C.E. Pandini³⁶, J.G. Panduro Vazquez⁹⁴, P. Pani⁴⁶, G. Panizzo^{67a,67c},
 L. Paolozzi⁵⁴, C. Papadatos¹¹⁰, K. Papageorgiou^{9,h}, S. Parajuli⁴³, A. Paramonov⁶,
 D. Paredes Hernandez^{63b}, S.R. Paredes Saenz¹³⁵, B. Parida¹⁶⁶, T.H. Park¹⁶⁷, A.J. Parker³¹,
 M.A. Parker³², F. Parodi^{55b,55a}, E.W. Parrish¹²¹, J.A. Parsons³⁹, U. Parzefall⁵²,
 L. Pascual Dominguez¹³⁶, V.R. Pascuzzi¹⁶⁷, J.M.P. Pasner¹⁴⁶, F. Pasquali¹²⁰, E. Pasqualucci^{73a},
 S. Passaggio^{55b}, F. Pastore⁹⁴, P. Pasuwan^{45a,45b}, S. Patariaia¹⁰⁰, J.R. Pater¹⁰¹, A. Pathak^{181,j},
 T. Pauly³⁶, B. Pearson¹¹⁵, M. Pedersen¹³⁴, L. Pedraza Diaz¹¹⁹, R. Pedro^{140a}, T. Peiffer⁵³,
 S.V. Peleganchuk^{122b,122a}, O. Penc¹⁴¹, H. Peng^{60a}, B.S. Peralva^{81a}, M.M. Perego⁶⁵,
 A.P. Pereira Peixoto^{140a}, D.V. Perepelitsa²⁹, F. Peri¹⁹, L. Perini^{69a,69b}, H. Pernegger³⁶,
 S. Perrella^{70a,70b}, K. Peters⁴⁶, R.F.Y. Peters¹⁰¹, B.A. Petersen³⁶, T.C. Petersen⁴⁰, E. Petit¹⁰²,
 A. Petridis¹, C. Petridou¹⁶², P. Petroff⁶⁵, M. Petrov¹³⁵, F. Petrucci^{75a,75b}, M. Pettee¹⁸³,
 N.E. Pettersson¹⁰³, K. Petukhova¹⁴³, A. Peyaud¹⁴⁵, R. Pezoa^{147d}, L. Pezzotti^{71a,71b}, T. Pham¹⁰⁵,
 F.H. Phillips¹⁰⁷, P.W. Phillips¹⁴⁴, M.W. Phipps¹⁷³, G. Piacquadio¹⁵⁵, E. Pianori¹⁸, A. Picazio¹⁰³,
 R.H. Pickles¹⁰¹, R. Piegai³⁰, D. Pietreanu^{27b}, J.E. Pilcher³⁷, A.D. Pilkington¹⁰¹,
 M. Pinamonti^{74a,74b}, J.L. Pinfold³, M. Pitt¹⁶¹, L. Pizzimento^{74a,74b}, M.-A. Pleier²⁹, V. Pleskot¹⁴³,
 E. Plotnikova⁸⁰, P. Podberczko^{122b,122a}, R. Poettgen⁹⁷, R. Poggi⁵⁴, L. Poggioli⁶⁵,
 I. Pogrebnyak¹⁰⁷, D. Pohl²⁴, I. Pokharel⁵³, G. Polesello^{71a}, A. Poley¹⁸, A. Policicchio^{73a,73b},
 R. Polifka¹⁴³, A. Polini^{23b}, C.S. Pollard⁴⁶, V. Polychronakos²⁹, D. Ponomarenko¹¹²,
 L. Pontecorvo³⁶, S. Popa^{27a}, G.A. Popeneci^{27d}, L. Portales⁵, D.M. Portillo Quintero⁵⁸,
 S. Pospisil¹⁴², K. Potamianos⁴⁶, I.N. Potrap⁸⁰, C.J. Potter³², H. Potti¹¹, T. Poulsen⁹⁷,
 J. Poveda³⁶, T.D. Powell¹⁴⁹, G. Pownall⁴⁶, M.E. Pozo Astigarraga³⁶, P. Pralavorio¹⁰², S. Prell⁷⁹,
 D. Price¹⁰¹, M. Primavera^{68a}, S. Prince¹⁰⁴, M.L. Proffitt¹⁴⁸, N. Proklova¹¹², K. Prokofiev^{63c},
 F. Prokoshin⁸⁰, S. Protopopescu²⁹, J. Proudfoot⁶, M. Przybycien^{84a}, D. Pudzha¹³⁸, A. Puri¹⁷³,
 P. Puzo⁶⁵, J. Qian¹⁰⁶, Y. Qin¹⁰¹, A. Quadt⁵³, M. Queitsch-Maitland⁴⁶, A. Qureshi¹, M. Racko^{28a},
 P. Rados¹⁰⁵, F. Ragusa^{69a,69b}, G. Rahal⁹⁸, J.A. Raine⁵⁴, S. Rajagopalan²⁹, A. Ramirez Morales⁹³,
 K. Ran^{15a,15d}, T. Rashid⁶⁵, S. Raspopov⁵, D.M. Rauch⁴⁶, F. Rauscher¹¹⁴, S. Rave¹⁰⁰,
 B. Ravina¹⁴⁹, I. Ravinovitch¹⁸⁰, J.H. Rawling¹⁰¹, M. Raymond³⁶, A.L. Read¹³⁴, N.P. Readioff⁵⁸,
 M. Reale^{68a,68b}, D.M. Rebuzzi^{71a,71b}, A. Redelbach¹⁷⁷, G. Redlinger²⁹, K. Reeves⁴³,
 L. Rehnisch¹⁹, J. Reichert¹³⁷, D. Reikher¹⁶¹, A. Reiss¹⁰⁰, A. Rej¹⁵¹, C. Rembser³⁶, M. Renda^{27b},
 M. Rescigno^{73a}, S. Resconi^{69a}, E.D. Resseguie¹³⁷, S. Rettie¹⁷⁵, E. Reynolds²¹,
 O.L. Rezanova^{122b,122a}, P. Reznicek¹⁴³, E. Ricci^{76a,76b}, R. Richter¹¹⁵, S. Richter⁴⁶,
 E. Richter-Was^{84b}, O. Ricken²⁴, M. Ridel¹³⁶, P. Rieck¹¹⁵, O. Rifki⁴⁶, M. Rijssenbeek¹⁵⁵,
 A. Rimoldi^{71a,71b}, M. Rimoldi⁴⁶, L. Rinaldi^{23b}, G. Ripellino¹⁵⁴, I. Riu¹⁴, J.C. Rivera Vergara¹⁷⁶,
 F. Rizatdinova¹³⁰, E. Rizvi⁹³, C. Rizzi³⁶, R.T. Roberts¹⁰¹, S.H. Robertson^{104,af}, M. Robin⁴⁶,
 D. Robinson³², J.E.M. Robinson⁴⁶, C.M. Robles Gajardo^{147d}, A. Robson⁵⁷, A. Rocchi^{74a,74b},
 E. Rocco¹⁰⁰, C. Roda^{72a,72b}, S. Rodriguez Bosca¹⁷⁴, A. Rodriguez Perez¹⁴,
 D. Rodriguez Rodriguez¹⁷⁴, A.M. Rodríguez Vera^{168b}, S. Roe³⁶, O. Röhne¹³⁴, R. Röhrig¹¹⁵,
 R.A. Rojas^{147d}, C.P.A. Roland⁶⁶, J. Roloff²⁹, A. Romaniouk¹¹², M. Romano^{23b,23a},

N. Rompotis⁹¹, M. Ronzani¹²⁵, L. Roos¹³⁶, S. Rosati^{73a}, K. Rosbach⁵², G. Rosin¹⁰³,
 B.J. Rosser¹³⁷, E. Rossi⁴⁶, E. Rossi^{75a,75b}, E. Rossi^{70a,70b}, L.P. Rossi^{55b}, L. Rossini^{69a,69b},
 R. Rosten¹⁴, M. Rotaru^{27b}, J. Rothberg¹⁴⁸, D. Rousseau⁶⁵, G. Rovelli^{71a,71b}, A. Roy¹¹, D. Roy^{33e},
 A. Rozanov¹⁰², Y. Rozen¹⁶⁰, X. Ruan^{33e}, F. Rühr⁵², A. Ruiz-Martinez¹⁷⁴, A. Rummler³⁶,
 Z. Rurikova⁵², N.A. Rusakovich⁸⁰, H.L. Russell¹⁰⁴, L. Rustige^{38,47}, J.P. Rutherford⁷,
 E.M. Rüttinger¹⁴⁹, M. Rybar³⁹, G. Rybkin⁶⁵, E.B. Rye¹³⁴, A. Ryzhov¹²³, J.A. Sabater Iglesias⁴⁶,
 P. Sabatini⁵³, G. Sabato¹²⁰, S. Sacerdoti⁶⁵, H.F.-W. Sadrozinski¹⁴⁶, R. Sadykov⁸⁰,
 F. Safai Tehrani^{73a}, B. Safarzadeh Samani¹⁵⁶, P. Saha¹²¹, S. Saha¹⁰⁴, M. Sahinsoy^{61a}, A. Sahu¹⁸²,
 M. Saimpert⁴⁶, M. Saito¹⁶³, T. Saito¹⁶³, H. Sakamoto¹⁶³, A. Sakharov^{125,an}, D. Salamani⁵⁴,
 G. Salamanna^{75a,75b}, J.E. Salazar Loyola^{147d}, A. Salnikov¹⁵³, J. Salt¹⁷⁴, D. Salvatore^{41b,41a},
 F. Salvatore¹⁵⁶, A. Salvucci^{63a,63b,63c}, A. Salzburger³⁶, J. Samarati³⁶, D. Sammel⁵²,
 D. Sampsonidis¹⁶², D. Sampsonidou¹⁶², J. Sánchez¹⁷⁴, A. Sanchez Pineda^{67a,36,67c},
 H. Sandaker¹³⁴, C.O. Sander⁴⁶, I.G. Sanderswood⁹⁰, M. Sandhoff¹⁸², C. Sandoval^{22a},
 D.P.C. Sankey¹⁴⁴, M. Sannino^{55b,55a}, Y. Sano¹¹⁷, A. Sansoni⁵¹, C. Santoni³⁸, H. Santos^{140a,140b},
 S.N. Santpur¹⁸, A. Santra¹⁷⁴, A. Sapronov⁸⁰, J.G. Saraiva^{140a,140d}, O. Sasaki⁸², K. Sato¹⁶⁹,
 F. Sauerburger⁵², E. Sauvan⁵, P. Savard^{167,aw}, N. Savic¹¹⁵, R. Sawada¹⁶³, C. Sawyer¹⁴⁴,
 L. Sawyer^{96,al}, C. Sbarra^{23b}, A. Sbrizzi^{23a}, T. Scanlon⁹⁵, J. Schaarschmidt¹⁴⁸, P. Schacht¹¹⁵,
 B.M. Schachtner¹¹⁴, D. Schaefer³⁷, L. Schaefer¹³⁷, J. Schaeffer¹⁰⁰, S. Schaepe³⁶, U. Schäfer¹⁰⁰,
 A.C. Schaffer⁶⁵, D. Schaile¹¹⁴, R.D. Schamberger¹⁵⁵, N. Scharmberg¹⁰¹, V.A. Schegelsky¹³⁸,
 D. Scheirich¹⁴³, F. Schenck¹⁹, M. Schernau¹⁷¹, C. Schiavi^{55b,55a}, S. Schier¹⁴⁶, L.K. Schildgen²⁴,
 Z.M. Schillaci²⁶, E.J. Schioppa³⁶, M. Schioppa^{41b,41a}, K.E. Schleicher⁵², S. Schlenker³⁶,
 K.R. Schmidt-Sommerfeld¹¹⁵, K. Schmieden³⁶, C. Schmitt¹⁰⁰, S. Schmitt⁴⁶, S. Schmitz¹⁰⁰,
 J.C. Schmoeckel⁴⁶, U. Schnoor⁵², L. Schoeffel¹⁴⁵, A. Schoening^{61b}, P.G. Scholer⁵², E. Schopf¹³⁵,
 M. Schott¹⁰⁰, J.F.P. Schouwenberg¹¹⁹, J. Schovancova³⁶, S. Schramm⁵⁴, F. Schroeder¹⁸²,
 A. Schulte¹⁰⁰, H.-C. Schultz-Coulon^{61a}, M. Schumacher⁵², B.A. Schumm¹⁴⁶, Ph. Schune¹⁴⁵,
 A. Schwartzman¹⁵³, T.A. Schwarz¹⁰⁶, Ph. Schwemling¹⁴⁵, R. Schwienhorst¹⁰⁷, A. Sciandra¹⁴⁶,
 G. Sciolla²⁶, M. Scodreggio⁴⁶, M. Scornajenghi^{41b,41a}, F. Scuri^{72a}, F. Scutti¹⁰⁵, L.M. Scyboz¹¹⁵,
 C.D. Sebastiani^{73a,73b}, P. Seema¹⁹, S.C. Seidel¹¹⁸, A. Seiden¹⁴⁶, B.D. Seidlitz²⁹, T. Seiss³⁷,
 J.M. Seixas^{81b}, G. Sekhniaidze^{70a}, K. Sekhon¹⁰⁶, S.J. Sekula⁴², N. Semprini-Cesari^{23b,23a},
 S. Sen⁴⁹, C. Serfon⁷⁷, L. Serin⁶⁵, L. Serkin^{67a,67b}, M. Sessa^{60a}, H. Severini¹²⁹, T. Šfiligoj⁹²,
 F. Sforza^{55b,55a}, A. Sfyrla⁵⁴, E. Shabalina⁵³, J.D. Shahinian¹⁴⁶, N.W. Shaikh^{45a,45b},
 D. Shaked Renous¹⁸⁰, L.Y. Shan^{15a}, J.T. Shank²⁵, M. Shapiro¹⁸, A. Sharma¹³⁵, A.S. Sharma¹,
 P.B. Shatalov¹²⁴, K. Shaw¹⁵⁶, S.M. Shaw¹⁰¹, A. Shcherbakova¹³⁸, M. Shehade¹⁸⁰, Y. Shen¹²⁹,
 A.D. Sherman²⁵, P. Sherwood⁹⁵, L. Shi^{158,at}, S. Shimizu⁸², C.O. Shimmin¹⁸³, Y. Shimogama¹⁷⁹,
 M. Shimojima¹¹⁶, I.P.J. Shipsey¹³⁵, S. Shirabe⁸⁸, M. Shiyakova^{80,ad}, J. Shlomi¹⁸⁰, A. Shmeleva¹¹¹,
 M.J. Shochet³⁷, J. Shojaii¹⁰⁵, D.R. Shope¹²⁹, S. Shrestha¹²⁷, E.M. Shrif^{33e}, E. Shulga¹⁸⁰,
 P. Sicho¹⁴¹, A.M. Sickles¹⁷³, P.E. Sidebo¹⁵⁴, E. Sideras Haddad^{33e}, O. Sidiropoulou³⁶,
 A. Sidoti^{23b,23a}, F. Siegert⁴⁸, Dj. Sijacki¹⁶, M.Jr. Silva¹⁸¹, M.V. Silva Oliveira^{81a},
 S.B. Silverstein^{45a}, S. Simion⁶⁵, E. Simioni¹⁰⁰, R. Simoniello¹⁰⁰, S. Simsek^{12b}, P. Sinervo¹⁶⁷,
 V. Sinetckii^{113,111}, N.B. Sinev¹³², M. Sioli^{23b,23a}, I. Siral¹⁰⁶, S.Yu. Sivoklov¹¹³, J. Sjölin^{45a,45b},
 E. Skorda⁹⁷, P. Skubic¹²⁹, M. Slawinska⁸⁵, K. Sliwa¹⁷⁰, R. Slovak¹⁴³, V. Smakhtin¹⁸⁰,
 B.H. Smart¹⁴⁴, J. Smiesko^{28a}, N. Smirnov¹¹², S.Yu. Smirnov¹¹², Y. Smirnov¹¹²,
 L.N. Smirnova^{113,v}, O. Smirnova⁹⁷, J.W. Smith⁵³, M. Smizanska⁹⁰, K. Smolek¹⁴²,
 A. Smykiewicz⁸⁵, A.A. Snegarev¹¹¹, H.L. Snoek¹²⁰, I.M. Snyder¹³², S. Snyder²⁹, R. Sobie^{176,af},
 A. Soffer¹⁶¹, A. Sogaard⁵⁰, F. Sohns⁵³, C.A. Solans Sanchez³⁶, E.Yu. Soldatov¹¹², U. Soldevila¹⁷⁴,
 A.A. Solodkov¹²³, A. Soloshenko⁸⁰, O.V. Solovyanov¹²³, V. Solovyev¹³⁸, P. Sommer¹⁴⁹, H. Son¹⁷⁰,
 W. Song¹⁴⁴, W.Y. Song^{168b}, A. Sopczak¹⁴², F. Sopkova^{28b}, C.L. Sotiropoulou^{72a,72b},
 S. Sottocornola^{71a,71b}, R. Soualah^{67a,67c,g}, A.M. Soukharev^{122b,122a}, D. South⁴⁶,

S. Spagnolo^{68a,68b}, M. Spalla¹¹⁵, M. Spangenberg¹⁷⁸, F. Spanò⁹⁴, D. Sperlich⁵², T.M. Spieker^{61a},
 R. Spighi^{23b}, G. Spigo³⁶, M. Spina¹⁵⁶, D.P. Spiteri⁵⁷, M. Spousta¹⁴³, A. Stabile^{69a,69b},
 B.L. Stamas¹²¹, R. Stamen^{61a}, M. Stamenkovic¹²⁰, E. Stanecka⁸⁵, B. Stanislaus¹³⁵,
 M.M. Stanitzki⁴⁶, M. Stankaityte¹³⁵, B. Stapf¹²⁰, E.A. Starchenko¹²³, G.H. Stark¹⁴⁶, J. Stark⁵⁸,
 S.H. Stark⁴⁰, P. Staroba¹⁴¹, P. Starovoitov^{61a}, S. Stärz¹⁰⁴, R. Staszewski⁸⁵, G. Stavropoulos⁴⁴,
 M. Stegler⁴⁶, P. Steinberg²⁹, A.L. Steinhebel¹³², B. Stelzer¹⁵², H.J. Stelzer¹³⁹,
 O. Stelzer-Chilton^{168a}, H. Stenzel⁵⁶, T.J. Stevenson¹⁵⁶, G.A. Stewart³⁶, M.C. Stockton³⁶,
 G. Stoicea^{27b}, M. Stolarski^{140a}, S. Stonjek¹¹⁵, A. Straessner⁴⁸, J. Strandberg¹⁵⁴,
 S. Strandberg^{45a,45b}, M. Strauss¹²⁹, P. Strizenc^{28b}, R. Ströhmer¹⁷⁷, D.M. Strom¹³²,
 R. Stroynowski⁴², A. Strubig⁵⁰, S.A. Stucci²⁹, B. Stugu¹⁷, J. Stupak¹²⁹, N.A. Styles⁴⁶, D. Su¹⁵³,
 S. Suchek^{61a}, V.V. Sulin¹¹¹, M.J. Sullivan⁹¹, D.M.S. Sultan⁵⁴, S. Sultansoy^{4c}, T. Sumida⁸⁶,
 S. Sun¹⁰⁶, X. Sun³, K. Suruliz¹⁵⁶, C.J.E. Suster¹⁵⁷, M.R. Sutton¹⁵⁶, S. Suzuki⁸², M. Svatos¹⁴¹,
 M. Swiatlowski³⁷, S.P. Swift², T. Swirski¹⁷⁷, A. Sydorenko¹⁰⁰, I. Sykora^{28a}, M. Sykora¹⁴³,
 T. Sykora¹⁴³, D. Ta¹⁰⁰, K. Tackmann^{46,ab}, J. Taenzer¹⁶¹, A. Taffard¹⁷¹, R. Tafirout^{168a},
 H. Takai²⁹, R. Takashima⁸⁷, K. Takeda⁸³, T. Takeshita¹⁵⁰, E.P. Takeva⁵⁰, Y. Takubo⁸²,
 M. Talby¹⁰², A.A. Talyshev^{122b,122a}, N.M. Tamir¹⁶¹, J. Tanaka¹⁶³, M. Tanaka¹⁶⁵, R. Tanaka⁶⁵,
 S. Tapia Araya¹⁷³, S. Tapprogge¹⁰⁰, A. Tarek Abouelfadl Mohamed¹³⁶, S. Tarem¹⁶⁰, K. Tariq^{60b},
 G. Tarna^{27b,c}, G.F. Tartarelli^{69a}, P. Tas¹⁴³, M. Tasevsky¹⁴¹, T. Tashiro⁸⁶, E. Tassi^{41b,41a},
 A. Tavares Delgado^{140a,140b}, Y. Tayalati^{35e}, A.J. Taylor⁵⁰, G.N. Taylor¹⁰⁵, W. Taylor^{168b},
 A.S. Tee⁹⁰, R. Teixeira De Lima¹⁵³, P. Teixeira-Dias⁹⁴, H. Ten Kate³⁶, J.J. Teoh¹²⁰, S. Terada⁸²,
 K. Terashi¹⁶³, J. Terron⁹⁹, S. Terzo¹⁴, M. Testa⁵¹, R.J. Teuscher^{167,af}, S.J. Thais¹⁸³,
 T. Thevenaux-Pelzer⁴⁶, F. Thiele⁴⁰, D.W. Thomas⁹⁴, J.O. Thomas⁴², J.P. Thomas²¹,
 A.S. Thompson⁵⁷, P.D. Thompson²¹, L.A. Thomsen¹⁸³, E. Thomson¹³⁷, E.J. Thorpe⁹³,
 R.E. Ticse Torres⁵³, V.O. Tikhomirov^{111,ap}, Yu.A. Tikhonov^{122b,122a}, S. Timoshenko¹¹²,
 P. Tipton¹⁸³, S. Tisserant¹⁰², K. Todome^{23b,23a}, S. Todorova-Nova⁵, S. Todt⁴⁸, J. Tojo⁸⁸,
 S. Tokár^{28a}, K. Tokushuku⁸², E. Tolley¹²⁷, K.G. Tomiwa^{33e}, M. Tomoto¹¹⁷, L. Tompkins^{153,q},
 B. Tong⁵⁹, P. Tornambe¹⁰³, E. Torrence¹³², H. Torres⁴⁸, E. Torró Pastor¹⁴⁸, C. Toscirì¹³⁵,
 J. Toth^{102,ae}, D.R. Tovey¹⁴⁹, A. Traeet¹⁷, C.J. Treado¹²⁵, T. Trefzger¹⁷⁷, F. Tresoldi¹⁵⁶,
 A. Tricoli²⁹, I.M. Trigger^{168a}, S. Trincaz-Duvoid¹³⁶, D.A. Trischuk¹⁷⁵, W. Trischuk¹⁶⁷,
 B. Trocme⁵⁸, A. Trofymov¹⁴⁵, C. Troncon^{69a}, M. Trovatelli¹⁷⁶, F. Trovato¹⁵⁶, L. Truong^{33c},
 M. Trzebinski⁸⁵, A. Trzupek⁸⁵, F. Tsai⁴⁶, J.C.-L. Tseng¹³⁵, P.V. Tsiareshka^{108,ak}, A. Tsirigotis^{162,y},
 V. Tsiskaridze¹⁵⁵, E.G. Tskhadadze^{159a}, M. Tsopoulou¹⁶², I.I. Tsukerman¹²⁴, V. Tsulaia¹⁸,
 S. Tsuno⁸², D. Tsybychev¹⁵⁵, Y. Tu^{63b}, A. Tudorache^{27b}, V. Tudorache^{27b}, T.T. Tulbure^{27a},
 A.N. Tuna⁵⁹, S. Turchikhin⁸⁰, D. Turgeman¹⁸⁰, I. Turk Cakir^{4b,w}, R.J. Turner²¹, R.T. Turra^{69a},
 P.M. Tuts³⁹, S. Tzamarias¹⁶², E. Tzovara¹⁰⁰, G. Ucchielli⁴⁷, K. Uchida¹⁶³, I. Ueda⁸²,
 M. Ughetto^{45a,45b}, F. Ukegawa¹⁶⁹, G. Unal³⁶, A. Undrus²⁹, G. Unel¹⁷¹, F.C. Ungaro¹⁰⁵,
 Y. Unno⁸², K. Uno¹⁶³, J. Urban^{28b}, P. Urquijo¹⁰⁵, G. Usai⁸, Z. Uysal^{12d}, V. Vacek¹⁴²,
 B. Vachon¹⁰⁴, K.O.H. Vadla¹³⁴, A. Vaidya⁹⁵, C. Valderanis¹¹⁴, E. Valdes Santurio^{45a,45b},
 M. Valente⁵⁴, S. Valentineti^{23b,23a}, A. Valero¹⁷⁴, L. Valéry⁴⁶, R.A. Vallance²¹, A. Vallier³⁶,
 J.A. Valls Ferrer¹⁷⁴, T.R. Van Daalen¹⁴, P. Van Gemmeren⁶, I. Van Vulpen¹²⁰, M. Vanadia^{74a,74b},
 W. Vandelli³⁶, E.R. Vandewall¹³⁰, A. Vaniachine¹⁶⁶, D. Vannicola^{73a,73b}, R. Vari^{73a},
 E.W. Varnes⁷, C. Varni^{55b,55a}, T. Varol¹⁵⁸, D. Varouchas⁶⁵, K.E. Varvell¹⁵⁷, M.E. Vasile^{27b},
 G.A. Vasquez¹⁷⁶, J.G. Vasquez¹⁸³, F. Vazeille³⁸, D. Vazquez Furelos¹⁴, T. Vazquez Schroeder³⁶,
 J. Veatch⁵³, V. Vecchio^{75a,75b}, M.J. Veen¹²⁰, L.M. Veloce¹⁶⁷, F. Veloso^{140a,140c}, S. Veneziano^{73a},
 A. Ventura^{68a,68b}, N. Venturi³⁶, A. Verbytskyi¹¹⁵, V. Vercesi^{71a}, M. Verducci^{72a,72b},
 C.M. Vergel Infante⁷⁹, C. Vergis²⁴, W. Verkerke¹²⁰, A.T. Vermeulen¹²⁰, J.C. Vermeulen¹²⁰,
 M.C. Vetterli^{152,aw}, N. Viaux Maira^{147d}, M. Vicente Barreto Pinto⁵⁴, T. Vickey¹⁴⁹,
 O.E. Vickey Boeriu¹⁴⁹, G.H.A. Viehhauser¹³⁵, L. Vigani^{61b}, M. Villa^{23b,23a},

M. Villaplana Perez^{69a,69b}, E. Vilucchi⁵¹, M.G. Vincter³⁴, G.S. Virdee²¹, A. Vishwakarma⁴⁶, C. Vittori^{23b,23a}, I. Vivarelli¹⁵⁶, M. Vogel¹⁸², P. Vokac¹⁴², S.E. von Buddenbrock^{33e}, E. Von Toerne²⁴, V. Vorobel¹⁴³, K. Vorobev¹¹², M. Vos¹⁷⁴, J.H. Vosseveld⁹¹, M. Vozak¹⁰¹, N. Vranjes¹⁶, M. Vranjes Milosavljevic¹⁶, V. Vrba¹⁴², M. Vreeswijk¹²⁰, R. Vuillermet³⁶, I. Vukotic³⁷, P. Wagner²⁴, W. Wagner¹⁸², J. Wagner-Kuhr¹¹⁴, S. Wahdan¹⁸², H. Wahlberg⁸⁹, V.M. Walbrecht¹¹⁵, J. Walder⁹⁰, R. Walker¹¹⁴, S.D. Walker⁹⁴, W. Walkowiak¹⁵¹, V. Wallangen^{45a,45b}, A.M. Wang⁵⁹, C. Wang^{60c}, C. Wang^{60b}, F. Wang¹⁸¹, H. Wang¹⁸, H. Wang³, J. Wang^{63a}, J. Wang¹⁵⁷, J. Wang^{61b}, P. Wang⁴², Q. Wang¹²⁹, R.-J. Wang¹⁰⁰, R. Wang^{60a}, R. Wang⁶, S.M. Wang¹⁵⁸, W.T. Wang^{60a}, W. Wang^{15c,ag}, W.X. Wang^{60a,ag}, Y. Wang^{60a,am}, Z. Wang^{60c}, C. Wanotayaroj⁴⁶, A. Warburton¹⁰⁴, C.P. Ward³², D.R. Wardrope⁹⁵, N. Warrack⁵⁷, A. Washbrook⁵⁰, A.T. Watson²¹, M.F. Watson²¹, G. Watts¹⁴⁸, B.M. Waugh⁹⁵, A.F. Webb¹¹, S. Webb¹⁰⁰, C. Weber¹⁸³, M.S. Weber²⁰, S.A. Weber³⁴, S.M. Weber^{61a}, A.R. Weidberg¹³⁵, J. Weingarten⁴⁷, M. Weirich¹⁰⁰, C. Weiser⁵², P.S. Wells³⁶, T. Wenaus²⁹, T. Wengler³⁶, S. Wenig³⁶, N. Wermes²⁴, M.D. Werner⁷⁹, M. Wessels^{61a}, T.D. Weston²⁰, K. Whalen¹³², N.L. Whallon¹⁴⁸, A.M. Wharton⁹⁰, A.S. White¹⁰⁶, A. White⁸, M.J. White¹, D. Whiteson¹⁷¹, B.W. Whitmore⁹⁰, W. Wiedenmann¹⁸¹, M. Wieler¹⁴⁴, N. Wieseotte¹⁰⁰, C. Wiglesworth⁴⁰, L.A.M. Wiik-Fuchs⁵², F. Wilk¹⁰¹, H.G. Wilkens³⁶, L.J. Wilkins⁹⁴, H.H. Williams¹³⁷, S. Williams³², C. Willis¹⁰⁷, S. Willocq¹⁰³, J.A. Wilson²¹, I. Wingerter-Seez⁵, E. Winkels¹⁵⁶, F. Winklmeier¹³², O.J. Winston¹⁵⁶, B.T. Winter⁵², M. Wittgen¹⁵³, M. Wobisch⁹⁶, A. Wolf¹⁰⁰, T.M.H. Wolf¹²⁰, R. Wolff¹⁰², R. Wölker¹³⁵, J. Wollrath⁵², M.W. Wolter⁸⁵, H. Wolters^{140a,140c}, V.W.S. Wong¹⁷⁵, N.L. Woods¹⁴⁶, S.D. Worm²¹, B.K. Wosiek⁸⁵, K.W. Woźniak⁸⁵, K. Wraight⁵⁷, S.L. Wu¹⁸¹, X. Wu⁵⁴, Y. Wu^{60a}, T.R. Wyatt¹⁰¹, B.M. Wynne⁵⁰, S. Xella⁴⁰, Z. Xi¹⁰⁶, L. Xia¹⁷⁸, X. Xiao¹⁰⁶, I. Xioidis¹⁵⁶, D. Xu^{15a}, H. Xu^{60a,c}, L. Xu²⁹, T. Xu¹⁴⁵, W. Xu¹⁰⁶, Z. Xu^{60b}, Z. Xu¹⁵³, B. Yabsley¹⁵⁷, S. Yacoob^{33a}, K. Yajima¹³³, D.P. Yallup⁹⁵, D. Yamaguchi¹⁶⁵, Y. Yamaguchi¹⁶⁵, A. Yamamoto⁸², M. Yamatani¹⁶³, T. Yamazaki¹⁶³, Y. Yamazaki⁸³, Z. Yan²⁵, H.J. Yang^{60c,60d}, H.T. Yang¹⁸, S. Yang⁷⁸, X. Yang^{60b,58}, Y. Yang¹⁶³, W.-M. Yao¹⁸, Y.C. Yap⁴⁶, Y. Yasu⁸², E. Yatsenko^{60c,60d}, J. Ye⁴², S. Ye²⁹, I. Yeletsikh⁸⁰, M.R. Yexley⁹⁰, E. Yigitbasi²⁵, K. Yorita¹⁷⁹, K. Yoshihara¹³⁷, C.J.S. Young³⁶, C. Young¹⁵³, J. Yu⁷⁹, R. Yuan^{60b,i}, X. Yue^{61a}, S.P.Y. Yuen²⁴, M. Zaazoua^{35e}, B. Zabinski⁸⁵, G. Zacharis¹⁰, E. Zaffaroni⁵⁴, J. Zahreddine¹³⁶, A.M. Zaitsev^{123,ao}, T. Zakareishvili^{159b}, N. Zakharchuk³⁴, S. Zambito⁵⁹, D. Zanzi³⁶, D.R. Zaripovas⁵⁷, S.V. Zeißner⁴⁷, C. Zeitnitz¹⁸², G. Zemaityte¹³⁵, J.C. Zeng¹⁷³, O. Zenin¹²³, T. Ženiš^{28a}, D. Zerwas⁶⁵, M. Zgubić¹³⁵, B. Zhang^{15c}, D.F. Zhang^{15b}, G. Zhang^{15b}, H. Zhang^{15c}, J. Zhang⁶, L. Zhang^{15c}, L. Zhang^{60a}, M. Zhang¹⁷³, R. Zhang²⁴, X. Zhang^{60b}, Y. Zhang^{15a,15d}, Z. Zhang^{63a}, Z. Zhang⁶⁵, P. Zhao⁴⁹, Y. Zhao^{60b}, Z. Zhao^{60a}, A. Zhemchugov⁸⁰, Z. Zheng¹⁰⁶, D. Zhong¹⁷³, B. Zhou¹⁰⁶, C. Zhou¹⁸¹, M.S. Zhou^{15a,15d}, M. Zhou¹⁵⁵, N. Zhou^{60c}, Y. Zhou⁷, C.G. Zhu^{60b}, C. Zhu^{15a,15d}, H.L. Zhu^{60a}, H. Zhu^{15a}, J. Zhu¹⁰⁶, Y. Zhu^{60a}, X. Zhuang^{15a}, K. Zhukov¹¹¹, V. Zhulanov^{122b,122a}, D. Zieminska⁶⁶, N.I. Zimine⁸⁰, S. Zimmermann⁵², Z. Zinonos¹¹⁵, M. Ziolkowski¹⁵¹, L. Živković¹⁶, G. Zobernig¹⁸¹, A. Zoccoli^{23b,23a}, K. Zoch⁵³, T.G. Zorbas¹⁴⁹, R. Zou³⁷, L. Zwalinski³⁶

¹ Department of Physics, University of Adelaide, Adelaide; Australia

² Physics Department, SUNY Albany, Albany NY; United States of America

³ Department of Physics, University of Alberta, Edmonton AB; Canada

⁴ Department of Physics^(a), Ankara University, Ankara; Istanbul Aydin University^(b), Application and Research Center for Advanced Studies, Istanbul; Division of Physics^(c), TOBB University of Economics and Technology, Ankara; Turkey

⁵ LAPP, Université Grenoble Alpes, Université Savoie Mont Blanc, CNRS/IN2P3, Annecy; France

⁶ High Energy Physics Division, Argonne National Laboratory, Argonne IL; United States of America

⁷ Department of Physics, University of Arizona, Tucson AZ; United States of America

⁸ Department of Physics, University of Texas at Arlington, Arlington TX; United States of America

- ⁹ *Physics Department, National and Kapodistrian University of Athens, Athens; Greece*
- ¹⁰ *Physics Department, National Technical University of Athens, Zografou; Greece*
- ¹¹ *Department of Physics, University of Texas at Austin, Austin TX; United States of America*
- ¹² *Bahcesehir University^(a), Faculty of Engineering and Natural Sciences, Istanbul; Istanbul Bilgi University^(b), Faculty of Engineering and Natural Sciences, Istanbul; Department of Physics^(c), Bogazici University, Istanbul; Department of Physics Engineering^(d), Gaziantep University, Gaziantep; Turkey*
- ¹³ *Institute of Physics, Azerbaijan Academy of Sciences, Baku; Azerbaijan*
- ¹⁴ *Institut de Física d'Altes Energies (IFAE), Barcelona Institute of Science and Technology, Barcelona; Spain*
- ¹⁵ *Institute of High Energy Physics^(a), Chinese Academy of Sciences, Beijing; Physics Department^(b), Tsinghua University, Beijing; Department of Physics^(c), Nanjing University, Nanjing; University of Chinese Academy of Science (UCAS)^(d), Beijing; China*
- ¹⁶ *Institute of Physics, University of Belgrade, Belgrade; Serbia*
- ¹⁷ *Department for Physics and Technology, University of Bergen, Bergen; Norway*
- ¹⁸ *Physics Division, Lawrence Berkeley National Laboratory and University of California, Berkeley CA; United States of America*
- ¹⁹ *Institut für Physik, Humboldt Universität zu Berlin, Berlin; Germany*
- ²⁰ *Albert Einstein Center for Fundamental Physics and Laboratory for High Energy Physics, University of Bern, Bern; Switzerland*
- ²¹ *School of Physics and Astronomy, University of Birmingham, Birmingham; United Kingdom*
- ²² *Facultad de Ciencias y Centro de Investigaciones^(a), Universidad Antonio Nariño, Bogotá; Departamento de Física^(b), Universidad Nacional de Colombia, Bogotá, Colombia; Colombia*
- ²³ *INFN Bologna and Università' di Bologna^(a), Dipartimento di Fisica; INFN Sezione di Bologna^(b); Italy*
- ²⁴ *Physikalisches Institut, Universität Bonn, Bonn; Germany*
- ²⁵ *Department of Physics, Boston University, Boston MA; United States of America*
- ²⁶ *Department of Physics, Brandeis University, Waltham MA; United States of America*
- ²⁷ *Transilvania University of Brasov^(a), Brasov; Horia Hulubei National Institute of Physics and Nuclear Engineering^(b), Bucharest; Department of Physics^(c), Alexandru Ioan Cuza University of Iasi, Iasi; National Institute for Research and Development of Isotopic and Molecular Technologies^(d), Physics Department, Cluj-Napoca; University Politehnica Bucharest^(e), Bucharest; West University in Timisoara^(f), Timisoara; Romania*
- ²⁸ *Faculty of Mathematics^(a), Physics and Informatics, Comenius University, Bratislava; Department of Subnuclear Physics^(b), Institute of Experimental Physics of the Slovak Academy of Sciences, Kosice; Slovak Republic*
- ²⁹ *Physics Department, Brookhaven National Laboratory, Upton NY; United States of America*
- ³⁰ *Departamento de Física, Universidad de Buenos Aires, Buenos Aires; Argentina*
- ³¹ *California State University, CA; United States of America*
- ³² *Cavendish Laboratory, University of Cambridge, Cambridge; United Kingdom*
- ³³ *Department of Physics^(a), University of Cape Town, Cape Town; iThemba Labs^(b), Western Cape; Department of Mechanical Engineering Science^(c), University of Johannesburg, Johannesburg; University of South Africa^(d), Department of Physics, Pretoria; School of Physics^(e), University of the Witwatersrand, Johannesburg; South Africa*
- ³⁴ *Department of Physics, Carleton University, Ottawa ON; Canada*
- ³⁵ *Faculté des Sciences Ain Chock^(a), Réseau Universitaire de Physique des Hautes Energies — Université Hassan II, Casablanca; Faculté des Sciences^(b), Université Ibn-Tofail, Kénitra; Faculté des Sciences Semlalia^(c), Université Cadi Ayyad, LPHEA-Marrakech; Faculté des Sciences^(d), Université Mohamed Premier and LPTPM, Oujda; Faculté des sciences^(e), Université Mohammed V, Rabat; Morocco*
- ³⁶ *CERN, Geneva; Switzerland*
- ³⁷ *Enrico Fermi Institute, University of Chicago, Chicago IL; United States of America*

- ³⁸ *LPC, Université Clermont Auvergne, CNRS/IN2P3, Clermont-Ferrand; France*
- ³⁹ *Nevis Laboratory, Columbia University, Irvington NY; United States of America*
- ⁴⁰ *Niels Bohr Institute, University of Copenhagen, Copenhagen; Denmark*
- ⁴¹ *Dipartimento di Fisica^(a), Università della Calabria, Rende; INFN Gruppo Collegato di Cosenza^(b), Laboratori Nazionali di Frascati; Italy*
- ⁴² *Physics Department, Southern Methodist University, Dallas TX; United States of America*
- ⁴³ *Physics Department, University of Texas at Dallas, Richardson TX; United States of America*
- ⁴⁴ *National Centre for Scientific Research “Demokritos”, Agia Paraskevi; Greece*
- ⁴⁵ *Department of Physics^(a), Stockholm University; Oskar Klein Centre^(b), Stockholm; Sweden*
- ⁴⁶ *Deutsches Elektronen-Synchrotron DESY, Hamburg and Zeuthen; Germany*
- ⁴⁷ *Lehrstuhl für Experimentelle Physik IV, Technische Universität Dortmund, Dortmund; Germany*
- ⁴⁸ *Institut für Kern- und Teilchenphysik, Technische Universität Dresden, Dresden; Germany*
- ⁴⁹ *Department of Physics, Duke University, Durham NC; United States of America*
- ⁵⁰ *SUPA — School of Physics and Astronomy, University of Edinburgh, Edinburgh; United Kingdom*
- ⁵¹ *INFN e Laboratori Nazionali di Frascati, Frascati; Italy*
- ⁵² *Physikalisches Institut, Albert-Ludwigs-Universität Freiburg, Freiburg; Germany*
- ⁵³ *II. Physikalisches Institut, Georg-August-Universität Göttingen, Göttingen; Germany*
- ⁵⁴ *Département de Physique Nucléaire et Corpusculaire, Université de Genève, Genève; Switzerland*
- ⁵⁵ *Dipartimento di Fisica^(a), Università di Genova, Genova; INFN Sezione di Genova^(b); Italy*
- ⁵⁶ *II. Physikalisches Institut, Justus-Liebig-Universität Giessen, Giessen; Germany*
- ⁵⁷ *SUPA — School of Physics and Astronomy, University of Glasgow, Glasgow; United Kingdom*
- ⁵⁸ *LPSC, Université Grenoble Alpes, CNRS/IN2P3, Grenoble INP, Grenoble; France*
- ⁵⁹ *Laboratory for Particle Physics and Cosmology, Harvard University, Cambridge MA; United States of America*
- ⁶⁰ *Department of Modern Physics and State Key Laboratory of Particle Detection and Electronics^(a), University of Science and Technology of China, Hefei; Institute of Frontier and Interdisciplinary Science and Key Laboratory of Particle Physics and Particle Irradiation (MOE)^(b), Shandong University, Qingdao; School of Physics and Astronomy^(c), Shanghai Jiao Tong University, KLPPAC-MoE, SKLPPC, Shanghai; Tsung-Dao Lee Institute^(d), Shanghai; China*
- ⁶¹ *Kirchhoff-Institut für Physik^(a), Ruprecht-Karls-Universität Heidelberg, Heidelberg; Physikalisches Institut^(b), Ruprecht-Karls-Universität Heidelberg, Heidelberg; Germany*
- ⁶² *Faculty of Applied Information Science, Hiroshima Institute of Technology, Hiroshima; Japan*
- ⁶³ *Department of Physics^(a), Chinese University of Hong Kong, Shatin, N.T., Hong Kong; Department of Physics^(b), University of Hong Kong, Hong Kong; Department of Physics and Institute for Advanced Study^(c), Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong; China*
- ⁶⁴ *Department of Physics, National Tsing Hua University, Hsinchu; Taiwan*
- ⁶⁵ *IJCLab, Université Paris-Saclay, CNRS/IN2P3, 91405, Orsay; France*
- ⁶⁶ *Department of Physics, Indiana University, Bloomington IN; United States of America*
- ⁶⁷ *INFN Gruppo Collegato di Udine^(a), Sezione di Trieste, Udine; ICTP^(b), Trieste; Dipartimento Politecnico di Ingegneria e Architettura^(c), Università di Udine, Udine; Italy*
- ⁶⁸ *INFN Sezione di Lecce^(a); Dipartimento di Matematica e Fisica^(b), Università del Salento, Lecce; Italy*
- ⁶⁹ *INFN Sezione di Milano^(a); Dipartimento di Fisica^(b), Università di Milano, Milano; Italy*
- ⁷⁰ *INFN Sezione di Napoli^(a); Dipartimento di Fisica^(b), Università di Napoli, Napoli; Italy*
- ⁷¹ *INFN Sezione di Pavia^(a); Dipartimento di Fisica^(b), Università di Pavia, Pavia; Italy*
- ⁷² *INFN Sezione di Pisa^(a); Dipartimento di Fisica E. Fermi^(b), Università di Pisa, Pisa; Italy*
- ⁷³ *INFN Sezione di Roma^(a); Dipartimento di Fisica^(b), Sapienza Università di Roma, Roma; Italy*
- ⁷⁴ *INFN Sezione di Roma Tor Vergata^(a); Dipartimento di Fisica^(b), Università di Roma Tor Vergata, Roma; Italy*
- ⁷⁵ *INFN Sezione di Roma Tre^(a); Dipartimento di Matematica e Fisica^(b), Università Roma Tre, Roma; Italy*

- 76 INFN-TIFPA^(a); Università degli Studi di Trento^(b), Trento; Italy
- 77 Institut für Astro- und Teilchenphysik, Leopold-Franzens-Universität, Innsbruck; Austria
- 78 University of Iowa, Iowa City IA; United States of America
- 79 Department of Physics and Astronomy, Iowa State University, Ames IA; United States of America
- 80 Joint Institute for Nuclear Research, Dubna; Russia
- 81 Departamento de Engenharia Elétrica^(a), Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora; Universidade Federal do Rio De Janeiro COPPE/EE/IF^(b), Rio de Janeiro; Universidade Federal de São João del Rei (UFSJ)^(c), São João del Rei; Instituto de Física^(d), Universidade de São Paulo, São Paulo; Brazil
- 82 KEK, High Energy Accelerator Research Organization, Tsukuba; Japan
- 83 Graduate School of Science, Kobe University, Kobe; Japan
- 84 AGH University of Science and Technology^(a), Faculty of Physics and Applied Computer Science, Krakow; Marian Smoluchowski Institute of Physics^(b), Jagiellonian University, Krakow; Poland
- 85 Institute of Nuclear Physics Polish Academy of Sciences, Krakow; Poland
- 86 Faculty of Science, Kyoto University, Kyoto; Japan
- 87 Kyoto University of Education, Kyoto; Japan
- 88 Research Center for Advanced Particle Physics and Department of Physics, Kyushu University, Fukuoka; Japan
- 89 Instituto de Física La Plata, Universidad Nacional de La Plata and CONICET, La Plata; Argentina
- 90 Physics Department, Lancaster University, Lancaster; United Kingdom
- 91 Oliver Lodge Laboratory, University of Liverpool, Liverpool; United Kingdom
- 92 Department of Experimental Particle Physics, Jožef Stefan Institute and Department of Physics, University of Ljubljana, Ljubljana; Slovenia
- 93 School of Physics and Astronomy, Queen Mary University of London, London; United Kingdom
- 94 Department of Physics, Royal Holloway University of London, Egham; United Kingdom
- 95 Department of Physics and Astronomy, University College London, London; United Kingdom
- 96 Louisiana Tech University, Ruston LA; United States of America
- 97 Fysiska institutionen, Lunds universitet, Lund; Sweden
- 98 Centre de Calcul de l'Institut National de Physique Nucléaire et de Physique des Particules (IN2P3), Villeurbanne; France
- 99 Departamento de Física Teórica C-15 and CIAFF, Universidad Autónoma de Madrid, Madrid; Spain
- 100 Institut für Physik, Universität Mainz, Mainz; Germany
- 101 School of Physics and Astronomy, University of Manchester, Manchester; United Kingdom
- 102 CPPM, Aix-Marseille Université, CNRS/IN2P3, Marseille; France
- 103 Department of Physics, University of Massachusetts, Amherst MA; United States of America
- 104 Department of Physics, McGill University, Montreal QC; Canada
- 105 School of Physics, University of Melbourne, Victoria; Australia
- 106 Department of Physics, University of Michigan, Ann Arbor MI; United States of America
- 107 Department of Physics and Astronomy, Michigan State University, East Lansing MI; United States of America
- 108 B.I. Stepanov Institute of Physics, National Academy of Sciences of Belarus, Minsk; Belarus
- 109 Research Institute for Nuclear Problems of Byelorussian State University, Minsk; Belarus
- 110 Group of Particle Physics, University of Montreal, Montreal QC; Canada
- 111 P.N. Lebedev Physical Institute of the Russian Academy of Sciences, Moscow; Russia
- 112 National Research Nuclear University MEPhI, Moscow; Russia
- 113 D.V. Skobel'syn Institute of Nuclear Physics, M.V. Lomonosov Moscow State University, Moscow; Russia
- 114 Fakultät für Physik, Ludwig-Maximilians-Universität München, München; Germany
- 115 Max-Planck-Institut für Physik (Werner-Heisenberg-Institut), München; Germany
- 116 Nagasaki Institute of Applied Science, Nagasaki; Japan
- 117 Graduate School of Science and Kobayashi-Maskawa Institute, Nagoya University, Nagoya; Japan

- 118 *Department of Physics and Astronomy, University of New Mexico, Albuquerque NM; United States of America*
- 119 *Institute for Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen/Nikhef, Nijmegen; Netherlands*
- 120 *Nikhef National Institute for Subatomic Physics and University of Amsterdam, Amsterdam; Netherlands*
- 121 *Department of Physics, Northern Illinois University, DeKalb IL; United States of America*
- 122 *Budker Institute of Nuclear Physics and NSU^(a), SB RAS, Novosibirsk; Novosibirsk State University Novosibirsk^(b); Russia*
- 123 *Institute for High Energy Physics of the National Research Centre Kurchatov Institute, Protvino; Russia*
- 124 *Institute for Theoretical and Experimental Physics named by A.I. Alikhanov of National Research Centre “Kurchatov Institute”, Moscow; Russia*
- 125 *Department of Physics, New York University, New York NY; United States of America*
- 126 *Ochanomizu University, Otsuka, Bunkyo-ku, Tokyo; Japan*
- 127 *Ohio State University, Columbus OH; United States of America*
- 128 *Faculty of Science, Okayama University, Okayama; Japan*
- 129 *Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma, Norman OK; United States of America*
- 130 *Department of Physics, Oklahoma State University, Stillwater OK; United States of America*
- 131 *Palacký University, RCPTM, Joint Laboratory of Optics, Olomouc; Czech Republic*
- 132 *Institute for Fundamental Science, University of Oregon, Eugene, OR; United States of America*
- 133 *Graduate School of Science, Osaka University, Osaka; Japan*
- 134 *Department of Physics, University of Oslo, Oslo; Norway*
- 135 *Department of Physics, Oxford University, Oxford; United Kingdom*
- 136 *LPNHE, Sorbonne Université, Université de Paris, CNRS/IN2P3, Paris; France*
- 137 *Department of Physics, University of Pennsylvania, Philadelphia PA; United States of America*
- 138 *Konstantinov Nuclear Physics Institute of National Research Centre “Kurchatov Institute”, PNPI, St. Petersburg; Russia*
- 139 *Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh PA; United States of America*
- 140 *Laboratório de Instrumentação e Física Experimental de Partículas — LIP^(a), Lisboa; Departamento de Física^(b), Faculdade de Ciências, Universidade de Lisboa, Lisboa; Departamento de Física^(c), Universidade de Coimbra, Coimbra; Centro de Física Nuclear da Universidade de Lisboa^(d), Lisboa; Departamento de Física^(e), Universidade do Minho, Braga; Departamento de Física Teórica y del Cosmos^(f), Universidad de Granada, Granada (Spain); Dep Física and CEFITEC of Faculdade de Ciências e Tecnologia^(g), Universidade Nova de Lisboa, Caparica; Instituto Superior Técnico^(h), Universidade de Lisboa, Lisboa; Portugal*
- 141 *Institute of Physics of the Czech Academy of Sciences, Prague; Czech Republic*
- 142 *Czech Technical University in Prague, Prague; Czech Republic*
- 143 *Charles University, Faculty of Mathematics and Physics, Prague; Czech Republic*
- 144 *Particle Physics Department, Rutherford Appleton Laboratory, Didcot; United Kingdom*
- 145 *IRFU, CEA, Université Paris-Saclay, Gif-sur-Yvette; France*
- 146 *Santa Cruz Institute for Particle Physics, University of California Santa Cruz, Santa Cruz CA; United States of America*
- 147 *Departamento de Física^(a), Pontificia Universidad Católica de Chile, Santiago; Universidad Andres Bello^(b), Department of Physics, Santiago; Instituto de Alta Investigación^(c), Universidad de Tarapacá; Departamento de Física^(d), Universidad Técnica Federico Santa María, Valparaíso; Chile*
- 148 *Department of Physics, University of Washington, Seattle WA; United States of America*
- 149 *Department of Physics and Astronomy, University of Sheffield, Sheffield; United Kingdom*
- 150 *Department of Physics, Shinshu University, Nagano; Japan*
- 151 *Department Physik, Universität Siegen, Siegen; Germany*

- 152 *Department of Physics, Simon Fraser University, Burnaby BC; Canada*
 153 *SLAC National Accelerator Laboratory, Stanford CA; United States of America*
 154 *Physics Department, Royal Institute of Technology, Stockholm; Sweden*
 155 *Departments of Physics and Astronomy, Stony Brook University, Stony Brook NY; United States of America*
 156 *Department of Physics and Astronomy, University of Sussex, Brighton; United Kingdom*
 157 *School of Physics, University of Sydney, Sydney; Australia*
 158 *Institute of Physics, Academia Sinica, Taipei; Taiwan*
 159 *E. Andronikashvili Institute of Physics^(a), Iv. Javakhishvili Tbilisi State University, Tbilisi; High Energy Physics Institute^(b), Tbilisi State University, Tbilisi; Georgia*
 160 *Department of Physics, Technion, Israel Institute of Technology, Haifa; Israel*
 161 *Raymond and Beverly Sackler School of Physics and Astronomy, Tel Aviv University, Tel Aviv; Israel*
 162 *Department of Physics, Aristotle University of Thessaloniki, Thessaloniki; Greece*
 163 *International Center for Elementary Particle Physics and Department of Physics, University of Tokyo, Tokyo; Japan*
 164 *Graduate School of Science and Technology, Tokyo Metropolitan University, Tokyo; Japan*
 165 *Department of Physics, Tokyo Institute of Technology, Tokyo; Japan*
 166 *Tomsk State University, Tomsk; Russia*
 167 *Department of Physics, University of Toronto, Toronto ON; Canada*
 168 *TRIUMF^(a), Vancouver BC; Department of Physics and Astronomy^(b), York University, Toronto ON; Canada*
 169 *Division of Physics and Tomonaga Center for the History of the Universe, Faculty of Pure and Applied Sciences, University of Tsukuba, Tsukuba; Japan*
 170 *Department of Physics and Astronomy, Tufts University, Medford MA; United States of America*
 171 *Department of Physics and Astronomy, University of California Irvine, Irvine CA; United States of America*
 172 *Department of Physics and Astronomy, University of Uppsala, Uppsala; Sweden*
 173 *Department of Physics, University of Illinois, Urbana IL; United States of America*
 174 *Instituto de Física Corpuscular (IFIC), Centro Mixto Universidad de Valencia — CSIC, Valencia; Spain*
 175 *Department of Physics, University of British Columbia, Vancouver BC; Canada*
 176 *Department of Physics and Astronomy, University of Victoria, Victoria BC; Canada*
 177 *Fakultät für Physik und Astronomie, Julius-Maximilians-Universität Würzburg, Würzburg; Germany*
 178 *Department of Physics, University of Warwick, Coventry; United Kingdom*
 179 *Waseda University, Tokyo; Japan*
 180 *Department of Particle Physics, Weizmann Institute of Science, Rehovot; Israel*
 181 *Department of Physics, University of Wisconsin, Madison WI; United States of America*
 182 *Fakultät für Mathematik und Naturwissenschaften, Fachgruppe Physik, Bergische Universität Wuppertal, Wuppertal; Germany*
 183 *Department of Physics, Yale University, New Haven CT; United States of America*
 184 *Yerevan Physics Institute, Yerevan; Armenia*
- ^a *Also at Borough of Manhattan Community College, City University of New York, New York NY; United States of America*
^b *Also at CERN, Geneva; Switzerland*
^c *Also at CPPM, Aix-Marseille Université, CNRS/IN2P3, Marseille; France*
^d *Also at Département de Physique Nucléaire et Corpusculaire, Université de Genève, Genève; Switzerland*
^e *Also at Departament de Física de la Universitat Autònoma de Barcelona, Barcelona; Spain*
^f *Also at Departamento de Física, Instituto Superior Técnico, Universidade de Lisboa, Lisboa; Portugal*

- ^g Also at Department of Applied Physics and Astronomy, University of Sharjah, Sharjah; United Arab Emirates
- ^h Also at Department of Financial and Management Engineering, University of the Aegean, Chios; Greece
- ⁱ Also at Department of Physics and Astronomy, Michigan State University, East Lansing MI; United States of America
- ^j Also at Department of Physics and Astronomy, University of Louisville, Louisville, KY; United States of America
- ^k Also at Department of Physics, Ben Gurion University of the Negev, Beer Sheva; Israel
- ^l Also at Department of Physics, California State University, East Bay; United States of America
- ^m Also at Department of Physics, California State University, Fresno; United States of America
- ⁿ Also at Department of Physics, California State University, Sacramento; United States of America
- ^o Also at Department of Physics, King's College London, London; United Kingdom
- ^p Also at Department of Physics, St. Petersburg State Polytechnical University, St. Petersburg; Russia
- ^q Also at Department of Physics, Stanford University, Stanford CA; United States of America
- ^r Also at Department of Physics, University of Adelaide, Adelaide; Australia
- ^s Also at Department of Physics, University of Fribourg, Fribourg; Switzerland
- ^t Also at Department of Physics, University of Michigan, Ann Arbor MI; United States of America
- ^u Also at Dipartimento di Matematica, Informatica e Fisica, Università di Udine, Udine; Italy
- ^v Also at Faculty of Physics, M.V. Lomonosov Moscow State University, Moscow; Russia
- ^w Also at Giresun University, Faculty of Engineering, Giresun; Turkey
- ^x Also at Graduate School of Science, Osaka University, Osaka; Japan
- ^y Also at Hellenic Open University, Patras; Greece
- ^z Also at IJCLab, Université Paris-Saclay, CNRS/IN2P3, 91405, Orsay; France
- ^{aa} Also at Institutio Catalana de Recerca i Estudis Avancats, ICREA, Barcelona; Spain
- ^{ab} Also at Institut für Experimentalphysik, Universität Hamburg, Hamburg; Germany
- ^{ac} Also at Institute for Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen/Nikhef, Nijmegen; Netherlands
- ^{ad} Also at Institute for Nuclear Research and Nuclear Energy (INRNE) of the Bulgarian Academy of Sciences, Sofia; Bulgaria
- ^{ae} Also at Institute for Particle and Nuclear Physics, Wigner Research Centre for Physics, Budapest; Hungary
- ^{af} Also at Institute of Particle Physics (IPP), Vancouver; Canada
- ^{ag} Also at Institute of Physics, Academia Sinica, Taipei; Taiwan
- ^{ah} Also at Institute of Physics, Azerbaijan Academy of Sciences, Baku; Azerbaijan
- ^{ai} Also at Institute of Theoretical Physics, Iliia State University, Tbilisi; Georgia
- ^{aj} Also at Instituto de Física Teórica, IFT-UAM/CSIC, Madrid; Spain
- ^{ak} Also at Joint Institute for Nuclear Research, Dubna; Russia
- ^{al} Also at Louisiana Tech University, Ruston LA; United States of America
- ^{am} Also at LPNHE, Sorbonne Université, Université de Paris, CNRS/IN2P3, Paris; France
- ^{an} Also at Manhattan College, New York NY; United States of America
- ^{ao} Also at Moscow Institute of Physics and Technology State University, Dolgoprudny; Russia
- ^{ap} Also at National Research Nuclear University MEPhI, Moscow; Russia
- ^{aq} Also at Physics Department, An-Najah National University, Nablus; Palestine
- ^{ar} Also at Physics Dept, University of South Africa, Pretoria; South Africa
- ^{as} Also at Physikalisches Institut, Albert-Ludwigs-Universität Freiburg, Freiburg; Germany
- ^{at} Also at School of Physics, Sun Yat-sen University, Guangzhou; China
- ^{au} Also at The City College of New York, New York NY; United States of America
- ^{av} Also at The Collaborative Innovation Center of Quantum Matter (CICQM), Beijing; China
- ^{aw} Also at TRIUMF, Vancouver BC; Canada
- ^{ax} Also at Università di Napoli Parthenope, Napoli; Italy
- * Deceased