



Measurement of W -boson helicity fractions in top-quark decays using $\cos\theta^*$

CDF Collaboration

T. Aaltonen^x, J. Adelmanⁿ, T. Akimoto^{bd}, B. Álvarez González^{l,1}, S. Amerio^{ar}, D. Amidei^{ai}, A. Anastassov^{am}, A. Annovi^t, J. Antos^o, G. Apollinari^r, A. Apresyan^{aw}, T. Arisawa^{bf}, A. Artikov^p, W. Ashmanskas^r, A. Attal^d, A. Aurisano^{bb}, F. Azfar^{aq}, W. Badgett^r, A. Barbaro-Galtieri^{ac}, V.E. Barnes^{aw}, B.A. Barnett^z, P. Barria^{au}, V. Bartsch^{ae}, G. Bauer^{ag}, P.-H. Beauchemin^{ah}, F. Bedeschi^{au}, D. Beecher^{ae}, S. Behari^z, G. Bellettini^{au}, J. Bellinger^{bh}, D. Benjamin^q, A. Beretvas^r, J. Beringer^{ac}, A. Bhatti^{ay}, M. Binkley^r, D. Bisello^{ar}, I. Bizjak^{ae,2}, R.E. Blair^b, C. Blocker^g, B. Blumenfeld^z, A. Bocci^q, A. Bodek^{ax}, V. Boisvert^{ax}, G. Bolla^{aw}, D. Bortoletto^{aw}, J. Boudreau^{av}, A. Boveia^k, B. Brau^{k,3}, A. Bridgeman^y, L. Brigliadori^f, C. Bromberg^{aj}, E. Brubakerⁿ, J. Budagov^p, H.S. Budd^{ax}, S. Budd^y, S. Burke^r, K. Burkett^r, G. Busetto^{ar}, P. Bussey^v, A. Buzatu^{ah}, K.L. Byrum^b, S. Cabrera^{q,4}, C. Calancha^{af}, M. Campanelli^{aj}, M. Campbell^{ai}, F. Canelli^{n,r}, A. Canepa^{at}, B. Carls^y, D. Carlsmith^{bh}, R. Carosi^{au}, S. Carrillo^{s,5}, S. Carron^{ah}, B. Casal^l, M. Casarsa^r, A. Castro^f, P. Catastini^{au}, D. Cauz^{bc}, V. Cavaliere^{au}, M. Cavalli-Sforza^d, A. Cerri^{ac}, L. Cerrito^{ae,6}, S.H. Chang^{ab}, Y.C. Chen^a, M. Chertok^h, G. Chiarelli^{au}, G. Chlachidze^r, F. Chlebana^r, K. Cho^{ab}, D. Chokheli^p, J.P. Chou^w, G. Choudalakis^{ag}, S.H. Chuang^{ba}, K. Chung^m, W.H. Chung^{bh}, Y.S. Chung^{ax}, T. Chwalek^{aa,*}, C.I. Ciobanu^{as}, M.A. Ciocci^{au}, A. Clark^u, D. Clark^g, G. Compostella^{ar}, M.E. Convery^r, J. Conway^h, M. Cordelli^t, G. Cortiana^{ar}, C.A. Cox^h, D.J. Cox^h, F. Crescioli^{au}, C. Cuenca Almenar^{h,4}, J. Cuevas^{l,1}, R. Culbertson^r, J.C. Cully^{ai}, D. Dagenhart^r, M. Datta^r, T. Davies^v, P. de Barbaro^{ax}, S. De Cecco^{az}, A. Deisher^{ac}, G. De Lorenzo^d, M. Dell'Orso^{au}, C. Deluca^d, L. Demortier^{ay}, J. Deng^q, M. Deninno^f, P.F. Derwent^r, A. Di Canto^{au}, G.P. di Giovanni^{as}, C. Dionisi^{az}, B. Di Ruzza^{bc}, J.R. Dittmann^e, M. D'Onofrio^d, S. Donati^{au}, P. Dongⁱ, J. Donini^{ar}, T. Dorigo^{ar}, S. Dube^{ba}, J. Efron^{an}, A. Elagin^{bb}, R. Erbacher^h, D. Errede^y, S. Errede^y, R. Eusebi^r, H.C. Fang^{ac}, S. Farrington^{aq}, W.T. Fedorkoⁿ, R.G. Feild^{bi}, M. Feindt^{aa}, J.P. Fernandez^{af}, C. Ferrazza^{au}, R. Field^s, G. Flanagan^{aw}, R. Forrest^h, M.J. Frank^e, M. Franklin^w, J.C. Freeman^r, I. Furic^s, M. Gallinaro^{az}, J. Galyardt^m, F. Garberon^k, J.E. Garcia^u, A.F. Garfinkel^{aw}, P. Garosi^{au}, K. Genser^r, H. Gerberich^y, D. Gerdes^{ai}, A. Gessler^{aa}, S. Giagu^{az}, V. Giakoumopoulou^c, P. Giannetti^{au}, K. Gibson^{av}, J.L. Gimmell^{ax}, C.M. Ginsburg^r, N. Giokaris^c, M. Giordani^{bc}, P. Giromini^t, M. Giunta^{au}, G. Giurgiu^z, V. Glagolev^p, D. Glenzinski^r, M. Gold^{al}, N. Goldschmidt^s, A. Golossanov^r, G. Gomez^l, G. Gomez-Ceballos^{ag}, M. Goncharov^{ag}, O. González^{af}, I. Gorelov^{al}, A.T. Goshaw^q, K. Goulianos^{ay}, A. Gresele^{ar}, S. Grinstein^w, C. Grosso-Pilcherⁿ, R.C. Group^r, U. Grundler^y, J. Guimaraes da Costa^w, Z. Gunay-Unalan^{aj}, C. Haber^{ac}, K. Hahn^{ag}, S.R. Hahn^r, E. Halkiadakis^{ba}, B.-Y. Han^{ax}, J.Y. Han^{ax}, F. Happacher^t, K. Hara^{bd}, D. Hare^{ba}, M. Hare^{be}, S. Harper^{aq}, R.F. Harr^{bg}, R.M. Harris^r, M. Hartz^{av}, K. Hatakeyama^{ay}, C. Hays^{aq}, M. Heck^{aa}, A. Heijboer^{at}, J. Heinrich^{at}, C. Henderson^{ag}, M. Herndon^{bh}, J. Heuser^{aa}, S. Hewamanage^e, D. Hidas^q, C.S. Hill^{k,7}, D. Hirschbuehl^{aa}, A. Hocker^r, S. Hou^a, M. Houlden^{ad}, S.-C. Hsu^{ac}, B.T. Huffman^{aq}, R.E. Hughes^{an}, U. Husemann^{bi}, M. Hussein^{aj}, J. Huston^{aj}, J. Incandela^k, G. Introzzi^{au}, M. Iori^{az}, A. Ivanov^h, E. James^r, D. Jang^m, B. Jayatilaka^q, E.J. Jeon^{ab}, M.K. Jha^f, S. Jindariani^r, W. Johnson^h, M. Jones^{aw}, K.K. Joo^{ab}, S.Y. Jun^m, J.E. Jung^{ab}, T.R. Junk^r, T. Kamon^{bb}, D. Kar^s, P.E. Karchin^{bg}, Y. Kato^{ap,8}, R. Kephart^r, W. Ketchumⁿ, J. Keung^{at}, V. Khotilovich^{bb}, B. Kilminster^r, D.H. Kim^{ab}, H.S. Kim^{ab}, H.W. Kim^{ab}, J.E. Kim^{ab}, M.J. Kim^t, S.B. Kim^{ab}, S.H. Kim^{bd}, Y.K. Kimⁿ, N. Kimura^{bd}, L. Kirsch^g, S. Klimentenko^s, B. Knuteson^{ag}, B.R. Ko^q, K. Kondo^{bf}, D.J. Kong^{ab}, J. Konigsberg^s, A. Korytov^s, A.V. Kotwal^q, M. Kreps^{aa}, J. Kroll^{at}, D. Kropⁿ, N. Krumnack^e, M. Kruse^q, V. Krutelyov^k, T. Kubo^{bd}, T. Kuhr^{aa}, N.P. Kulkarni^{bg},

M. Kurata^{bd}, S. Kwangⁿ, A.T. Laasanen^{aw}, S. Lami^{au}, S. Lammel^r, M. Lancaster^{ae}, R.L. Lander^h, K. Lannon^{an,9}, A. Lath^{ba}, G. Latino^{au}, I. Lazzizzera^{ar}, T. LeCompte^b, E. Lee^{bb}, H.S. Leeⁿ, S.W. Lee^{bb,10}, S. Leone^{au}, J.D. Lewis^r, C.-S. Lin^{ac}, J. Linacre^{aq}, M. Lindgren^r, E. Lipeles^{at}, A. Lister^h, D.O. Litvintsev^r, C. Liu^{av}, T. Liu^r, N.S. Lockyer^{at}, A. Loginov^{bi}, M. Loreti^{ar}, L. Lovas^o, D. Lucchesi^{ar}, C. Luci^{az}, J. Lueck^{aa}, P. Lujan^{ac}, P. Lukens^r, G. Lungu^{ay}, L. Lyons^{aq}, J. Lys^{ac}, R. Lysak^o, D. MacQueen^{ah}, R. Madrak^r, K. Maeshima^r, K. Makhoul^{ag}, T. Maki^x, P. Maksimovic^z, S. Malde^{aq}, S. Malik^{ae}, G. Manca^{ad,11}, A. Manousakis-Katsikakis^c, F. Margaroli^{aw}, C. Marino^{aa}, C.P. Marino^y, A. Martin^{bi}, V. Martin^{v,12}, M. Martínez^d, R. Martínez-Ballarín^{af}, T. Maruyama^{bd}, P. Mastrandrea^{az}, T. Masubuchi^{bd}, M. Mathis^z, M.E. Mattson^{bg}, P. Mazzanti^f, K.S. McFarland^{ax}, P. McIntyre^{bb}, R. McNulty^{ad,13}, A. Mehta^{ad}, P. Mehtala^x, A. Menzione^{au}, P. Merkel^{aw}, C. Mesropian^{ay}, T. Miao^r, N. Miladinovic^g, R. Miller^{aj}, C. Mills^w, M. Milnik^{aa}, A. Mitra^a, G. Mitselmakher^s, H. Miyake^{bd}, S. Moed^w, N. Moggi^f, C.S. Moon^{ab}, R. Moore^r, M.J. Morello^{au}, J. Morlock^{aa}, P. Movilla Fernandez^r, J. Mülmenstädt^{ac}, A. Mukherjee^r, Th. Müller^{aa}, R. Mumford^z, P. Murat^r, M. Mussini^f, J. Nachtman^{r,14}, Y. Nagai^{bd}, A. Nagano^{bd}, J. Naganoma^{bd}, K. Nakamura^{bd}, I. Nakano^{ao}, A. Napier^{be}, V. Necula^q, J. Nett^{bh}, C. Neu^{at,15}, M.S. Neubauer^y, S. Neubauer^{aa}, J. Nielsen^{ac,16}, L. Nodulman^b, M. Norman^j, O. Norriella^y, E. Nurse^{ae}, L. Oakes^{aq}, S.H. Oh^q, Y.D. Oh^{ab}, I. Oksuzian^s, T. Okusawa^{ap}, R. Orava^x, K. Osterberg^x, S. Pagan Griso^{ar}, E. Palencia^r, V. Papadimitriou^r, A. Papaikonomou^{aa}, A.A. Paramonovⁿ, B. Parks^{an}, S. Pashapour^{ah}, J. Patrick^r, G. Pauletta^{bc}, M. Paulini^m, C. Paus^{ag}, T. Peiffer^{aa}, D.E. Pellett^h, A. Penzo^{bc}, T.J. Phillips^q, G. Piacentino^{au}, E. Pianori^{at}, L. Pinera^s, K. Pitts^y, C. Plagerⁱ, L. Pondrom^{bh}, O. Poukhov^{p,17}, N. Pounder^{aq}, F. Prakhoshyn^p, A. Pronko^r, J. Proudfoot^b, F. Ptohos^{r,18}, E. Pueschel^m, G. Punzi^{au}, J. Pursley^{bh}, J. Rademacker^{aq,7}, A. Rahaman^{av}, V. Ramakrishnan^{bh}, N. Ranjan^{aw}, I. Redondo^{af}, P. Renton^{aq}, M. Renz^{aa}, M. Rescigno^{az}, S. Richter^{aa}, F. Rimondi^f, L. Ristori^{au}, A. Robson^v, T. Rodrigo^l, T. Rodriguez^{at}, E. Rogers^y, S. Rolli^{be}, R. Roser^r, M. Rossi^{bc}, R. Rossin^k, P. Roy^{ah}, A. Ruiz^l, J. Russ^m, V. Rusu^r, B. Rutherford^r, H. Saarikko^x, A. Safonov^{bb}, W.K. Sakumoto^{ax}, O. Saltó^d, L. Santi^{bc}, S. Sarkar^{az}, L. Sartori^{au}, K. Sato^r, A. Savoy-Navarro^{as}, P. Schlabach^r, A. Schmidt^{aa}, E.E. Schmidt^r, M.A. Schmidtⁿ, M.P. Schmidt^{bi,17}, M. Schmitt^{am}, T. Schwarz^h, L. Scodellaro^l, A. Scribano^{au}, F. Scuri^{au}, A. Sedov^{aw}, S. Seidel^{al}, Y. Seiya^{ap}, A. Semenov^p, L. Sexton-Kennedy^r, F. Sforza^{au}, A. Sfyrla^y, S.Z. Shalhout^{bg}, T. Shears^{ad}, P.F. Shepard^{av}, M. Shimojima^{bd,19}, S. Shiraishiⁿ, M. Shochetⁿ, Y. Shon^{bh}, I. Shreyber^{ak}, P. Sinervo^{ah}, A. Sisakyan^p, A.J. Slaughter^r, J. Slaunwhite^{an}, K. Sliwa^{be}, J.R. Smith^h, F.D. Snider^r, R. Snihur^{ah}, A. Soha^h, S. Somalwar^{ba}, V. Sorin^{aj}, T. Spreitzer^{ah}, P. Squillacioti^{au}, M. Stanitzki^{bi}, R.St. Denis^v, B. Stelzer^{ah}, O. Stelzer-Chilton^{ah}, D. Stentz^{am}, J. Strologas^{al}, G.L. Strycker^{ai}, J.S. Suh^{ab}, A. Sukhanov^s, I. Suslov^p, T. Suzuki^{bd}, A. Taffard^{y,20}, R. Takashima^{ao}, Y. Takeuchi^{bd}, R. Tanaka^{ao}, M. Tecchio^{ai}, P.K. Teng^a, K. Terashi^{ay}, J. Thom^{r,21}, A.S. Thompson^v, G.A. Thompson^y, E. Thomson^{at}, P. Tipton^{bi}, P. Ttito-Guzmán^{af}, S. Tkaczyk^r, D. Toback^{bb}, S. Tokar^o, K. Tollefson^{aj}, T. Tomura^{bd}, D. Tonelli^r, S. Torre^t, D. Torretta^r, P. Totaro^{bc}, S. Tourneur^{as}, M. Trovato^{au}, S.-Y. Tsai^a, Y. Tu^{at}, N. Turini^{au}, F. Ukegawa^{bd}, S. Vallecorsa^u, N. van Remortel^{x,22}, A. Varganov^{ai}, E. Vataga^{au}, F. Vázquez^{s,5}, G. Velev^r, C. Vellidis^c, M. Vidal^{af}, R. Vidal^r, I. Vila^l, R. Vilar^l, T. Vine^{ae}, M. Vogel^{al}, I. Volobouev^{ac,10}, G. Volpi^{au}, P. Wagner^{at}, R.G. Wagner^b, R.L. Wagner^r, W. Wagner^{aa,23}, J. Wagner-Kuhr^{aa}, T. Wakisaka^{ap}, R. Wallnyⁱ, S.M. Wang^a, A. Warburton^{ah}, D. Waters^{ae}, M. Weinberger^{bb}, J. Weinelt^{aa}, W.C. Wester III^r, B. Whitehouse^{be}, D. Whiteson^{at,20}, A.B. Wicklund^b, E. Wicklund^r, S. Wilburⁿ, G. Williams^{ah}, H.H. Williams^{at}, P. Wilson^r, B.L. Winer^{an}, P. Wittich^{r,21}, S. Wolbers^r, C. Wolfeⁿ, T. Wright^{ai}, X. Wu^u, F. Würthwein^j, S. Xie^{ag}, A. Yagil^j, K. Yamamoto^{ap}, J. Yamaoka^q, U.K. Yang^{n,24}, Y.C. Yang^{ab}, W.M. Yao^{ac}, G.P. Yeh^r, K. Yi^{r,14}, J. Yoh^r, K. Yorita^{bf}, T. Yoshida^{ap,25}, G.B. Yu^{ax}, I. Yu^{ab}, S.S. Yu^r, J.C. Yun^r, L. Zanello^{az}, A. Zanetti^{bc}, X. Zhang^y, Y. Zheng^{i,26}, S. Zucchelli^f

^a Institute of Physics, Academia Sinica, Taipei, Taiwan 11529, Republic of China

^b Argonne National Laboratory, Argonne, IL 60439, United States

^c University of Athens, 157 71 Athens, Greece

^d Institut de Física d'Altes Energies, Universitat Autònoma de Barcelona, E-08193, Bellaterra (Barcelona), Spain

^e Baylor University, Waco, TX 76798, United States

^f Istituto Nazionale di Fisica Nucleare Bologna, and University of Bologna, I-40127 Bologna, Italy

^g Brandeis University, Waltham, MA 02254, United States

^h University of California, Davis, Davis, CA 95616, United States

ⁱ University of California, Los Angeles, Los Angeles, CA 90024, United States

^j University of California, San Diego, La Jolla, CA 92093, United States

^k University of California, Santa Barbara, Santa Barbara, CA 93106, United States

^l Instituto de Física de Cantabria, CSIC-University of Cantabria, 39005 Santander, Spain

^m Carnegie Mellon University, Pittsburgh, PA 15213, United States

Download English Version:

<https://daneshyari.com/en/article/10725858>

Download Persian Version:

<https://daneshyari.com/article/10725858>

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