UNIVERSITY OF AMSTERDAM

UvA-DARE (Digital Academic Repository)

Measurements of W and Z boson production in pp collisions at √s = 5.02 TeV with the ATLAS detector

ATLAS Collaboration

DOI
10.1140/epjc/s10052-019-6622-x

Publication date
2019

Document Version
Other version

Published in
European Physical Journal C

License
CC BY

Link to publication

Citation for published version (APA):
ATLAS Collaboration (2019). Measurements of *W* and *Z* boson production in *pp* collisions at √s = 5.02 TeV with the ATLAS detector. *European Physical Journal C*, *79*(2), Article 128. https://doi.org/10.1140/epjc/s10052-019-6622-x

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: https://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, P.O. Box 19185, 1000 GD Amsterdam, The Netherlands. You will be contacted as soon as possible.

UvA-DARE is a service provided by the library of the University of Amsterdam (https://dare.uva.nl)

Download date:14 Sept 2026

Eur. Phys. J. C (2019) 79:374
https://doi.org/10.1140/epjc/s10052-019-6870-9

THE EUROPEAN PHYSICAL JOURNAL C

Erratum

Erratum to: Measurements of W and Z boson production in pp collisions at $\sqrt{s} = 5.02$ TeV with the ATLAS detector

ATLAS Collaboration[⋆]

CERN, 1211 Geneva 23, Switzerland

Received: 3 April 2019 / Accepted: 6 April 2019 / Published online: 30 April 2019
© CERN for the benefit of the ATLAS collaboration 2019

Erratum to: Eur. Phys. J. C (2019) 79:128
https://doi.org/10.1140/epjc/s10052-019-6622-x

It has been found that the theoretical predictions for W and Z boson cross sections, and for the W boson charge asymmetry, which are labelled as NNPDF3.1 [1] have in fact been calculated using the NNPDF3.0 PDF set [2] instead. The reported experimental results are not affected.

The corrected versions of Figs. 11, 12 and 13 of the paper are presented below.

The corrected text discussing the comparison of predicted cross sections to data in Sect. 9.2 of the paper should read:

A comparison of the differential cross sections shows that the predictions obtained with the NNPDF3.1 PDF set are in good agreement with the measured values, mainly because the NNPDF3.1 global fit includes high precision LHC measurements of W/Z boson production [3,4]. On the other hand, the predictions obtained with other recent PDF sets systematically deviate from the measured values.

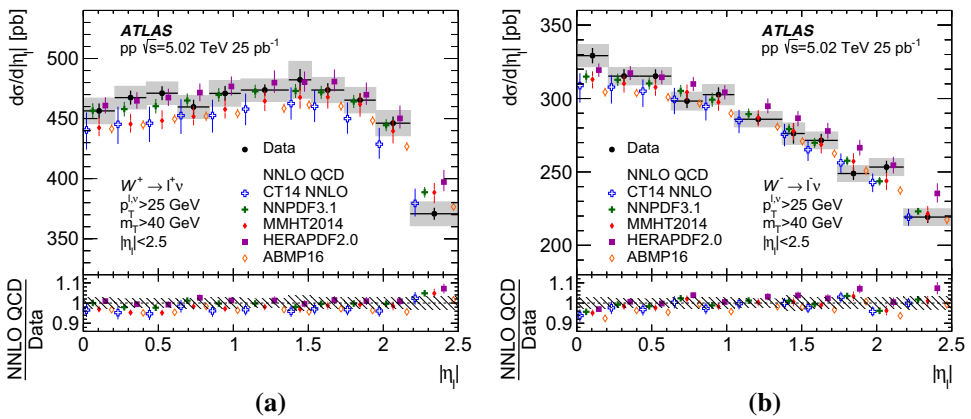

Fig. 11 Differential cross sections for **a** W^+ and **b** W^- boson production as a function of absolute decay lepton pseudorapidity compared with theoretical predictions. Statistical and systematic errors are shown as corresponding bars and shaded bands on the data points. The luminosity uncertainty is not included. Only the dominant uncertainty (PDF) is displayed for the theory. The lower panel shows the ratio of predictions to the measured differential cross section in each bin, and the shaded band shows the sum in quadrature of statistical and systematic uncertainties of the data

The original article can be found online at https://doi.org/10.1140/epjc/s10052-019-6622-x.

⋆ e-mail: atlas.publications@cern.ch

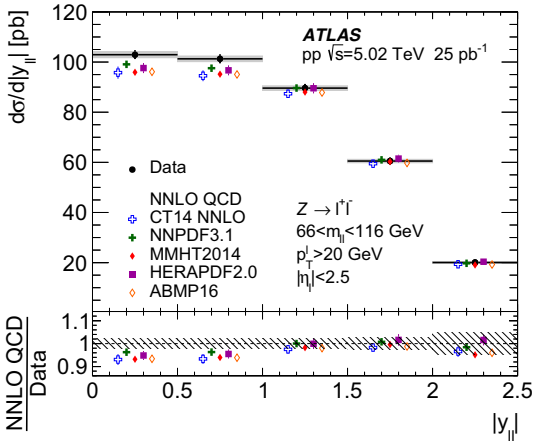

Fig. 12 Differential cross section for Z boson production as a function of absolute lepton-pair rapidity compared with theoretical predictions. Statistical and systematic errors are shown as corresponding bars and shaded bands on the data points. The luminosity uncertainty is not included. Only the dominant uncertainty (PDF) is displayed for the theory. The lower panel shows the ratio of predictions to the measured differential cross section in each bin, and the shaded band shows the sum in quadrature of statistical and systematic uncertainties of the data

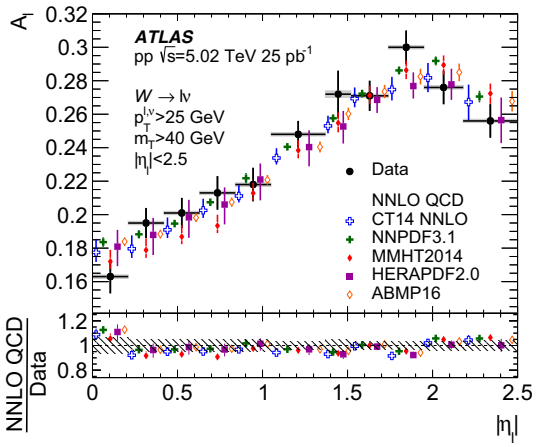

Fig. 13 Charge asymmetry for W bosons as a function of absolute decay lepton pseudorapidity compared with theoretical predictions. Statistical and systematic errors are shown as corresponding bars and shaded bands on the data points. Only the dominant uncertainty (PDF) is displayed for the theory. The lower panel shows the ratio of predictions to the measured differential cross section in each bin, and the shaded band shows the sum in quadrature of statistical and systematic uncertainties of the data

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.
Funded by SCOAP[3].

References

1. R.D. Ball et al., Parton distributions from high-precision collider data. Eur. Phys. J. C **77**, 663 (2017). arXiv:1706.00428 [hep-ph]
2. R.D. Ball et al., Parton distributions for the LHC Run II. JHEP **04**, 040 (2015). arXiv:1410.8849 [hep-ph]
3. ATLAS Collaboration, Precision measurement and interpretation of inclusive W^+, W^- and Z/γ^* production cross sections with the ATLAS detector. Eur. Phys. J. C **77**, 367 (2017). arXiv:1612.03016 [hep-ex]
4. CMS Collaboration, Measurement of the differential cross section and charge asymmetry for inclusive $pp \to W^{\pm} + X$ production at $\sqrt{s} = 8\ TeV$. Eur. Phys. J. C **76**, 469 (2016). arXiv: 1603.01803 [hep-ex]

ATLAS Collaboration

M. Aaboud[34d], G. Aad[99], B. Abbott[125], O. Abdinov[13,*], B. Abeloos[129], D. K. Abhayasinghe[91], S. H. Abidi[164], O. S. AbouZeid[39], N. L. Abraham[153], H. Abramowicz[158], H. Abreu[157], Y. Abulaiti[6], B. S. Acharya[64a,64b,p], S. Adachi[160], L. Adamczyk[81a], J. Adelman[119], M. Adersberger[112], A. Adiguzel[12c,aj], T. Adye[141], A. A. Affolder[143], Y. Afik[157], C. Agheorghiesei[27c], J. A. Aguilar-Saavedra[137a,137f,ai], F. Ahmadov[77,ag], G. Aielli[71a,71b], S. Akatsuka[83], T. P. A. Åkesson[94], E. Akilli[52], A. V. Akimov[108], G. L. Alberghi[23a,23b], J. Albert[173], P. Albicocco[49], M. J. Alconada Verzini[86], S. Alderweireldt[117], M. Aleksa[35], I. N. Aleksandrov[77], C. Alexa[27b], T. Alexopoulos[10], M. Alhroob[125], B. Ali[139], G. Alimonti[66a], J. Alison[36], S. P. Alkire[145], C. Allaire[129], B. M. M. Allbrooke[153], B. W. Allen[128], P. P. Allport[21], A. Aloisio[67a,67b], A. Alonso[39], F. Alonso[86], C. Alpigiani[145], A. A. Alshehri[55], M. I. Alstaty[99], B. Alvarez Gonzalez[35], D. Álvarez Piqueras[171], M. G. Alviggi[67a,67b], B. T. Amadio[18], Y. Amaral Coutinho[78b], L. Ambroz[132], C. Amelung[26], D. Amidei[103], S. P. Amor Dos Santos[137a,137c], S. Amoroso[44], C. S. Amrouche[52], C. Anastopoulos[146], L. S. Ancu[52], N. Andari[142], T. Andeen[11], C. F. Anders[59b], J. K. Anders[20], K. J. Anderson[36], A. Andreazza[66a,66b], V. Andrei[59a], C. R. Anelli[173], S. Angelidakis[37], I. Angelozzi[118], A. Angerami[38], A. V. Anisenkov[120a,120b], A. Annovi[69a], C. Antel[59a], M. T. Anthony[146], M. Antonelli[49], D. J. A. Antrim[168], F. Anulli[70a], M. Aoki[79], J. A. Aparisi Pozo[171], L. Aperio Bella[35], G. Arabidze[104], J. P. Araque[137a], V. Araujo Ferraz[78b], R. Araujo Pereira[78b], A. T. H. Arce[47], R. E. Ardell[91], F. A. Arduh[86], J.-F. Arguin[107], S. Argyropoulos[75], A. J. Armbruster[35], L. J. Armitage[90], A. Armstrong[168], O. Arnaez[164], H. Arnold[118], M. Arratia[31], O. Arslan[24], A. Artamonov[109,*], G. Artoni[132], S. Artz[97], S. Asai[160], N. Asbah[57], E. M. Asimakopoulou[169], L. Asquith[153], K. Assamagan[29], R. Astalos[28a], R. J. Atkin[32a], M. Atkinson[170], N. B. Atlay[148], K. Augsten[139], G. Avolio[35], R. Avramidou[58a], M. K. Ayoub[15a], G. Azuelos[107,av], A. E. Baas[59a], M. J. Baca[21], H. Bachacou[142], K. Bachas[65a,65b], M. Backes[132], P. Bagnaia[70a,70b], M. Bahmani[82], H. Bahrasemani[149], A. J. Bailey[171], J. T. Baines[141], M. Bajic[39], C. Bakalis[10], O. K. Baker[180], P. J. Bakker[118], D. Bakshi Gupta[93], E. M. Baldin[120a,120b], P. Balek[177], F. Balli[142], W. K. Balunas[134], J. Balz[97], E. Banas[82], A. Bandyopadhyay[24], S. Banerjee[178,l], A. A. E. Bannoura[179], L. Barak[158], W. M. Barbe[37], E. L. Barberio[102], D. Barberis[53a,53b], M. Barbero[99], T. Barillari[113], M.-S. Barisits[35], J. Barkeloo[128], T. Barklow[150], R. Barnea[157], S. L. Barnes[58c], B. M. Barnett[141], R. M. Barnett[18], Z. Barnovska-Blenessy[58a], A. Baroncelli[72a], G. Barone[26], A. J. Barr[132], L. Barranco Navarro[171], F. Barreiro[96], J. Barreiro Guimarães da Costa[15a], R. Bartoldus[150], A. E. Barton[87], P. Bartos[28a], A. Basalaev[135], A. Bassalat[129], R. L. Bates[55], S. J. Batista[164], S. Batlamous[34e], J. R. Batley[31], M. Battaglia[143], M. Bauce[70a,70b], F. Bauer[142], K. T. Bauer[168], H. S. Bawa[150,n], J. B. Beacham[123], T. Beau[133], P. H. Beauchemin[167], P. Bechtle[24], H. C. Beck[51], H. P. Beck[20,s], K. Becker[50], M. Becker[97], C. Becot[44], A. Beddall[12d], A. J. Beddall[12a], V. A. Bednyakov[77], M. Bedognetti[118], C. P. Bee[152], T. A. Beermann[35], M. Begalli[78b], M. Begel[29], A. Behera[152], J. K. Behr[44], A. S. Bell[92], G. Bella[158], L. Bellagamba[23b], A. Bellerive[33], M. Bellomo[157], P. Bellos[9], K. Belotskiy[110], N. L. Belyaev[110], O. Benary[158,*], D. Benchekroun[34a], M. Bender[112], N. Benekos[10], Y. Benhammou[158], E. Benhar Noccioli[180], J. Benitez[75], D. P. Benjamin[47], M. Benoit[52], J. R. Bensinger[26], S. Bentvelsen[118], L. Beresford[132], M. Beretta[49], D. Berge[44], E. Bergeaas Kuutmann[169], N. Berger[5], L. J. Bergsten[26], J. Beringer[18], S. Berlendis[7], N. R. Bernard[100], G. Bernardi[133], C. Bernius[150], F. U. Bernlochner[24], T. Berry[91], P. Berta[97], C. Bertella[15a], G. Bertoli[43a,43b], I. A. Bertram[87], G. J. Besjes[39], O. Bessidskaia Bylund[179], M. Bessner[44], N. Besson[142], A. Bethani[98], S. Bethke[113], A. Betti[24], A. J. Bevan[90], J. Beyer[113], R. M. Bianchi[136], O. Biebel[112], D. Biedermann[19], R. Bielski[35], K. Bierwagen[97], N. V. Biesuz[69a,69b], M. Biglietti[72a], T. R. V. Billoud[107], M. Bindi[51], A. Bingul[12d], C. Bini[70a,70b], S. Biondi[23a,23b], M. Birman[177], T. Bisanz[51], J. P. Biswal[158], C. Bittrich[46], D. M. Bjergaard[47], J. E. Black[150], K. M. Black[25], T. Blazek[28a], I. Bloch[44], C. Blocker[26], A. Blue[55], U. Blumenschein[90], Dr. Blunier[144a], G. J. Bobbink[118], V. S. Bobrovnikov[120a,120b], S. S. Bocchetta[94], A. Bocci[47], D. Boerner[179], D. Bogavac[112], A. G. Bogdanchikov[120a,120b], C. Bohm[43a], V. Boisvert[91], P. Bokan[169], T. Bold[81a], A. S. Boldyrev[111], A. E. Bolz[59b], M. Bomben[133], M. Bona[90], J. S. Bonilla[128], M. Boonekamp[142], A. Borisov[121], G. Borissov[87], J. Bortfeldt[35], D. Bortoletto[132], V. Bortolotto[71a,71b], D. Boscherini[23b], M. Bosman[14], J. D. Bossio Sola[30], K. Bouaouda[34a], J. Boudreau[136], E. V. Bouhova-Thacker[87], D. Boumediene[37], C. Bourdarios[129], S. K. Boutle[55], A. Boveia[123], J. Boyd[35], D. Boye[32b], I. R. Boyko[77], A. J. Bozson[91], J. Bracinik[21], N. Brahimi[99], A. Brandt[8], G. Brandt[179], O. Brandt[59a], F. Braren[44], U. Bratzler[161], B. Brau[100], J. E. Brau[128], W. D. Breaden Madden[55], K. Brendlinger[44], L. Brenner[44], R. Brenner[169], S. Bressler[177], B. Brickwedde[97], D. L. Briglin[21], D. Britton[55], D. Britzger[59b], I. Brock[24], R. Brock[104], G. Brooijmans[38], T. Brooks[91], W. K. Brooks[144b], E. Brost[119], J. H Broughton[21], P. A. Bruckman de Renstrom[82], D. Bruncko[28b], A. Bruni[23b], G. Bruni[23b], L. S. Bruni[118], S. Bruno[71a,71b], B.H. Brunt[31], M. Bruschi[23b], N. Bruscino[136], P. Bryant[36], L. Bryngemark[44], T. Buanes[17], Q. Buat[35], P. Buchholz[148], A. G. Buckley[55], I. A. Budagov[77], M. K. Bugge[131], F. Bührer[50], O. Bulekov[110], D. Bullock[8], T. J. Burch[119], S. Burdin[88], C. D. Burgard[118], A. M. Burger[5], B. Burghgrave[119], K. Burka[82], S. Burke[141], I. Burmeister[45], J. T. P. Burr[132], V. Büscher[97], E. Buschmann[51], P. Bussey[55], J. M. Butler[25], C. M. Buttar[55], J. M. Butterworth[92], P. Butti[35],

W. Buttinger[35], A. Buzatu[155], A. R. Buzykaev[120a,120b], G. Cabras[23a,23b], S. Cabrera Urbán[171], D. Caforio[139], H. Cai[170], V. M. M. Cairo[2], O. Cakir[4a], N. Calace[52], P. Calafiura[18], A. Calandri[99], G. Calderini[133], P. Calfayan[63], G. Callea[40a,40b], L. P. Caloba[78b], S. Calvente Lopez[96], D. Calvet[37], S. Calvet[37], T. P. Calvet[152], M. Calvetti[69a,69b], R. Camacho Toro[133], S. Camarda[35], P. Camarri[71a,71b], D. Cameron[131], R. Caminal Armadans[100], C. Camincher[35], S. Campana[35], M. Campanelli[92], A. Camplani[39], A. Campoverde[148], V. Canale[67a,67b], M. Cano Bret[58c], J. Cantero[126], T. Cao[158], Y. Cao[170], M. D. M. Capeans Garrido[35], I. Caprini[27b], M. Caprini[27b], M. Capua[40a,40b], R. M. Carbone[38], R. Cardarelli[71a], F. C. Cardillo[146], I. Carli[140], T. Carli[35], G. Carlino[67a], B. T. Carlson[136], L. Carminati[66a,66b], R. M. D. Carney[43a,43b], S. Caron[117], E. Carquin[144b], S. Carrá[66a,66b], G. D. Carrillo-Montoya[35], D. Casadei[32b], M. P. Casado[14,g], A. F. Casha[164], D. W. Casper[168], R. Castelijn[118], F. L. Castillo[171], V. Castillo Gimenez[171], N. F. Castro[137a,137e], A. Catinaccio[35], J. R. Catmore[131], A. Cattai[35], J. Caudron[24], V. Cavaliere[29], E. Cavallaro[14], D. Cavalli[66a], M. Cavalli-Sforza[14], V. Cavasinni[69a,69b], E. Celebi[12b], F. Ceradini[72a,72b], L. Cerda Alberich[171], A. S. Cerqueira[78a], A. Cerri[153], L. Cerrito[71a,71b], F. Cerutti[18], A. Cervelli[23a,23b], S. A. Cetin[12b], A. Chafaq[34a], D. Chakraborty[119], S. K. Chan[57], W. S. Chan[118], Y. L. Chan[61a], J. D. Chapman[31], B. Chargeishvili[156b], D. G. Charlton[21], C. C. Chau[33], C. A. Chavez Barajas[153], S. Che[123], A. Chegwidden[104], S. Chekanov[6], S. V. Chekulaev[165a], G. A. Chelkov[77,au], M. A. Chelstowska[35], C. Chen[58a], C. H. Chen[76], H. Chen[29], J. Chen[58a], J. Chen[38], S. Chen[134], S. J. Chen[15c], X. Chen[15b,at], Y. Chen[80], Y.-H. Chen[44], H. C. Cheng[103], H. J. Cheng[15d], A. Cheplakov[77], E. Cheremushkina[121], R. Cherkaoui El Moursli[34e], E. Cheu[7], K. Cheung[62], L. Chevalier[142], V. Chiarella[49], G. Chiarelli[69a], G. Chiodini[65a], A. S. Chisholm[35,21], A. Chitan[27b], I. Chiu[160], Y. H. Chiu[173], M. V. Chizhov[77], K. Choi[63], A. R. Chomont[129], S. Chouridou[159], Y. S. Chow[118], V. Christodoulou[92], M. C. Chu[61a], J. Chudoba[138], A. J. Chuinard[101], J. J. Chwastowski[82], L. Chytka[127], D. Cinca[45], V. Cindro[89], I. A. Cioară[24], A. Ciocio[18], F. Cirotto[67a,67b], Z. H. Citron[177], M. Citterio[66a], A. Clark[52], M. R. Clark[38], P. J. Clark[48], C. Clement[43a,43b], Y. Coadou[99], M. Cobal[64a,64c], A. Coccaro[53a,53b], J. Cochran[76], H. Cohen[158], A. E. C. Coimbra[177], L. Colasurdo[117], B. Cole[38], A. P. Colijn[118], J. Collot[56], P. Conde Muiño[137a,i], E. Coniavitis[50], S. H. Connell[32b], I. A. Connelly[98], S. Constantinescu[27b], F. Conventi[67a,aw], A. M. Cooper-Sarkar[132], F. Cormier[172], K. J. R. Cormier[164], L. D. Corpe[92], M. Corradi[70a,70b], E. E. Corrigan[94], F. Corriveau[101,ae], A. Cortes-Gonzalez[35], M. J. Costa[171], F. Costanza[5], D. Costanzo[146], G. Cottin[31], G. Cowan[91], B. E. Cox[98], J. Crane[98], K. Cranmer[122], S. J. Crawley[55], R. A. Creager[134], G. Cree[33], S. Crépé-Renaudin[56], F. Crescioli[133], M. Cristinziani[24], V. Croft[122], G. Crosetti[40a,40b], A. Cueto[96], T. Cuhadar Donszelmann[146], A. R. Cukierman[150], S. Czekierda[82], P. Czodrowski[35], M. J. Da Cunha Sargedas De Sousa[58b], C. Da Via[98], W. Dabrowski[81a], T. Dado[28a,z], S. Dahbi[34e], T. Dai[103], F. Dallaire[107], C. Dallapiccola[100], M. Dam[39], G. D'amen[23a,23b], J. Damp[97], J. R. Dandoy[134], M. F. Daneri[30], N. P. Dang[178,l], N. D. Dann[98], M. Danninger[172], V. Dao[35], G. Darbo[53b], S. Darmora[8], O. Dartsi[5], A. Dattagupta[128], T. Daubney[44], S. D'Auria[55], W. Davey[24], C. David[44], T. Davidek[140], D. R. Davis[47], E. Dawe[102], I. Dawson[146], K. De[8], R. De Asmundis[67a], A. De Benedetti[125], M. De Beurs[118], S. De Castro[23a,23b], S. De Cecco[70a,70b], N. De Groot[117], P. de Jong[118], H. De la Torre[104], F. De Lorenzi[76], A. De Maria[51,u], D. De Pedis[70a], A. De Salvo[70a], U. De Sanctis[71a,71b], M. De Santis[71a,71b], A. De Santo[153], K. De Vasconcelos Corga[99], J. B. De Vivie De Regie[129], C. Debenedetti[143], D. V. Dedovich[77], N. Dehghanian[3], M. Del Gaudio[40a,40b], J. Del Peso[96], Y. Delabat Diaz[44], D. Delgove[129], F. Deliot[142], C. M. Delitzsch[7], M. Della Pietra[67a,67b], D. Della Volpe[52], A. Dell'Acqua[35], L. Dell'Asta[25], M. Delmastro[5], C. Delporte[129], P. A. Delsart[56], D. A. DeMarco[164], S. Demers[180], M. Demichev[77], S. P. Denisov[121], D. Denysiuk[118], L. D'Eramo[133], D. Derendarz[82], J. E. Derkaoui[34d], F. Derue[133], P. Dervan[88], K. Desch[24], C. Deterre[44], K. Dette[164], M. R. Devesa[30], P. O. Deviveiros[35], A. Dewhurst[141], S. Dhaliwal[26], F. A. Di Bello[52], A. Di Ciaccio[71a,71b], L. Di Ciaccio[5], W. K. Di Clemente[134], C. Di Donato[67a,67b], A. Di Girolamo[35], B. Di Micco[72a,72b], R. Di Nardo[100], K. F. Di Petrillo[57], R. Di Sipio[164], D. Di Valentino[33], C. Diaconu[99], M. Diamond[164], F. A. Dias[39], T. Dias Do Vale[137a], M. A. Diaz[144a], J. Dickinson[18], E. B. Diehl[103], J. Dietrich[19], S. Díez Cornell[44], A. Dimitrievska[18], J. Dingfelder[24], F. Dittus[35], F. Djama[99], T. Djobava[156b], J. I. Djuvsland[59a], M. A. B. Do Vale[78c], M. Dobre[27b], D. Dodsworth[26], C. Doglioni[94], J. Dolejsi[140], Z. Dolezal[140], M. Donadelli[78d], J. Donini[37], A. D'onofrio[90], M. D'Onofrio[88], J. Dopke[141], A. Doria[67a], M. T. Dova[86], A. T. Doyle[55], E. Drechsler[51], E. Dreyer[149], T. Dreyer[51], Y. Du[58b], F. Dubinin[108], M. Dubovsky[28a], A. Dubreuil[52], E. Duchovni[177], G. Duckeck[112], A. Ducourthial[133], O. A. Ducu[107,y], D. Duda[113], A. Dudarev[35], A. C. Dudder[97], E. M. Duffield[18], L. Duflot[129], M. Dührssen[35], C. Dülsen[179], M. Dumancic[177], A. E. Dumitriu[27b,e], A. K. Duncan[55], M. Dunford[59a], A. Duperrin[99], H. Duran Yildiz[4a], M. Düren[54], A. Durglishvili[156b], D. Duschinger[46], B. Dutta[44], D. Duvnjak[1], M. Dyndal[44], S. Dysch[98], B. S. Dziedzic[82], C. Eckardt[44], K. M. Ecker[113], R. C. Edgar[103], T. Eifert[35], G. Eigen[17], K. Einsweiler[18], T. Ekelof[169], M. El Kacimi[34c], R. El Kosseifi[99], V. Ellajosyula[99], M. Ellert[169], F. Ellinghaus[179], A. A. Elliot[90], N. Ellis[35], J. Elmsheuser[29], M. Elsing[35], D. Emeliyanov[141], Y. Enari[160], J. S. Ennis[175], M. B. Epland[47], J. Erdmann[45], A. Ereditato[20], S. Errede[170], M. Escalier[129], C. Escobar[171], O. Estrada Pastor[171], A. I. Etienvre[142], E. Etzion[158], H. Evans[63], A. Ezhilov[135], M. Ezzi[34e], F. Fabbri[55], L. Fabbri[23a,23b], V. Fabiani[117], G. Facini[92], R. M. Faisca Rodrigues Pereira[137a], R. M. Fakhrutdinov[121], S. Falciano[70a], P. J. Falke[5],

S. Falke[5], J. Faltova[140], Y. Fang[15a], M. Fanti[66a,66b], A. Farbin[8], A. Farilla[72a], E. M. Farina[68a,68b], T. Farooque[104], S. Farrell[18], S. M. Farrington[175], P. Farthouat[35], F. Fassi[34e], P. Fassnacht[35], D. Fassouliotis[9], M. Faucci Giannelli[48], A. Favareto[53a,53b], W. J. Fawcett[31], L. Fayard[129], O. L. Fedin[135,q], W. Fedorko[172], M. Feickert[41], S. Feigl[131], L. Feligioni[99], C. Feng[58b], E. J. Feng[35], M. Feng[47], M. J. Fenton[55], A. B. Fenyuk[121], L. Feremenga[8], J. Ferrando[44], A. Ferrari[169], P. Ferrari[118], R. Ferrari[68a], D. E. Ferreira de Lima[59b], A. Ferrer[171], D. Ferrere[52], C. Ferretti[103], F. Fiedler[97], A. Filipčič[89], F. Filthaut[117], K. D. Finelli[25], M. C. N. Fiolhais[137a,137c,a], L. Fiorini[171], C. Fischer[14], W. C. Fisher[104], N. Flaschel[44], I. Fleck[148], P. Fleischmann[103], R. R. M. Fletcher[134], T. Flick[179], B. M. Flierl[112], L. M. Flores[134], L. R. Flores Castillo[61a], F. M. Follega[73a,73b], N. Fomin[17], G. T. Forcolin[98], A. Formica[142], F. A. Förster[14], A. C. Forti[98], A. G. Foster[21], D. Fournier[129], H. Fox[87], S. Fracchia[146], P. Francavilla[69a,69b], M. Franchini[23a,23b], S. Franchino[59a], D. Francis[35], L. Franconi[131], M. Franklin[57], M. Frate[168], M. Fraternali[68a,68b], A. N. Fray[90], D. Freeborn[92], S. M. Fressard-Batraneanu[35], B. Freund[107], W. S. Freund[78b], D. C. Frizzell[125], D. Froidevaux[35], J. A. Frost[132], C. Fukunaga[161], E. Fullana Torregrosa[171], T. Fusayasu[114], J. Fuster[171], O. Gabizon[157], A. Gabrielli[23a,23b], A. Gabrielli[18], G. P. Gach[81a], S. Gadatsch[52], P. Gadow[113], G. Gagliardi[53a,53b], L. G. Gagnon[107], C. Galea[27b], B. Galhardo[137a,137c], E. J. Gallas[132], B. J. Gallop[141], P. Gallus[139], G. Galster[39], R. Gamboa Goni[90], K. K. Gan[123], S. Ganguly[177], J. Gao[58a], Y. Gao[88], Y. S. Gao[150,n], C. García[171], J. E. García Navarro[171], J. A. García Pascual[15a], M. Garcia-Sciveres[18], R. W. Gardner[36], N. Garelli[150], V. Garonne[131], K. Gasnikova[44], A. Gaudiello[53a,53b], G. Gaudio[68a], I. L. Gavrilenko[108], A. Gavrilyuk[109], C. Gay[172], G. Gaycken[24], E. N. Gazis[10], C. N. P. Gee[141], J. Geisen[51], M. Geisen[97], M. P. Geisler[59a], K. Gellerstedt[43a,43b], C. Gemme[53b], M. H. Genest[56], C. Geng[103], S. Gentile[70a,70b], S. George[91], D. Gerbaudo[14], G. Gessner[45], S. Ghasemi[148], M. Ghasemi Bostanabad[173], M. Ghneimat[24], B. Giacobbe[23b], S. Giagu[70a,70b], N. Giangiacomi[23a,23b], P. Giannetti[69a], A. Giannini[67a,67b], S. M. Gibson[91], M. Gignac[143], D. Gillberg[33], G. Gilles[179], D. M. Gingrich[3,av], M. P. Giordani[64a,64c], F. M. Giorgi[23b], P. F. Giraud[142], P. Giromini[57], G. Giugliarelli[64a,64c], D. Giugni[66a], F. Giuli[132], M. Giulini[59b], S. Gkaitatzis[159], I. Gkialas[9,k], E. L. Gkougkousis[14], P. Gkountoumis[10], L. K. Gladilin[111], C. Glasman[96], J. Glatzer[14], P. C. F. Glaysher[44], A. Glazov[44], M. Goblirsch-Kolb[26], J. Godlewski[82], S. Goldfarb[102], T. Golling[52], D. Golubkov[121], A. Gomes[137a,137b], R. Goncalves Gama[78a], R. Gonçalo[137a], G. Gonella[50], L. Gonella[21], A. Gongadze[77], F. Gonnella[21], J. L. Gonski[57], S. González de la Hoz[171], S. Gonzalez-Sevilla[52], L. Goossens[35], P. A. Gorbounov[109], H. A. Gordon[29], B. Gorini[35], E. Gorini[65a,65b], A. Gorišek[89], A. T. Goshaw[47], C. Gössling[45], M. I. Gostkin[77], C. A. Gottardo[24], C. R. Goudet[129], D. Goujdami[34c], A. G. Goussiou[145], N. Govender[32b,c], C. Goy[5], E. Gozani[157], I. Grabowska-Bold[81a], P. O. J. Gradin[169], E. C. Graham[88], J. Gramling[168], E. Gramstad[131], S. Grancagnolo[19], V. Gratchev[135], P. M. Gravila[27f], F. G. Gravili[65a,65b], C. Gray[55], H. M. Gray[18], Z. D. Greenwood[93,al], C. Grefe[24], K. Gregersen[94], I. M. Gregor[44], P. Grenier[150], K. Grevtsov[44], N. A. Grieser[125], J. Griffiths[8], A. A. Grillo[143], K. Grimm[150,b], S. Grinstein[14,aa], Ph. Gris[37], J.-F. Grivaz[129], S. Groh[97], E. Gross[177], J. Grosse-Knetter[51], G. C. Grossi[93], Z. J. Grout[92], C. Grud[103], A. Grummer[116], L. Guan[103], W. Guan[178], J. Guenther[35], A. Guerguichon[129], F. Guescini[165a], D. Guest[168], R. Gugel[50], B. Gui[123], T. Guillemin[5], S. Guindon[35], U. Gul[55], C. Gumpert[35], J. Guo[58c], W. Guo[103], Y. Guo[58a,t], Z. Guo[99], R. Gupta[41], S. Gurbuz[12c], G. Gustavino[125], B. J. Gutelman[157], P. Gutierrez[125], C. Gutschow[92], C. Guyot[142], M. P. Guzik[81a], C. Gwenlan[132], C. B. Gwilliam[88], A. Haas[122], C. Haber[18], H. K. Hadavand[8], N. Haddad[34e], A. Hadef[58a], S. Hageböck[24], M. Hagihara[166], H. Hakobyan[181,*], M. Haleem[174], J. Haley[126], G. Halladjian[104], G. D. Hallewell[99], K. Hamacher[179], P. Hamal[127], K. Hamano[173], A. Hamilton[32a], G. N. Hamity[146], K. Han[58a,ak], L. Han[58a], S. Han[15d], K. Hanagaki[79,w], M. Hance[143], D. M. Handl[112], B. Haney[134], R. Hankache[133], P. Hanke[59a], E. Hansen[94], J. B. Hansen[39], J. D. Hansen[39], M. C. Hansen[24], P. H. Hansen[39], K. Hara[166], A. S. Hard[178], T. Harenberg[179], S. Harkusha[105], P. F. Harrison[175], N. M. Hartmann[112], Y. Hasegawa[147], A. Hasib[48], S. Hassani[142], S. Haug[20], R. Hauser[104], L. Hauswald[46], L. B. Havener[38], M. Havranek[139], C. M. Hawkes[21], R. J. Hawkings[35], D. Hayden[104], C. Hayes[152], C. P. Hays[132], J. M. Hays[90], H. S. Hayward[88], S. J. Haywood[141], M. P. Heath[48], V. Hedberg[94], L. Heelan[8], S. Heer[24], K. K. Heidegger[50], J. Heilman[33], S. Heim[44], T. Heim[18], B. Heinemann[44,aq], J. J. Heinrich[112], L. Heinrich[122], C. Heinz[54], J. Hejbal[138], L. Helary[35], A. Held[172], S. Hellesund[131], S. Hellman[43a,43b], C. Helsens[35], R. C. W. Henderson[87], Y. Heng[178], S. Henkelmann[172], A. M. Henriques Correia[35], G. H. Herbert[19], H. Herde[26], V. Herget[174], Y. Hernández Jiménez[32c], H. Herr[97], M. G. Herrmann[112], G. Herten[50], R. Hertenberger[112], L. Hervas[35], T. C. Herwig[134], G. G. Hesketh[92], N. P. Hessey[165a], J. W. Hetherly[41], S. Higashino[79], E. Higón-Rodriguez[171], K. Hildebrand[36], E. Hill[173], J. C. Hill[31], K. K. Hill[29], K. H. Hiller[44], S. J. Hillier[21], M. Hils[46], I. Hinchliffe[18], M. Hirose[130], D. Hirschbuehl[179], B. Hiti[89], O. Hladik[138], D. R. Hlaluku[32c], X. Hoad[48], J. Hobbs[152], N. Hod[165a], M. C. Hodgkinson[146], A. Hoecker[35], M. R. Hoeferkamp[116], F. Hoenig[112], D. Hohn[24], D. Hohov[129], T. R. Holmes[36], M. Holzbock[112], M. Homann[45], S. Honda[166], T. Honda[79], T. M. Hong[136], A. Hönle[113], B. H. Hooberman[170], W. H. Hopkins[128], Y. Horii[115], P. Horn[46], A. J. Horton[149], L. A. Horyn[36], J.-Y. Hostachy[56], A. Hostiuc[145], S. Hou[155], A. Hoummada[34a], J. Howarth[98], J. Hoya[86], M. Hrabovsky[127], I. Hristova[19], J. Hrivnac[129], A. Hrynevich[106], T. Hryn'ova[5], P. J. Hsu[62], S.-C. Hsu[145], Q. Hu[29], S. Hu[58c], Y. Huang[15a], Z. Hubacek[139],

F. Hubaut[99], M. Huebner[24], F. Huegging[24], T. B. Huffman[132], E. W. Hughes[38], M. Huhtinen[35], R. F. H. Hunter[33], P. Huo[152], A. M. Hupe[33], N. Huseynov[77,ag], J. Huston[104], J. Huth[57], R. Hyneman[103], G. Iacobucci[52], G. Iakovidis[29], I. Ibragimov[148], L. Iconomidou-Fayard[129], Z. Idrissi[34e], P. Iengo[35], R. Ignazzi[39], O. Igonkina[118,ac], R. Iguchi[160], T. Iizawa[52], Y. Ikegami[79], M. Ikeno[79], D. Iliadis[159], N. Ilic[117], F. Iltzsche[46], G. Introzzi[68a,68b], M. Iodice[72a], K. Iordanidou[38], V. Ippolito[70a,70b], M. F. Isacson[169], N. Ishijima[130], M. Ishino[160], M. Ishitsuka[162], W. Islam[126], C. Issever[132], S. Istin[157], F. Ito[166], J. M. Iturbe Ponce[61a], R. Iuppa[73a,73b], A. Ivina[177], H. Iwasaki[79], J. M. Izen[42], V. Izzo[67a], P. Jacka[138], P. Jackson[1], R. M. Jacobs[24], V. Jain[2], G. Jäkel[179], K. B. Jakobi[97], K. Jakobs[50], S. Jakobsen[74], T. Jakoubek[138], D. O. Jamin[126], D. K. Jana[93], R. Jansky[52], J. Janssen[24], M. Janus[51], P. A. Janus[81a], G. Jarlskog[94], N. Javadov[77,ag], T. Javůrek[35], M. Javurkova[50], F. Jeanneau[142], L. Jeanty[18], J. Jejelava[156a,ah], A. Jelinskas[175], P. Jenni[50,d], J. Jeong[44], N. Jeong[44], S. Jézéquel[5], H. Ji[178], J. Jia[152], H. Jiang[76], Y. Jiang[58a], Z. Jiang[150,r], S. Jiggins[50], F. A. Jimenez Morales[37], J. Jimenez Pena[171], S. Jin[15c], A. Jinaru[27b], O. Jinnouchi[162], H. Jivan[32c], P. Johansson[146], K. A. Johns[7], C. A. Johnson[63], W. J. Johnson[145], K. Jon-And[43a,43b], R. W. L. Jones[87], S. D. Jones[153], S. Jones[7], T. J. Jones[88], J. Jongmanns[59a], P. M. Jorge[137a,137b], J. Jovicevic[165a], X. Ju[18], J. J. Junggeburth[113], A. Juste Rozas[14,aa], A. Kaczmarska[82], M. Kado[129], H. Kagan[123], M. Kagan[150], T. Kaji[176], E. Kajomovitz[157], C. W. Kalderon[94], A. Kaluza[97], S. Kama[41], A. Kamenshchikov[121], L. Kanjir[89], Y. Kano[160], V. A. Kantserov[110], J. Kanzaki[79], B. Kaplan[122], L. S. Kaplan[178], D. Kar[32c], M. J. Kareem[165b], E. Karentzos[10], S. N. Karpov[77], Z. M. Karpova[77], V. Kartvelishvili[87], A. N. Karyukhin[121], L. Kashif[178], R. D. Kass[123], A. Kastanas[151], Y. Kataoka[160], C. Kato[58c,58d], J. Katzy[44], K. Kawade[80], K. Kawagoe[85], T. Kawamoto[160], G. Kawamura[51], E. F. Kay[88], V. F. Kazanin[120a,120b], R. Keeler[173], R. Kehoe[41], J. S. Keller[33], E. Kellermann[94], J. J. Kempster[21], J. Kendrick[21], O. Kepka[138], S. Kersten[179], B. P. Kerševan[89], R. A. Keyes[101], M. Khader[170], F. Khalil-Zada[13], A. Khanov[126], A. G. Kharlamov[120a,120b], T. Kharlamova[120a,120b], E. E. Khoda[172], A. Khodinov[163], T. J. Khoo[52], E. Khramov[77], J. Khubua[156b], S. Kido[80], M. Kiehn[52], C. R. Kilby[91], Y. K. Kim[36], N. Kimura[64a,64c], O. M. Kind[19], B. T. King[88], D. Kirchmeier[46], J. Kirk[141], A. E. Kiryunin[113], T. Kishimoto[160], D. Kisielewska[81a], V. Kitali[44], O. Kivernyk[5], E. Kladiva[28b,*], T. Klapdor-Kleingrothaus[50], M. H. Klein[103], M. Klein[88], U. Klein[88], K. Kleinknecht[97], P. Klimek[119], A. Klimentov[29], R. Klingenberg[45,*], T. Klingl[24], T. Klioutchnikova[35], F. F. Klitzner[112], P. Kluit[118], S. Kluth[113], E. Kneringer[74], E. B. F. G. Knoops[99], A. Knue[50], A. Kobayashi[160], D. Kobayashi[85], T. Kobayashi[160], M. Kobel[46], M. Kocian[150], P. Kodys[140], P. T. Koenig[24], T. Koffas[33], E. Koffeman[118], N. M. Köhler[113], T. Koi[150], M. Kolb[59b], I. Koletsou[5], T. Kondo[79], N. Kondrashova[58c], K. Köneke[50], A. C. König[117], T. Kono[79], R. Konoplich[122,an], V. Konstantinides[92], N. Konstantinidis[92], B. Konya[94], R. Kopeliansky[63], S. Koperny[81a], K. Korcyl[82], K. Kordas[159], G. Koren[158], A. Korn[92], I. Korolkov[14], E. V. Korolkova[146], N. Korotkova[111], O. Kortner[113], S. Kortner[113], T. Kosek[140], V. V. Kostyukhin[24], A. Kotwal[47], A. Koulouris[10], A. Kourkoumeli-Charalampidi[68a,68b], C. Kourkoumelis[9], E. Kourlitis[146], V. Kouskoura[29], A. B. Kowalewska[82], R. Kowalewski[173], T. Z. Kowalski[81a], C. Kozakai[160], W. Kozanecki[142], A. S. Kozhin[121], V. A. Kramarenko[111], G. Kramberger[89], D. Krasnopevtsev[58a], M. W. Krasny[133], A. Krasznahorkay[35], D. Krauss[113], J. A. Kremer[81a], J. Kretzschmar[88], P. Krieger[164], K. Krizka[18], K. Kroeninger[45], H. Kroha[113], J. Kroll[138], J. Kroll[134], J. Krstic[16], U. Kruchonak[77], H. Krüger[24], N. Krumnack[76], M. C. Kruse[47], T. Kubota[102], S. Kuday[4b], J. T. Kuechler[179], S. Kuehn[35], A. Kugel[59a], F. Kuger[174], T. Kuhl[44], V. Kukhtin[77], R. Kukla[99], Y. Kulchitsky[105], S. Kuleshov[144b], Y. P. Kulinich[170], M. Kuna[56], T. Kunigo[83], A. Kupco[138], T. Kupfer[45], O. Kuprash[158], H. Kurashige[80], L. L. Kurchaninov[165a], Y. A. Kurochkin[105], M. G. Kurth[15d], E. S. Kuwertz[35], M. Kuze[162], J. Kvita[127], T. Kwan[101], A. La Rosa[113], J. L. La Rosa Navarro[78d], L. La Rotonda[40a,40b], F. La Ruffa[40a,40b], C. Lacasta[171], F. Lacava[70a,70b], J. Lacey[44], D. P. J. Lack[98], H. Lacker[19], D. Lacour[133], E. Ladygin[77], R. Lafaye[5], B. Laforge[133], T. Lagouri[32c], S. Lai[51], S. Lammers[63], W. Lampl[7], E. Lançon[29], U. Landgraf[50], M. P. J. Landon[90], M. C. Lanfermann[52], V. S. Lang[44], J. C. Lange[14], R. J. Langenberg[35], A. J. Lankford[168], F. Lanni[29], K. Lantzsch[24], A. Lanza[68a], A. Lapertosa[53a,53b], S. Laplace[133], J. F. Laporte[142], T. Lari[66a], F. Lasagni Manghi[23a,23b], M. Lassnig[35], T. S. Lau[61a], A. Laudrain[129], M. Lavorgna[67a,67b], A. T. Law[143], M. Lazzaroni[66a,66b], B. Le[102], O. Le Dortz[133], E. Le Guirriec[99], E. P. Le Quilleuc[142], M. LeBlanc[7], T. LeCompte[6], F. Ledroit-Guillon[56], C. A. Lee[29], G. R. Lee[144a], L. Lee[57], S. C. Lee[155], B. Lefebvre[101], M. Lefebvre[173], F. Legger[112], C. Leggett[18], K. Lehmann[149], N. Lehmann[179], G. Lehmann Miotto[35], W. A. Leight[44], A. Leisos[159,x], M. A. L. Leite[78d], R. Leitner[140], D. Lellouch[177], B. Lemmer[51], K. J. C. Leney[92], T. Lenz[24], B. Lenzi[35], R. Leone[7], S. Leone[69a], C. Leonidopoulos[48], G. Lerner[153], C. Leroy[107], R. Les[164], A. A. J. Lesage[142], C. G. Lester[31], M. Levchenko[135], J. Levêque[5], D. Levin[103], L. J. Levinson[177], D. Lewis[90], B. Li[103], C.-Q. Li[58a,am], H. Li[58b], L. Li[58c], Q. Li[15d], Q. Y. Li[58a], S. Li[58c,58d], X. Li[58c], Y. Li[148], Z. Liang[15a], B. Liberti[71a], A. Liblong[164], K. Lie[61c], S. Liem[118], A. Limosani[154], C. Y. Lin[31], K. Lin[104], T. H. Lin[97], R. A. Linck[63], J. H. Lindon[21], B. E. Lindquist[152], A. L. Lionti[52], E. Lipeles[134], A. Lipniacka[17], M. Lisovyi[59b], T. M. Liss[170,as], A. Lister[172], A. M. Litke[143], J. D. Little[8], B. Liu[76], B. L Liu[6], H. B. Liu[29], H. Liu[103], J. B. Liu[58a], J. K. K. Liu[132], K. Liu[133], M. Liu[58a], P. Liu[18], Y. Liu[15a], Y. L. Liu[58a], Y. W. Liu[58a], M. Livan[68a,68b], A. Lleres[56], J. Llorente Merino[15a], S. L. Lloyd[90], C. Y. Lo[61b], F. Lo Sterzo[41], E. M. Lobodzinska[44], P. Loch[7], T. Lohse[19],

K. Lohwasser[146], M. Lokajicek[138], B. A. Long[25], J. D. Long[170], R. E. Long[87], L. Longo[65a,65b], K. A. Looper[123], J. A. Lopez[144b], I. Lopez Paz[14], A. Lopez Solis[146], J. Lorenz[112], N. Lorenzo Martinez[5], M. Losada[22], P. J. Lösel[112], A. Lösle[50], X. Lou[44], X. Lou[15a], A. Lounis[129], J. Love[6], P. A. Love[87], J. J. Lozano Bahilo[171], H. Lu[61a], M. Lu[58a], N. Lu[103], Y. J. Lu[62], H. J. Lubatti[145], C. Luci[70a,70b], A. Lucotte[56], C. Luedtke[50], F. Luehring[63], I. Luise[133], L. Luminari[70a], B. Lund-Jensen[151], M. S. Lutz[100], P. M. Luzi[133], D. Lynn[29], R. Lysak[138], E. Lytken[94], F. Lyu[15a], V. Lyubushkin[77], H. Ma[29], L. L. Ma[58b], Y. Ma[58b], G. Maccarrone[49], A. Macchiolo[113], C. M. Macdonald[146], J. Machado Miguens[134,137b], D. Madaffari[171], R. Madar[37], W. F. Mader[46], A. Madsen[44], N. Madysa[46], J. Maeda[80], K. Maekawa[160], S. Maeland[17], T. Maeno[29], A. S. Maevskiy[111], V. Magerl[50], C. Maidantchik[78b], T. Maier[112], A. Maio[137a,137b,137d], O. Majersky[28a], S. Majewski[128], Y. Makida[79], N. Makovec[129], B. Malaescu[133], Pa. Malecki[82], V. P. Maleev[135], F. Malek[56], U. Mallik[75], D. Malon[6], C. Malone[31], S. Maltezos[10], S. Malyukov[35], J. Mamuzic[171], G. Mancini[49], I. Mandić[89], J. Maneira[137a], L. Manhaes de Andrade Filho[78a], J. Manjarres Ramos[46], K. H. Mankinen[94], A. Mann[112], A. Manousos[74], B. Mansoulie[142], J. D. Mansour[15a], M. Mantoani[51], S. Manzoni[66a,66b], G. Marceca[30], L. March[52], L. Marchese[132], G. Marchiori[133], M. Marcisovsky[138], C. A. Marin Tobon[35], M. Marjanovic[37], D. E. Marley[103], F. Marroquim[78b], Z. Marshall[18], M. U. F Martensson[169], S. Marti-Garcia[171], C. B. Martin[123], T. A. Martin[175], V. J. Martin[48], B. Martin dit Latour[17], M. Martinez[14,aa], V. I. Martinez Outschoorn[100], S. Martin-Haugh[141], V. S. Martoiu[27b], A. C. Martyniuk[92], A. Marzin[35], L. Masetti[97], T. Mashimo[160], R. Mashinistov[108], J. Masik[98], A. L. Maslennikov[120a,120b], L. H. Mason[102], L. Massa[71a,71b], P. Massarotti[67a,67b], P. Mastrandrea[5], A. Mastroberardino[40a,40b], T. Masubuchi[160], P. Mättig[179], J. Maurer[27b], B. Maček[89], S. J. Maxfield[88], D. A. Maximov[120a,120b], R. Mazini[155], I. Maznas[159], S. M. Mazza[143], N. C. Mc Fadden[116], G. Mc Goldrick[164], S. P. Mc Kee[103], A. McCarn[103], T. G. McCarthy[113], L. I. McClymont[92], E. F. McDonald[102], J. A. Mcfayden[35], G. Mchedlidze[51], M. A. McKay[41], K. D. McLean[173], S. J. McMahon[141], P. C. McNamara[102], C. J. McNicol[175], R. A. McPherson[173,ae], J. E. Mdhluli[32c], Z. A. Meadows[100], S. Meehan[145], T. M. Megy[50], S. Mehlhase[112], A. Mehta[88], T. Meideck[56], B. Meirose[42], D. Melini[171,h], B. R. Mellado Garcia[32c], J. D. Mellenthin[51], M. Melo[28a], F. Meloni[44], A. Melzer[24], S. B. Menary[98], E. D. Mendes Gouveia[137a], L. Meng[88], X. T. Meng[103], A. Mengarelli[23a,23b], S. Menke[113], E. Meoni[40a,40b], S. Mergelmeyer[19], C. Merlassino[20], P. Mermod[52], L. Merola[67a,67b], C. Meroni[66a], F. S. Merritt[36], A. Messina[70a,70b], J. Metcalfe[6], A. S. Mete[168], C. Meyer[134], J. Meyer[157], J.-P. Meyer[142], H. Meyer Zu Theenhausen[59a], F. Miano[153], R. P. Middleton[141], L. Mijović[48], G. Mikenberg[177], M. Mikestikova[138], M. Mikuž[89], M. Milesi[102], A. Milic[164], D. A. Millar[90], D. W. Miller[36], A. Milov[177], D. A. Milstead[43a,43b], A. A. Minaenko[121], M. Miñano Moya[171], I. A. Minashvili[156b], A. I. Mincer[122], B. Mindur[81a], M. Mineev[77], Y. Minegishi[160], Y. Ming[178], L. M. Mir[14], A. Mirto[65a,65b], K. P. Mistry[134], T. Mitani[176], J. Mitrevski[112], V. A. Mitsou[171], A. Miucci[20], P. S. Miyagawa[146], A. Mizukami[79], J. U. Mjörnmark[94], T. Mkrtchyan[181], M. Mlynarikova[140], T. Moa[43a,43b], K. Mochizuki[107], P. Mogg[50], S. Mohapatra[38], S. Molander[43a,43b], R. Moles-Valls[24], M. C. Mondragon[104], K. Mönig[44], J. Monk[39], E. Monnier[99], A. Montalbano[149], J. Montejo Berlingen[35], F. Monticelli[86], S. Monzani[66a], N. Morange[129], D. Moreno[22], M. Moreno Llácer[35], P. Morettini[53b], M. Morgenstern[118], S. Morgenstern[46], D. Mori[149], M. Morii[57], M. Morinaga[176], V. Morisbak[131], A. K. Morley[35], G. Mornacchi[35], A. P. Morris[92], J. D. Morris[90], L. Morvaj[152], P. Moschovakos[10], M. Mosidze[156b], H. J. Moss[146], J. Moss[150,o], K. Motohashi[162], R. Mount[150], E. Mountricha[35], E. J. W. Moyse[100], S. Muanza[99], F. Mueller[113], J. Mueller[136], R. S. P. Mueller[112], D. Muenstermann[87], G. A. Mullier[20], F. J. Munoz Sanchez[98], P. Murin[28b], W. J. Murray[141,175], A. Murrone[66a,66b], M. Muškinja[89], C. Mwewa[32a], A. G. Myagkov[121,ao], J. Myers[128], M. Myska[139], B. P. Nachman[18], O. Nackenhorst[45], K. Nagai[132], K. Nagano[79], Y. Nagasaka[60], M. Nagel[50], E. Nagy[99], A. M. Nairz[35], Y. Nakahama[115], K. Nakamura[79], T. Nakamura[160], I. Nakano[124], H. Nanjo[130], F. Napolitano[59a], R. F. Naranjo Garcia[44], R. Narayan[11], D. I. Narrias Villar[59a], I. Naryshkin[135], T. Naumann[44], G. Navarro[22], R. Nayyar[7], H. A. Neal[103,*], P. Y. Nechaeva[108], T. J. Neep[142], A. Negri[68a,68b], M. Negrini[23b], S. Nektarijevic[117], C. Nellist[51], M. E. Nelson[132], S. Nemecek[138], P. Nemethy[122], M. Nessi[35,f], M. S. Neubauer[170], M. Neumann[179], P. R. Newman[21], T. Y. Ng[61c], Y. S. Ng[19], H. D. N. Nguyen[99], T. Nguyen Manh[107], E. Nibigira[37], R. B. Nickerson[132], R. Nicolaidou[142], J. Nielsen[143], N. Nikiforou[11], V. Nikolaenko[121,ao], I. Nikolic-Audit[133], K. Nikolopoulos[21], P. Nilsson[29], Y. Ninomiya[79], A. Nisati[70a], N. Nishu[58c], R. Nisius[113], I. Nitsche[45], T. Nitta[176], T. Nobe[160], Y. Noguchi[83], M. Nomachi[130], I. Nomidis[133], M. A. Nomura[29], T. Nooney[90], M. Nordberg[35], N. Norjoharuddeen[132], T. Novak[89], O. Novgorodova[46], R. Novotny[139], L. Nozka[127], K. Ntekas[168], E. Nurse[92], F. Nuti[102], F. G. Oakham[33,av], H. Oberlack[113], T. Obermann[24], J. Ocariz[133], A. Ochi[80], I. Ochoa[38], J. P. Ochoa-Ricoux[144a], K. O'Connor[26], S. Oda[85], S. Odaka[79], S. Oerdek[51], A. Oh[98], S. H. Oh[47], C. C. Ohm[151], H. Oide[53a,53b], M. L. Ojeda[164], H. Okawa[166], Y. Okazaki[83], Y. Okumura[160], T. Okuyama[79], A. Olariu[27b], L. F. Oleiro Seabra[137a], S. A. Olivares Pino[144a], D. Oliveira Damazio[29], J. L. Oliver[1], M. J. R. Olsson[36], A. Olszewski[82], J. Olszowska[82], D. C. O'Neil[149], A. Onofre[137a,137e], K. Onogi[115], P. U. E. Onyisi[11], H. Oppen[131], M. J. Oreglia[36], G. E. Orellana[86], Y. Oren[158], D. Orestano[72a,72b], E. C. Orgill[98], N. Orlando[61b], A. A. O'Rourke[44], R. S. Orr[164], B. Osculati[53a,53b,*], V. O'Shea[55], R. Ospanov[58a], G. Otero y Garzon[30],

H. Otono[85], M. Ouchrif[34d], F. Ould-Saada[131], A. Ouraou[142], Q. Ouyang[15a], M. Owen[55], R. E. Owen[21], V. E. Ozcan[12c], N. Ozturk[8], J. Pacalt[127], H. A. Pacey[31], K. Pachal[149], A. Pacheco Pages[14], L. Pacheco Rodriguez[142], C. Padilla Aranda[14], S. Pagan Griso[18], M. Paganini[180], G. Palacino[63], S. Palazzo[40a,40b], S. Palestini[35], M. Palka[81b], D. Pallin[37], I. Panagoulias[10], C. E. Pandini[35], J. G. Panduro Vazquez[91], P. Pani[35], G. Panizzo[64a,64c], L. Paolozzi[52], T. D. Papadopoulou[10], K. Papageorgiou[9,k], A. Paramonov[6], D. Paredes Hernandez[61b], S. R. Paredes Saenz[132], B. Parida[163], A. J. Parker[87], K. A. Parker[44], M. A. Parker[31], F. Parodi[53a,53b], J. A. Parsons[38], U. Parzefall[50], V. R. Pascuzzi[164], J. M. P. Pasner[143], E. Pasqualucci[70a], S. Passaggio[53b], F. Pastore[91], P. Pasuwan[43a,43b], S. Pataraia[97], J. R. Pater[98], A. Pathak[178,l], T. Pauly[35], B. Pearson[113], M. Pedersen[131], L. Pedraza Diaz[117], R. Pedro[137a,137b], S. V. Peleganchuk[120a,120b], O. Penc[138], C. Peng[15d], H. Peng[58a], B. S. Peralva[78a], M. M. Perego[142], A. P. Pereira Peixoto[137a], D. V. Perepelitsa[29], F. Peri[19], L. Perini[66a,66b], H. Pernegger[35], S. Perrella[67a,67b], V. D. Peshekhonov[77,*], K. Peters[44], R. F. Y. Peters[98], B. A. Petersen[35], T. C. Petersen[39], E. Petit[56], A. Petridis[1], C. Petridou[159], P. Petroff[129], M. Petrov[132], F. Petrucci[72a,72b], M. Pettee[180], N. E. Pettersson[100], A. Peyaud[142], R. Pezoa[144b], T. Pham[102], F. H. Phillips[104], P. W. Phillips[141], M. W. Phipps[170], G. Piacquadio[152], E. Pianori[18], A. Picazio[100], M. A. Pickering[132], R. H. Pickles[98], R. Piegaia[30], J. E. Pilcher[36], A. D. Pilkington[98], M. Pinamonti[71a,71b], J. L. Pinfold[3], M. Pitt[177], M.-A. Pleier[29], V. Pleskot[140], E. Plotnikova[77], D. Pluth[76], P. Podberezko[120a,120b], R. Poettgen[94], R. Poggi[52], L. Poggioli[129], I. Pogrebnyak[104], D. Pohl[24], I. Pokharel[51], G. Polesello[68a], A. Poley[18], A. Policicchio[70a,70b], R. Polifka[35], A. Polini[23b], C. S. Pollard[44], V. Polychronakos[29], D. Ponomarenko[110], L. Pontecorvo[35], G. A. Popeneciu[27d], D. M. Portillo Quintero[133], S. Pospisil[139], K. Potamianos[44], I. N. Potrap[77], C. J. Potter[31], H. Potti[11], T. Poulsen[94], J. Poveda[35], T. D. Powell[146], M. E. Pozo Astigarraga[35], P. Pralavorio[99], S. Prell[76], D. Price[98], M. Primavera[65a], S. Prince[101], N. Proklova[110], K. Prokofiev[61c], F. Prokoshin[144b], S. Protopopescu[29], J. Proudfoot[6], M. Przybycien[81a], A. Puri[170], P. Puzo[129], J. Qian[103], Y. Qin[98], A. Quadt[51], M. Queitsch-Maitland[44], A. Qureshi[1], P. Rados[102], F. Ragusa[66a,66b], G. Rahal[95], J. A. Raine[52], S. Rajagopalan[29], A. Ramirez Morales[90], T. Rashid[129], S. Raspopov[5], M. G. Ratti[66a,66b], D. M. Rauch[44], F. Rauscher[112], S. Rave[97], B. Ravina[146], I. Ravinovich[177], J. H. Rawling[98], M. Raymond[35], A. L. Read[131], N. P. Readioff[56], M. Reale[65a,65b], D. M. Rebuzzi[68a,68b], A. Redelbach[174], G. Redlinger[29], R. Reece[143], R. G. Reed[32c], K. Reeves[42], L. Rehnisch[19], J. Reichert[134], D. Reikher[158], A. Reiss[97], C. Rembser[35], H. Ren[15d], M. Rescigno[70a], S. Resconi[66a], E. D. Resseguie[134], S. Rettie[172], E. Reynolds[21], O. L. Rezanova[120a,120b], P. Reznicek[140], E. Ricci[73a,73b], R. Richter[113], S. Richter[44], E. Richter-Was[81b], O. Ricken[24], M. Ridel[133], P. Rieck[113], C. J. Riegel[179], O. Rifki[44], M. Rijssenbeek[152], A. Rimoldi[68a,68b], M. Rimoldi[20], L. Rinaldi[23b], G. Ripellino[151], B. Ristić[87], E. Ritsch[35], I. Riu[14], J. C. Rivera Vergara[144a], F. Rizatdinova[126], E. Rizvi[90], C. Rizzi[14], R. T. Roberts[98], S. H. Robertson[101,ae], D. Robinson[31], J. E. M. Robinson[44], A. Robson[55], E. Rocco[97], C. Roda[69a,69b], Y. Rodina[99], S. Rodriguez Bosca[171], A. Rodriguez Perez[14], D. Rodriguez Rodriguez[171], A. M. Rodríguez Vera[165b], S. Roe[35], C. S. Rogan[57], O. Røhne[131], R. Röhrig[113], C. P. A. Roland[63], J. Roloff[57], A. Romaniouk[110], M. Romano[23a,23b], N. Rompotis[88], M. Ronzani[122], L. Roos[133], S. Rosati[70a], K. Rosbach[50], P. Rose[143], N.-A. Rosien[51], E. Rossi[44], E. Rossi[67a,67b], L. P. Rossi[53b], L. Rossini[66a,66b], J. H. N. Rosten[31], R. Rosten[14], M. Rotaru[27b], J. Rothberg[145], D. Rousseau[129], D. Roy[32c], A. Rozanov[99], Y. Rozen[157], X. Ruan[32c], F. Rubbo[150], F. Rühr[50], A. Ruiz-Martinez[171], Z. Rurikova[50], N. A. Rusakovich[77], H. L. Russell[101], J. P. Rutherfoord[7], E. M. Rüttinger[44,m], Y. F. Ryabov[135], M. Rybar[170], G. Rybkin[129], S. Ryu[6], A. Ryzhov[121], G. F. Rzehorz[51], P. Sabatini[51], G. Sabato[118], S. Sacerdoti[129], H. F.-W. Sadrozinski[143], R. Sadykov[77], F. Safai Tehrani[70a], P. Saha[119], M. Sahinsoy[59a], A. Sahu[179], M. Saimpert[44], M. Saito[160], T. Saito[160], H. Sakamoto[160], A. Sakharov[122,an], D. Salamani[52], G. Salamanna[72a,72b], J. E. Salazar Loyola[144b], D. Salek[118], P. H. Sales De Bruin[169], D. Salihagic[113], A. Salnikov[150], J. Salt[171], D. Salvatore[40a,40b], F. Salvatore[153], A. Salvucci[61a,61b,61c], A. Salzburger[35], J. Samarati[35], D. Sammel[50], D. Sampsonidis[159], D. Sampsonidou[159], J. Sánchez[171], A. Sanchez Pineda[64a,64c], H. Sandaker[131], C. O. Sander[44], M. Sandhoff[179], C. Sandoval[22], D. P. C. Sankey[141], M. Sannino[53a,53b], Y. Sano[115], A. Sansoni[49], C. Santoni[37], H. Santos[137a], I. Santoyo Castillo[153], A. Santra[171], A. Sapronov[77], J. G. Saraiva[137a,137d], O. Sasaki[79], K. Sato[166], E. Sauvan[5], P. Savard[164,av], N. Savic[113], R. Sawada[160], C. Sawyer[141], L. Sawyer[93,al], C. Sbarra[23b], A. Sbrizzi[23a], T. Scanlon[92], J. Schaarschmidt[145], P. Schacht[113], B. M. Schachtner[112], D. Schaefer[36], L. Schaefer[134], J. Schaeffer[97], S. Schaepe[35], U. Schäfer[97], A. C. Schaffer[129], D. Schaile[112], R. D. Schamberger[152], N. Scharmberg[98], V. A. Schegelsky[135], D. Scheirich[140], F. Schenck[19], M. Schernau[168], C. Schiavi[53a,53b], S. Schier[143], L. K. Schildgen[24], Z. M. Schillaci[26], E. J. Schioppa[35], M. Schioppa[40a,40b], K. E. Schleicher[50], S. Schlenker[35], K. R. Schmidt-Sommerfeld[113], K. Schmieden[35], C. Schmitt[97], S. Schmitt[44], S. Schmitz[97], J. C. Schmoeckel[44], U. Schnoor[50], L. Schoeffel[142], A. Schoening[59b], E. Schopf[24], M. Schott[97], J. F. P. Schouwenberg[117], J. Schovancova[35], S. Schramm[52], A. Schulte[97], H.-C. Schultz-Coulon[59a], M. Schumacher[50], B. A. Schumm[143], Ph. Schune[142], A. Schwartzman[150], T. A. Schwarz[103], Ph. Schwemling[142], R. Schwienhorst[104], A. Sciandra[24], G. Sciolla[26], M. Scornajenghi[40a,40b], F. Scuri[69a], F. Scutti[102], L. M. Scyboz[113], J. Searcy[103], C. D. Sebastiani[70a,70b], P. Seema[19], S. C. Seidel[116], A. Seiden[143], T. Seiss[36], J. M. Seixas[78b], G. Sekhniaidze[67a], K. Sekhon[103], S. J. Sekula[41], N. Semprini-Cesari[23a,23b], S. Sen[47], S. Senkin[37],

C. Serfon[131], L. Serin[129], L. Serkin[64a,64b], M. Sessa[58a], H. Severini[125], F. Sforza[167], A. Sfyrla[52], E. Shabalina[51], J. D. Shahinian[143], N. W. Shaikh[43a,43b], L. Y. Shan[15a], R. Shang[170], J. T. Shank[25], M. Shapiro[18], A. S. Sharma[1], A. Sharma[132], P. B. Shatalov[109], K. Shaw[153], S. M. Shaw[98], A. Shcherbakova[135], Y. Shen[125], N. Sherafati[33], A. D. Sherman[25], P. Sherwood[92], L. Shi[155,ar], S. Shimizu[79], C. O. Shimmin[180], M. Shimojima[114], I. P. J. Shipsey[132], S. Shirabe[85], M. Shiyakova[77], J. Shlomi[177], A. Shmeleva[108], D. Shoaleh Saadi[107], M. J. Shochet[36], S. Shojaii[102], D. R. Shope[125], S. Shrestha[123], E. Shulga[110], P. Sicho[138], A. M. Sickles[170], P. E. Sidebo[151], E. Sideras Haddad[32c], O. Sidiropoulou[35], A. Sidoti[23a,23b], F. Siegert[46], Dj. Sijacki[16], J. Silva[137a], M. Silva Jr.[178], M. V. Silva Oliveira[78a], S. B. Silverstein[43a], L. Simic[77], S. Simion[129], E. Simioni[97], M. Simon[97], R. Simoniello[97], P. Sinervo[164], N. B. Sinev[128], M. Sioli[23a,23b], G. Siragusa[174], I. Siral[103], S. Yu. Sivoklokov[111], J. Sjölin[43a,43b], P. Skubic[125], M. Slater[21], T. Slavicek[139], M. Slawinska[82], K. Sliwa[167], R. Slovak[140], V. Smakhtin[177], B. H. Smart[5], J. Smiesko[28a], N. Smirnov[110], S. Yu. Smirnov[110], Y. Smirnov[110], L. N. Smirnova[111], O. Smirnova[94], J. W. Smith[51], M. N. K. Smith[38], M. Smizanska[87], K. Smolek[139], A. Smykiewicz[82], A. A. Snesarev[108], I. M. Snyder[128], S. Snyder[29], R. Sobie[173,ae], A. M. Soffa[168], A. Soffer[158], A. Søgaard[48], D. A. Soh[155], G. Sokhrannyi[89], C. A. Solans Sanchez[35], M. Solar[139], E. Yu. Soldatov[110], U. Soldevila[171], A. A. Solodkov[121], A. Soloshenko[77], O. V. Solovyanov[121], V. Solovyev[135], P. Sommer[146], H. Son[167], W. Song[141], W. Y. Song[165b], A. Sopczak[139], F. Sopkova[28b], C. L. Sotiropoulou[69a,69b], S. Sottocornola[68a,68b], R. Soualah[64a,64c,j], A. M. Soukharev[120a,120b], D. South[44], B. C. Sowden[91], S. Spagnolo[65a,65b], M. Spalla[113], M. Spangenberg[175], F. Spanò[91], D. Sperlich[19], F. Spettel[113], T. M. Spieker[59a], R. Spighi[23b], G. Spigo[35], L. A. Spiller[102], D. P. Spiteri[55], M. Spousta[140], A. Stabile[66a,66b], R. Stamen[59a], S. Stamm[19], E. Stanecka[82], R. W. Stanek[6], C. Stanescu[72a], B. Stanislaus[132], M. M. Stanitzki[44], B. Stapf[118], S. Stapnes[131], E. A. Starchenko[121], G. H. Stark[36], J. Stark[56], S. H Stark[39], P. Staroba[138], P. Starovoitov[59a], S. Stärz[35], R. Staszewski[82], M. Stegler[44], P. Steinberg[29], B. Stelzer[149], H. J. Stelzer[35], O. Stelzer-Chilton[165a], H. Stenzel[54], T. J. Stevenson[90], G. A. Stewart[35], M. C. Stockton[128], G. Stoicea[27b], P. Stolte[51], S. Stonjek[113], A. Straessner[46], J. Strandberg[151], S. Strandberg[43a,43b], M. Strauss[125], P. Strizenec[28b], R. Ströhmer[174], D. M. Strom[128], R. Stroynowski[41], A. Strubig[48], S. A. Stucci[29], B. Stugu[17], J. Stupak[125], N. A. Styles[44], D. Su[150], J. Su[136], S. Suchek[59a], Y. Sugaya[130], M. Suk[139], V. V. Sulin[108], D. M. S. Sultan[52], S. Sultansoy[4c], T. Sumida[83], S. Sun[103], X. Sun[3], K. Suruliz[153], C. J. E. Suster[154], M. R. Sutton[153], S. Suzuki[79], M. Svatos[138], M. Swiatlowski[36], S. P. Swift[2], A. Sydorenko[97], I. Sykora[28a], T. Sykora[140], D. Ta[97], K. Tackmann[44,ab], J. Taenzer[158], A. Taffard[168], R. Tafirout[165a], E. Tahirovic[90], N. Taiblum[158], H. Takai[29], R. Takashima[84], E. H. Takasugi[113], K. Takeda[80], T. Takeshita[147], Y. Takubo[79], M. Talby[99], A. A. Talyshev[120a,120b], J. Tanaka[160], M. Tanaka[162], R. Tanaka[129], B. B. Tannenwald[123], S. Tapia Araya[144b], S. Tapprogge[97], A. Tarek Abouelfadl Mohamed[133], S. Tarem[157], G. Tarna[27b,e], G. F. Tartarelli[66a], P. Tas[140], M. Tasevsky[138], T. Tashiro[83], E. Tassi[40a,40b], A. Tavares Delgado[137a,137b], Y. Tayalati[34e], A. C. Taylor[116], A. J. Taylor[48], G. N. Taylor[102], P. T. E. Taylor[102], W. Taylor[165b], A. S. Tee[87], P. Teixeira-Dias[91], H. Ten Kate[35], P. K. Teng[155], J. J. Teoh[118], S. Terada[79], K. Terashi[160], J. Terron[96], S. Terzo[14], M. Testa[49], R. J. Teuscher[164,ae], S. J. Thais[180], T. Theveneaux-Pelzer[44], F. Thiele[39], D. W. Thomas[91], J. P. Thomas[21], A. S. Thompson[55], P. D. Thompson[21], L. A. Thomsen[180], E. Thomson[134], Y. Tian[38], R. E. Ticse Torres[51], V. O. Tikhomirov[108,ap], Yu. A. Tikhonov[120a,120b], S. Timoshenko[110], P. Tipton[180], S. Tisserant[99], K. Todome[162], S. Todorova-Nova[5], S. Todt[46], J. Tojo[85], S. Tokár[28a], K. Tokushuku[79], E. Tolley[123], K. G. Tomiwa[32c], M. Tomoto[115], L. Tompkins[150,r], K. Toms[116], B. Tong[57], P. Tornambe[50], E. Torrence[128], H. Torres[46], E. Torró Pastor[145], C. Tosciri[132], J. Toth[99,ad], F. Touchard[99], D. R. Tovey[146], C. J. Treado[122], T. Trefzger[174], F. Tresoldi[153], A. Tricoli[29], I. M. Trigger[165a], S. Trincaz-Duvoid[133], M. F. Tripiana[14], W. Trischuk[164], B. Trocmé[56], A. Trofymov[129], C. Troncon[66a], M. Trovatelli[173], F. Trovato[153], L. Truong[32b], M. Trzebinski[82], A. Trzupek[82], F. Tsai[44], J. C.-L. Tseng[132], P. V. Tsiareshka[105], A. Tsirigotis[159], N. Tsirintanis[9], V. Tsiskaridze[152], E. G. Tskhadadze[156a], I. I. Tsukerman[109], V. Tsulaia[18], S. Tsuno[79], D. Tsybychev[152,163], Y. Tu[61b], A. Tudorache[27b], V. Tudorache[27b], T. T. Tulbure[27a], A. N. Tuna[57], S. Turchikhin[77], D. Turgeman[177], I. Turk Cakir[4b,v], R. Turra[66a], P. M. Tuts[38], E. Tzovara[97], G. Ucchielli[23a,23b], I. Ueda[79], M. Ughetto[43a,43b], F. Ukegawa[166], G. Unal[35], A. Undrus[29], G. Unel[168], F. C. Ungaro[102], Y. Unno[79], K. Uno[160], J. Urban[28b], P. Urquijo[102], P. Urrejola[97], G. Usai[8], J. Usui[79], L. Vacavant[99], V. Vacek[139], B. Vachon[101], K. O. H. Vadla[131], A. Vaidya[92], C. Valderanis[112], E. Valdes Santurio[43a,43b], M. Valente[52], S. Valentinetti[23a,23b], A. Valero[171], L. Valéry[44], R. A. Vallance[21], A. Vallier[5], J. A. Valls Ferrer[171], T. R. Van Daalen[14], H. Van der Graaf[118], P. Van Gemmeren[6], J. Van Nieuwkoop[149], I. Van Vulpen[118], M. Vanadia[71a,71b], W. Vandelli[35], A. Vaniachine[163], P. Vankov[118], R. Vari[70a], E. W. Varnes[7], C. Varni[53a,53b], T. Varol[41], D. Varouchas[129], K. E. Varvell[154], G. A. Vasquez[144b], J. G. Vasquez[180], F. Vazeille[37], D. Vazquez Furelos[14], T. Vazquez Schroeder[101], J. Veatch[51], V. Vecchio[72a,72b], L. M. Veloce[164], F. Veloso[137a,137c], S. Veneziano[70a], A. Ventura[65a,65b], M. Venturi[173], N. Venturi[35], V. Vercesi[68a], M. Verducci[72a,72b], C. M. Vergel Infante[76], C. Vergis[24], W. Verkerke[118], A. T. Vermeulen[118], J. C. Vermeulen[118], M. C. Vetterli[149,av], N. Viaux Maira[144b], M. Vicente Barreto Pinto[52], I. Vichou[170,*], T. Vickey[146], O. E. Vickey Boeriu[146], G. H. A. Viehhauser[132], S. Viel[18], L. Vigani[132], M. Villa[23a,23b], M. Villaplana Perez[66a,66b],

E. Vilucchi[49], M. G. Vincter[33], V. B. Vinogradov[77], A. Vishwakarma[44], C. Vittori[23a,23b], I. Vivarelli[153], S. Vlachos[10], M. Vogel[179], P. Vokac[139], G. Volpi[14], S. E. Von Buddenbrock[32c], E. von Toerne[24], V. Vorobel[140], K. Vorobev[110], M. Vos[171], J. H. Vossebeld[88], N. Vranjes[16], M. Vranjes Milosavljevic[16], V. Vrba[139], M. Vreeswijk[118], T. Šfiligoj[89], R. Vuillermet[35], I. Vukotic[36], T. Ženiš[28a], L. Živković[16], P. Wagner[24], W. Wagner[179], J. Wagner-Kuhr[112], H. Wahlberg[86], S. Wahrmund[46], K. Wakamiya[80], V. M. Walbrecht[113], J. Walder[87], R. Walker[112], S. D. Walker[91], W. Walkowiak[148], V. Wallangen[43a,43b], A. M. Wang[57], C. Wang[58b,e], F. Wang[178], H. Wang[18], H. Wang[3], J. Wang[154], J. Wang[59b], P. Wang[41], Q. Wang[125], R.-J. Wang[133], R. Wang[58a], R. Wang[6], S. M. Wang[155], T. Wang[58a], W. Wang[15c,af], W. X. Wang[58a,af], Y. Wang[58a,am], Z. Wang[58c], C. Wanotayaroj[44], A. Warburton[101], C. P. Ward[31], D. R. Wardrope[92], A. Washbrook[48], P. M. Watkins[21], A. T. Watson[21], M. F. Watson[21], G. Watts[145], S. Watts[98], B. M. Waugh[92], A. F. Webb[11], S. Webb[97], C. Weber[180], M. S. Weber[20], S. A. Weber[33], S. M. Weber[59a], A. R. Weidberg[132], B. Weinert[63], J. Weingarten[45], M. Weirich[97], C. Weiser[50], P. S. Wells[35], T. Wenaus[29], T. Wengler[35], S. Wenig[35], N. Wermes[24], M. D. Werner[76], P. Werner[35], M. Wessels[59a], T. D. Weston[20], K. Whalen[128], N. L. Whallon[145], A. M. Wharton[87], A. S. White[103], A. White[8], M. J. White[1], R. White[144b], D. Whiteson[168], B. W. Whitmore[87], F. J. Wickens[141], W. Wiedenmann[178], M. Wielers[141], C. Wiglesworth[39], L. A. M. Wiik-Fuchs[50], A. Wildauer[113], F. Wilk[98], H. G. Wilkens[35], L. J. Wilkins[91], H. H. Williams[134], S. Williams[31], C. Willis[104], S. Willocq[100], J. A. Wilson[21], I. Wingerter-Seez[5], E. Winkels[153], F. Winklmeier[128], O. J. Winston[153], B. T. Winter[24], M. Wittgen[150], M. Wobisch[93], A. Wolf[97], T. M. H. Wolf[118], R. Wolff[99], M. W. Wolter[82], H. Wolters[137a,137c], V. W. S. Wong[172], N. L. Woods[143], S. D. Worm[21], B. K. Wosiek[82], K. W. Woźniak[82], K. Wraight[55], M. Wu[36], S. L. Wu[178], X. Wu[52], Y. Wu[58a], T. R. Wyatt[98], B. M. Wynne[48], S. Xella[39], Z. Xi[103], L. Xia[175], D. Xu[15a], H. Xu[58a,e], L. Xu[29], T. Xu[142], W. Xu[103], B. Yabsley[154], S. Yacoob[32a], K. Yajima[130], D. P. Yallup[92], D. Yamaguchi[162], Y. Yamaguchi[162], A. Yamamoto[79], T. Yamanaka[160], F. Yamane[80], M. Yamatani[160], T. Yamazaki[160], Y. Yamazaki[80], Z. Yan[25], H. J. Yang[58c,58d], H. T. Yang[18], S. Yang[75], Y. Yang[160], Z. Yang[17], W-M. Yao[18], Y. C. Yap[44], Y. Yasu[79], E. Yatsenko[58c,58d], J. Ye[41], S. Ye[29], I. Yeletskikh[77], E. Yigitbasi[25], E. Yildirim[97], K. Yorita[176], K. Yoshihara[134], C. J. S. Young[35], C. Young[150], J. Yu[8], J. Yu[76], X. Yue[59a], S. P. Y. Yuen[24], B. Zabinski[82], G. Zacharis[10], E. Zaffaroni[52], R. Zaidan[14], A. M. Zaitsev[121,ao], T. Zakareishvili[156b], N. Zakharchuk[33], J. Zalieckas[17], S. Zambito[57], D. Zanzi[35], D. R. Zaripovas[55], S. V. Zeißner[45], C. Zeitnitz[179], G. Zemaityte[132], J. C. Zeng[170], Q. Zeng[150], O. Zenin[121], D. Zerwas[129], M. Zgubič[132], D. F. Zhang[58b], D. Zhang[103], F. Zhang[178], G. Zhang[58a], H. Zhang[15c], J. Zhang[6], L. Zhang[15c], L. Zhang[58a], M. Zhang[170], P. Zhang[15c], R. Zhang[58a], R. Zhang[24], X. Zhang[58b], Y. Zhang[15d], Z. Zhang[129], P. Zhao[47], X. Zhao[41], Y. Zhao[58b,129,ak], Z. Zhao[58a], A. Zhemchugov[77], B. Zhou[103], C. Zhou[178], L. Zhou[41], M. S. Zhou[15d], M. Zhou[152], N. Zhou[58c], Y. Zhou[7], C. G. Zhu[58b], H. L. Zhu[58a], H. Zhu[15a], J. Zhu[103], Y. Zhu[58a], X. Zhuang[15a], K. Zhukov[108], V. Zhulanov[120a,120b], A. Zibell[174], D. Zieminska[63], N. I. Zimine[77], S. Zimmermann[50], Z. Zinonos[113], M. Zinser[97], M. Ziolkowski[148], G. Zobernig[178], A. Zoccoli[23a,23b], K. Zoch[51], T. G. Zorbas[146], R. Zou[36], M. Zur Nedden[19], L. Zwalinski[35]

[1] Department of Physics, University of Adelaide, Adelaide, Australia
[2] Physics Department, SUNY Albany, Albany, NY, USA
[3] Department of Physics, University of Alberta, Edmonton, AB, Canada
[4] [(a)]Department of Physics, Ankara University, Ankara, Turkey; [(b)]Istanbul Aydin University, Istanbul, Turkey; [(c)]Division of Physics, 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, USA
[7] Department of Physics, University of Arizona, Tucson, AZ, USA
[8] Department of Physics, University of Texas at Arlington, Arlington, TX, USA
[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, USA
[12] [(a)]Faculty of Engineering and Natural Sciences, Bahcesehir University, Istanbul, Turkey; [(b)]Faculty of Engineering and Natural Sciences, Istanbul Bilgi University, Istanbul, Turkey; [(c)]Department of Physics, Bogazici University, Istanbul, Turkey; [(d)]Department of Physics Engineering, 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] [(a)]Institute of High Energy Physics, Chinese Academy of Sciences, Beijing, China; [(b)]Physics Department, Tsinghua University, Beijing, China; [(c)]Department of Physics, Nanjing University, Nanjing, China; [(d)]University of Chinese Academy of Science (UCAS), 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, USA
[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, UK
[22] Centro de Investigaciónes, Universidad Antonio Nariño, Bogotá, Colombia
[23] [(a)]Dipartimento di Fisica e Astronomia, Università di Bologna, Bologna, Italy; [(b)]INFN Sezione di Bologna, Bologna, Italy
[24] Physikalisches Institut, Universität Bonn, Bonn, Germany
[25] Department of Physics, Boston University, Boston, MA, USA
[26] Department of Physics, Brandeis University, Waltham, MA, USA
[27] [(a)]Transilvania University of Brasov, Brasov, Romania; [(b)]Horia Hulubei National Institute of Physics and Nuclear Engineering, Bucharest, Romania; [(c)]Department of Physics, Alexandru Ioan Cuza University of Iasi, Iasi, Romania; [(d)]Physics Department, National Institute for Research and Development of Isotopic and Molecular Technologies, Cluj-Napoca, Romania; [(e)]University Politehnica Bucharest, Bucharest, Romania; [(f)]West University in Timisoara, Timisoara, Romania
[28] [(a)]Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava, Slovakia; [(b)]Department of Subnuclear Physics, Institute of Experimental Physics of the Slovak Academy of Sciences, Kosice, Slovak Republic
[29] Physics Department, Brookhaven National Laboratory, Upton, NY, USA
[30] Departamento de Física, Universidad de Buenos Aires, Buenos Aires, Argentina
[31] Cavendish Laboratory, University of Cambridge, Cambridge, UK
[32] [(a)]Department of Physics, University of Cape Town, Cape Town, South Africa; [(b)]Department of Mechanical Engineering Science, University of Johannesburg, Johannesburg, South Africa; [(c)]School of Physics, University of the Witwatersrand, Johannesburg, South Africa
[33] Department of Physics, Carleton University, Ottawa, ON, Canada
[34] [(a)]Faculté des Sciences Ain Chock, Réseau Universitaire de Physique des Hautes Energies-Université Hassan II, Casablanca, Morocco; [(b)]Centre National de l'Energie des Sciences Techniques Nucleaires (CNESTEN), Rabat, Morocco; [(c)]Faculté des Sciences Semlalia, Université Cadi Ayyad, LPHEA-Marrakech, Marrakech, Morocco; [(d)]Faculté des Sciences, Université Mohamed Premier and LPTPM, Oujda, Morocco; [(e)]Faculté des sciences, Université Mohammed V, Rabat, Morocco
[35] CERN, Geneva, Switzerland
[36] Enrico Fermi Institute, University of Chicago, Chicago, IL, USA
[37] LPC, Université Clermont Auvergne, CNRS/IN2P3, Clermont-Ferrand, France
[38] Nevis Laboratory, Columbia University, Irvington, NY, USA
[39] Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark
[40] [(a)]Dipartimento di Fisica, Università della Calabria, Rende, Italy; [(b)]INFN Gruppo Collegato di Cosenza, Laboratori Nazionali di Frascati, Frascati, Italy
[41] Physics Department, Southern Methodist University, Dallas, TX, USA
[42] Physics Department, University of Texas at Dallas, Richardson, TX, USA
[43] [(a)]Department of Physics, Stockholm University, Stockholm, Sweden; [(b)]Oskar Klein Centre, Stockholm, Sweden
[44] Deutsches Elektronen-Synchrotron DESY, Hamburg and Zeuthen, Germany
[45] Lehrstuhl für Experimentelle Physik IV, Technische Universität Dortmund, Dortmund, Germany
[46] Institut für Kern- und Teilchenphysik, Technische Universität Dresden, Dresden, Germany
[47] Department of Physics, Duke University, Durham, NC, USA
[48] SUPA-School of Physics and Astronomy, University of Edinburgh, Edinburgh, UK
[49] INFN e Laboratori Nazionali di Frascati, Frascati, Italy
[50] Physikalisches Institut, Albert-Ludwigs-Universität Freiburg, Freiburg, Germany
[51] II. Physikalisches Institut, Georg-August-Universität Göttingen, Göttingen, Germany
[52] Département de Physique Nucléaire et Corpusculaire, Université de Genève, Geneva, Switzerland
[53] [(a)]Dipartimento di Fisica, Università di Genova, Genoa, Italy; [(b)]INFN Sezione di Genova, Genoa, Italy
[54] II. Physikalisches Institut, Justus-Liebig-Universität Giessen, Giessen, Germany
[55] SUPA-School of Physics and Astronomy, University of Glasgow, Glasgow, UK

[56] LPSC, Université Grenoble Alpes, CNRS/IN2P3, Grenoble INP, Grenoble, France
[57] Laboratory for Particle Physics and Cosmology, Harvard University, Cambridge, MA, USA
[58] [(a)]Department of Modern Physics and State Key Laboratory of Particle Detection and Electronics, University of Science and Technology of China, Hefei, China; [(b)]Institute of Frontier and Interdisciplinary Science and Key Laboratory of Particle Physics and Particle Irradiation (MOE), Shandong University, Qingdao, China; [(c)]School of Physics and Astronomy, Shanghai Jiao Tong University, KLPPAC-MoE, SKLPPC, Shanghai, China; [(d)]Tsung-Dao Lee Institute, Shanghai, China
[59] [(a)]Kirchhoff-Institut für Physik, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany; [(b)]Physikalisches Institut, Ruprecht-Karls-Universität Heidelberg, Heidelberg, Germany
[60] Faculty of Applied Information Science, Hiroshima Institute of Technology, Hiroshima, Japan
[61] [(a)]Department of Physics, Chinese University of Hong Kong, Shatin, NT, Hong Kong; [(b)]Department of Physics, University of Hong Kong, Hong Kong, China; [(c)]Department of Physics and Institute for Advanced Study, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, China
[62] Department of Physics, National Tsing Hua University, Hsinchu, Taiwan
[63] Department of Physics, Indiana University, Bloomington, IN, USA
[64] [(a)]INFN Gruppo Collegato di Udine, Sezione di Trieste, Udine, Italy; [(b)]ICTP, Trieste, Italy; [(c)]Dipartimento di Chimica, Fisica e Ambiente, Università di Udine, Udine, Italy
[65] [(a)]INFN Sezione di Lecce, Lecce, Italy; [(b)]Dipartimento di Matematica e Fisica, Università del Salento, Lecce, Italy
[66] [(a)]INFN Sezione di Milano, Milan, Italy; [(b)]Dipartimento di Fisica, Università di Milano, Milan, Italy
[67] [(a)]INFN Sezione di Napoli, Naples, Italy; [(b)]Dipartimento di Fisica, Università di Napoli, Naples, Italy
[68] [(a)]INFN Sezione di Pavia, Pavia, Italy; [(b)]Dipartimento di Fisica, Università di Pavia, Pavia, Italy
[69] [(a)]INFN Sezione di Pisa, Pisa, Italy; [(b)]Dipartimento di Fisica E. Fermi, Università di Pisa, Pisa, Italy
[70] [(a)]INFN Sezione di Roma, Rome, Italy; [(b)]Dipartimento di Fisica, Sapienza Università di Roma, Rome, Italy
[71] [(a)]INFN Sezione di Roma Tor Vergata, Rome, Italy; [(b)]Dipartimento di Fisica, Università di Roma Tor Vergata, Rome, Italy
[72] [(a)]INFN Sezione di Roma Tre, Rome, Italy; [(b)]Dipartimento di Matematica e Fisica, Università Roma Tre, Rome, Italy
[73] [(a)]INFN-TIFPA, Povo, Italy; [(b)]Università degli Studi di Trento, Trento, Italy
[74] Institut für Astro- und Teilchenphysik, Leopold-Franzens-Universität, Innsbruck, Austria
[75] University of Iowa, Iowa City, IA, USA
[76] Department of Physics and Astronomy, Iowa State University, Ames, IA, USA
[77] Joint Institute for Nuclear Research, Dubna, Russia
[78] [(a)]Departamento de Engenharia Elétrica, Universidade Federal de Juiz de Fora (UFJF), Juiz de Fora, Brazil; [(b)]Universidade Federal do Rio De Janeiro COPPE/EE/IF, Rio de Janeiro, Brazil; [(c)]Universidade Federal de São João del Rei (UFSJ), São João del Rei, Brazil; [(d)]Instituto de Física, Universidade de São Paulo, São Paulo, Brazil
[79] KEK, High Energy Accelerator Research Organization, Tsukuba, Japan
[80] Graduate School of Science, Kobe University, Kobe, Japan
[81] [(a)]Faculty of Physics and Applied Computer Science, AGH University of Science and Technology, Kraków, Poland; [(b)]Marian Smoluchowski Institute of Physics, Jagiellonian University, Kraków, Poland
[82] Institute of Nuclear Physics Polish Academy of Sciences, Kraków, Poland
[83] Faculty of Science, Kyoto University, Kyoto, Japan
[84] Kyoto University of Education, Kyoto, Japan
[85] Research Center for Advanced Particle Physics and Department of Physics, Kyushu University, Fukuoka, Japan
[86] Instituto de Física La Plata, Universidad Nacional de La Plata and CONICET, La Plata, Argentina
[87] Physics Department, Lancaster University, Lancaster, UK
[88] Oliver Lodge Laboratory, University of Liverpool, Liverpool, UK
[89] Department of Experimental Particle Physics, Jožef Stefan Institute and Department of Physics, University of Ljubljana, Ljubljana, Slovenia
[90] School of Physics and Astronomy, Queen Mary University of London, London, UK
[91] Department of Physics, Royal Holloway University of London, Egham, UK
[92] Department of Physics and Astronomy, University College London, London, UK
[93] Louisiana Tech University, Ruston, LA, USA
[94] Fysiska institutionen, Lunds universitet, Lund, Sweden

[95] Centre de Calcul de l'Institut National de Physique Nucléaire et de Physique des Particules (IN2P3), Villeurbanne, France
[96] Departamento de Física Teorica C-15 and CIAFF, Universidad Autónoma de Madrid, Madrid, Spain
[97] Institut für Physik, Universität Mainz, Mainz, Germany
[98] School of Physics and Astronomy, University of Manchester, Manchester, UK
[99] CPPM, Aix-Marseille Université, CNRS/IN2P3, Marseille, France
[100] Department of Physics, University of Massachusetts, Amherst, MA, USA
[101] Department of Physics, McGill University, Montreal, QC, Canada
[102] School of Physics, University of Melbourne, Parkville, VIC, Australia
[103] Department of Physics, University of Michigan, Ann Arbor, MI, USA
[104] Department of Physics and Astronomy, Michigan State University, East Lansing, MI, USA
[105] B.I. Stepanov Institute of Physics, National Academy of Sciences of Belarus, Minsk, Belarus
[106] Research Institute for Nuclear Problems of Byelorussian State University, Minsk, Belarus
[107] Group of Particle Physics, University of Montreal, Montreal, QC, Canada
[108] P.N. Lebedev Physical Institute of the Russian Academy of Sciences, Moscow, Russia
[109] Institute for Theoretical and Experimental Physics (ITEP), Moscow, Russia
[110] National Research Nuclear University MEPhI, Moscow, Russia
[111] D.V. Skobeltsyn Institute of Nuclear Physics, M.V. Lomonosov Moscow State University, Moscow, Russia
[112] Fakultät für Physik, Ludwig-Maximilians-Universität München, Munich, Germany
[113] Max-Planck-Institut für Physik (Werner-Heisenberg-Institut), Munich, Germany
[114] Nagasaki Institute of Applied Science, Nagasaki, Japan
[115] Graduate School of Science and Kobayashi-Maskawa Institute, Nagoya University, Nagoya, Japan
[116] Department of Physics and Astronomy, University of New Mexico, Albuquerque, NM, USA
[117] Institute for Mathematics, Astrophysics and Particle Physics, Radboud University Nijmegen/Nikhef, Nijmegen, The Netherlands
[118] Nikhef National Institute for Subatomic Physics, University of Amsterdam, Amsterdam, The Netherlands
[119] Department of Physics, Northern Illinois University, De Kalb, IL, USA
[120] [(a)]Budker Institute of Nuclear Physics and NSU, SB RAS, Novosibirsk, Russia; [(b)]Novosibirsk State University, Novosibirsk, Russia
[121] Institute for High Energy Physics of the National Research Centre Kurchatov Institute, Protvino, Russia
[122] Department of Physics, New York University, New York, NY, USA
[123] Ohio State University, Columbus, OH, USA
[124] Faculty of Science, Okayama University, Okayama, Japan
[125] Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma, Norman, OK, USA
[126] Department of Physics, Oklahoma State University, Stillwater, OK, USA
[127] Palacký University, RCPTM, Joint Laboratory of Optics, Olomouc, Czech Republic
[128] Center for High Energy Physics, University of Oregon, Eugene, OR, USA
[129] LAL, Université Paris-Sud, CNRS/IN2P3, Université Paris-Saclay, Orsay, France
[130] Graduate School of Science, Osaka University, Osaka, Japan
[131] Department of Physics, University of Oslo, Oslo, Norway
[132] Department of Physics, Oxford University, Oxford, UK
[133] LPNHE, Sorbonne Université, Paris Diderot Sorbonne Paris Cité, CNRS/IN2P3, Paris, France
[134] Department of Physics, University of Pennsylvania, Philadelphia, PA, USA
[135] Konstantinov Nuclear Physics Institute of National Research Centre "Kurchatov Institute", PNPI, St. Petersburg, Russia
[136] Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA, USA
[137] [(a)]Laboratório de Instrumentação e Física Experimental de Partículas-LIP, Lisbon, Portugal; [(b)]Departamento de Física, Faculdade de Ciências, Universidade de Lisboa, Lisbon, Portugal; [(c)]Departamento de Física, Universidade de Coimbra, Coimbra, Portugal; [(d)]Centro de Física Nuclear da Universidade de Lisboa, Lisbon, Portugal; [(e)]Departamento de Física, Universidade do Minho, Braga, Portugal; [(f)]Departamento de Física Teorica y del Cosmos, Universidad de Granada, Granada, Spain; [(g)]Dep Física and CEFITEC of Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Caparica, Portugal
[138] Institute of Physics, Academy of Sciences of the Czech Republic, Prague, Czech Republic
[139] Czech Technical University in Prague, Prague, Czech Republic

[140] Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic
[141] Particle Physics Department, Rutherford Appleton Laboratory, Didcot, UK
[142] IRFU, CEA, Université Paris-Saclay, Gif-sur-Yvette, France
[143] Santa Cruz Institute for Particle Physics, University of California Santa Cruz, Santa Cruz, CA, USA
[144] [(a)]Departamento de Física, Pontificia Universidad Católica de Chile, Santiago, Chile; [(b)]Departamento de Física, Universidad Técnica Federico Santa María, Valparaiso, Chile
[145] Department of Physics, University of Washington, Seattle, WA, USA
[146] Department of Physics and Astronomy, University of Sheffield, Sheffield, UK
[147] Department of Physics, Shinshu University, Nagano, Japan
[148] Department Physik, Universität Siegen, Siegen, Germany
[149] Department of Physics, Simon Fraser University, Burnaby, BC, Canada
[150] SLAC National Accelerator Laboratory, Stanford, CA, USA
[151] Physics Department, Royal Institute of Technology, Stockholm, Sweden
[152] Departments of Physics and Astronomy, Stony Brook University, Stony Brook, NY, USA
[153] Department of Physics and Astronomy, University of Sussex, Brighton, UK
[154] School of Physics, University of Sydney, Sydney, Australia
[155] Institute of Physics, Academia Sinica, Taipei, Taiwan
[156] [(a)]E. Andronikashvili Institute of Physics, Iv. Javakhishvili Tbilisi State University, Tbilisi, Georgia; [(b)]High Energy Physics Institute, Tbilisi State University, Tbilisi, Georgia
[157] Department of Physics, Technion, Israel Institute of Technology, Haifa, Israel
[158] Raymond and Beverly Sackler School of Physics and Astronomy, Tel Aviv University, Tel Aviv, Israel
[159] Department of Physics, Aristotle University of Thessaloniki, Thessaloníki, Greece
[160] International Center for Elementary Particle Physics and Department of Physics, University of Tokyo, Tokyo, Japan
[161] Graduate School of Science and Technology, Tokyo Metropolitan University, Tokyo, Japan
[162] Department of Physics, Tokyo Institute of Technology, Tokyo, Japan
[163] Tomsk State University, Tomsk, Russia
[164] Department of Physics, University of Toronto, Toronto, ON, Canada
[165] [(a)]TRIUMF, Vancouver, BC, Canada; [(b)]Department of Physics and Astronomy, York University, Toronto, ON, Canada
[166] Division of Physics and Tomonaga Center for the History of the Universe, Faculty of Pure and Applied Sciences, University of Tsukuba, Tsukuba, Japan
[167] Department of Physics and Astronomy, Tufts University, Medford, MA, USA
[168] Department of Physics and Astronomy, University of California Irvine, Irvine, CA, USA
[169] Department of Physics and Astronomy, University of Uppsala, Uppsala, Sweden
[170] Department of Physics, University of Illinois, Urbana, IL, USA
[171] Instituto de Física Corpuscular (IFIC), Centro Mixto Universidad de Valencia, CSIC, Valencia, Spain
[172] Department of Physics, University of British Columbia, Vancouver, BC, Canada
[173] Department of Physics and Astronomy, University of Victoria, Victoria, BC, Canada
[174] Fakultät für Physik und Astronomie, Julius-Maximilians-Universität Würzburg, Würzburg, Germany
[175] Department of Physics, University of Warwick, Coventry, UK
[176] Waseda University, Tokyo, Japan
[177] Department of Particle Physics, Weizmann Institute of Science, Rehovot, Israel
[178] Department of Physics, University of Wisconsin, Madison, WI, USA
[179] Fakultät für Mathematik und Naturwissenschaften, Fachgruppe Physik, Bergische Universität Wuppertal, Wuppertal, Germany
[180] Department of Physics, Yale University, New Haven, CT, USA
[181] Yerevan Physics Institute, Yerevan, Armenia

[a] Also at Borough of Manhattan Community College, City University of New York, NY, USA
[b] Also at California State University, East Bay, USA
[c] Also at Centre for High Performance Computing, CSIR Campus, Rosebank, Cape Town, South Africa
[d] Also at CERN, Geneva, Switzerland
[e] Also at CPPM, Aix-Marseille Université, CNRS/IN2P3, Marseille, France
[f] Also at Département de Physique Nucléaire et Corpusculaire, Université de Genève, Geneva, Switzerland

[g] Also at Departament de Fisica de la Universitat Autonoma de Barcelona, Barcelona, Spain
[h] Also at Departamento de Física Teorica y del Cosmos, Universidad de Granada, Granada (Spain), Spain
[i] Also at Departamento de Física, Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal
[j] Also at Department of Applied Physics and Astronomy, University of Sharjah, Sharjah, United Arab Emirates
[k] Also at Department of Financial and Management Engineering, University of the Aegean, Chios, Greece
[l] Also at Department of Physics and Astronomy, University of Louisville, Louisville, KY, USA
[m] Also at Department of Physics and Astronomy, University of Sheffield, Sheffield, UK
[n] Also at Department of Physics, California State University, Fresno, CA, USA
[o] Also at Department of Physics, California State University, Sacramento, CA, USA
[p] Also at Department of Physics, King's College London, London, UK
[q] Also at Department of Physics, St. Petersburg State Polytechnical University, St. Petersburg, Russia
[r] Also at Department of Physics, Stanford University, USA
[s] Also at Department of Physics, University of Fribourg, Fribourg, Switzerland
[t] Also at Department of Physics, University of Michigan, Ann Arbor, MI, USA
[u] Also at Dipartimento di Fisica E. Fermi, Università di Pisa, Pisa, Italy
[v] Also at Giresun University, Faculty of Engineering, Giresun, Turkey
[w] Also at Graduate School of Science, Osaka University, Osaka, Japan
[x] Also at Hellenic Open University, Patras, Greece
[y] Also at Horia Hulubei National Institute of Physics and Nuclear Engineering, Bucharest, Romania
[z] Also at II Physikalisches Institut, Georg-August-Universität Göttingen, Göttingen, Germany
[aa] Also at Institucio 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, The Netherlands
[ad] Also at Institute for Particle and Nuclear Physics, Wigner Research Centre for Physics, Budapest, Hungary
[ae] Also at Institute of Particle Physics (IPP), Canada
[af] Also at Institute of Physics, Academia Sinica, Taipei, Taiwan
[ag] Also at Institute of Physics, Azerbaijan Academy of Sciences, Baku, Azerbaijan
[ah] Also at Institute of Theoretical Physics, Ilia State University, Tbilisi, Georgia
[ai] Also at Instituto de Física Teórica de la Universidad Autónoma de Madrid, Spain
[aj] Also at Istanbul University, Dept. of Physics, Istanbul, Turkey
[ak] Also at LAL, Université Paris-Sud, CNRS/IN2P3, Université Paris-Saclay, Orsay, France
[al] Also at Louisiana Tech University, Ruston, LA, USA
[am] Also at LPNHE, Sorbonne Université, Paris Diderot Sorbonne Paris Cité, CNRS/IN2P3, Paris, France
[an] Also at Manhattan College, New York, NY, USA
[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 Physikalisches Institut, Albert-Ludwigs-Universität Freiburg, Freiburg, Germany
[ar] Also at School of Physics, Sun Yat-sen University, Guangzhou, China
[as] Also at The City College of New York, New York, NY, USA
[at] Also at The Collaborative Innovation Center of Quantum Matter (CICQM), Beijing, China
[au] Also at Tomsk State University, Tomsk, and Moscow Institute of Physics and Technology State University, Dolgoprudny, Russia
[av] Also at TRIUMF, Vancouver, BC, Canada
[aw] Also at Universita di Napoli Parthenope, Naples, Italy
* Deceased