Measurement of the top quark polarization and t(t)over-barspin correlations using dilepton final states in proton-proton collisions at root s=13 TeV

By: Sirunyan, AM (Sirunyan, A. M.)[1]; Tumasyan, A (Tumasyan, A.)[1]; Adam, W (Adam, W.)[2]; Ambrogi, F (Ambrogi, F.)[2]; Asilar, E (Asilar, E.)[2]; Bergauer, T (Bergauer, T.)[2]; Brandstetter, J (Brandstetter, J.)[2]; Dragicevic, M (Dragicevic, M.)[2]; Ero, J (Eroe, J.)[2]; Del Valle, AE (Del Valle, A. Escalante)[2] ...More

Group Author(s): CMS Collaboration

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Abstract

Measurements of the top quark polarization and top quark pair (t (t) over bar) spin correlations are presented using events containing two oppositely charged leptons (e(+)e(-), e(+/-)mu(-/+), or mu(+)mu(-)) produced in proton-proton collisions at a center-of-mass energy of 13 TeV. The data were recorded by the CMS experiment at the LHC in 2016 and correspond to an integrated luminosity of 35.9 fb(-1) . A set of parton-level normalized differential cross sections, sensitive to each of the independent coefficients of the spin-dependent parts of the t (t) over bar production density matrix, is measured for the first time at 13 TeV. The measured distributions and extracted coefficients are compared with standard model predictions from simulations at next-to-leading-order (NLO) accuracy in quantum chromodynamics (QCD), and from NLO QCD calculations including electroweak corrections. All measurements are found to be consistent with the expectations of the standard model. The normalized differential cross sections are used in fits to constrain the anomalous chromomagnetic and chromoelectric dipole moments of the top quark to -0.24 < C-tG/Lambda(2) < 0.07 TeV-2 and -0.33 < C-tG(I)/Lambda(2) < 0.20 TeV-2, respectively, at the 95% confidence level.

Author Information

Reprint Address: Sirunyan, AM (reprint author)

Yerevan Phys Inst, Yerevan, Armenia.

Addresses:

[1] Yerevan Phys Inst, Yerevan, Armenia
[2] Inst Hochenergiephys, Vienna, Austria
[3] Inst Nucl Problems, Minsk, BELARUS
[4] Univ Antwerp, Antwerp, Belgium
[5] Vrije Univ Brussel, Brussels, Belgium
[6] Univ Libre Bruxelles, Brussels, Belgium
[7] Univ Ghent, Ghent, Belgium
[8] Catholic Univ Louvain, Louvain La Neuve, Belgium
[9] Ctr Brasileiro Pesquisas Fis, Rio De Janeiro, Brazil
[10] Univ Estado Rio de Janeiro, Rio De Janeiro, Brazil
[11] Univ Estadual Paulista, Univ Fed ABC, Sao Paulo, Brazil
[12] Univ Fed ABC, Sao Paulo, Brazil
[13] Bulgarian Acad Sci, Inst Nucl Res & Nucl Energy, Sofia, Bulgaria
[14] Univ Sofia, Sofia, Bulgaria
[15] Beihang Univ, Beijing, Peoples R China
[16] Inst High Energy Phys, Beijing, Peoples R China
[17] Peking Univ, State Key Lab Nucl Phys & Technol, Beijing, Peoples R China
[18] Tsinghua Univ, Beijing, Peoples R China
[19] Univ Los Andes, Bogota, Colombia
[20] Univ Antioquia, Medellin, Colombia
[21] Univ Split, Fac Elect Engn Mech Engn & Naval Architecture, Split, Croatia
[22] Univ Split, Fac Sci, Split, Croatia
[23] Inst Rudjer Boskovic, Zagreb, Croatia
[24] Univ Cyprus, Nicosia, Cyprus

[25] Charles Univ Prague, Prague, Czech Republic

[26] Escuela Politec Nacl, Quito, Ecuador

[27] Univ San Francisco Quito, Quito, Ecuador

[28] Acad Sci Res & Technol Arab Republ Egypt, Egyptian Network High Energy Phys, Cairo, Egypt

[29] NICPB, Tallinn, Estonia

[30] Univ Helsinki, Dept Phys, Helsinki, Finland

[31] Helsinki Inst Phys, Helsinki, Finland

[32] Lappeenranta Univ Technol, Lappeenranta, Finland

[33] Univ Paris Saclay, CEA, IRFU, Gif Sur Yvette, France

[34] Univ Paris Saclay, Lab Leprince Ringuet, Ecole Polytech, CNRS IN2P3, Palaiseau, France

[35] Univ Strasbourg, CNRS, IPHC UMR 7178, Strasbourg, France

[36] Inst Natl Phys Nucl & Phys Particules, Ctr Calcul, CNRS, IN2P3, Villeurbanne, France

[37] Univ Claude Bernard Lyon 1, Inst Phys Nucl Lyon, Univ Lyon, CNRS IN2P3, Villeurbanne, France

[38] Georgian Tech Univ, Tbilisi, Georgia

[39] Tbilisi State Univ, Tbilisi, Georgia

[40] Rhein Westfal TH Aachen, Phys Inst 1, Aachen, Germany

[41] Rhein Westfal TH Aachen, Phys Inst A 3, Aachen, Germany

[42] Rhein Westfal TH Aachen, Phys Inst B 3, Aachen, Germany

[43] DESY, Hamburg, Germany

[44] Univ Hamburg, Hamburg, Germany

[45] Karlsruher Inst Technol, Karlsruhe, Germany

[46] NCSR Demokritos, Inst Nucl & Particle Phys, Aghia Paraskevi, Greece

[47] Natl & Kapodistrian Univ Athens, Athens, Greece

[48] Natl Tech Univ Athens, Athens, Greece

[49] Univ Ioannina, Ioannina, Greece

[50] Eotvos Lorand Univ, MTA ELTE Lendulet CMS Particle & Nucl Phys Grp, Budapest, Hungary

[51] Wigner Res Ctr Phys, Budapest, Hungary

[52] Inst Nucl Res ATOMKI, Debrecen, Hungary

[53] Univ Debrecen, Inst Phys, Debrecen, Hungary

[54] Indian Inst Sci IISc, Bangalore, Karnataka, India

[55] HBNI, Natl Inst Sci Educ & Res, Bhubaneswar, India

[56] Panjab Univ, Chandigarh, India

[57] Univ Delhi, Delhi, India

[58] HBNI, Saha Inst Nucl Phys, Kolkata, India

[59] Indian Inst Technol Madras, Madras, Tamil Nadu, India

[60] Bhabha Atom Res Ctr, Mumbai, Maharashtra, India

[61] Tata Inst Fundamental Res A, Mumbai, Maharashtra, India

[62] Tata Inst Fundamental Res B, Mumbai, Maharashtra, India

[63] Indian Inst Sci Educ & Res, Pune, Maharashtra, India

[64] Inst Res Fundamental Sci IPM, Tehran, Iran

[65] Univ Coll Dublin, Dublin, Ireland

[66] Politecn Bari, Sez Bari, INFN, Bari, Italy

[67] Univ Bari, Politecn Bari, Bari, Italy

[68] Politecn Bari, Bari, Italy

[69] INFN, Sez Bologna, Bologna, Italy

[70] Univ Bologna, Bologna, Italy

[71] INFN, Sez Catania, Catania, Italy

[72] Univ Catania, Catania, Italy

[73] INFN, Sez Firenze, Florence, Italy

[74] Univ Firenze, Florence, Italy

[75] INFN, Lab Nazl Frascati, Frascati, Italy

[76] INFN, Sez Genova, Genoa, Italy

[77] Univ Genoa, Genoa, Italy

[78] INFN, Sez Milano Bicocca, Milan, Italy

[79] Univ Milano Bicocca, Milan, Italy

[80] INFN, Sez Napoli, Naples, Italy

[81] Univ Napoli Federico II, Naples, Italy

[82] Univ Basilicata, Potenza, Italy

[83] Univ G Marconi, Rome, Italy

[84] INFN, Sez Padova, Padua, Italy

[85] Univ Padua, Padua, Italy

[86] Univ Trento, Trento, Italy

[87] INFN, Sez Pavia, Pavia, Italy

[88] Univ Pavia, Pavia, Italy

[89] INFN, Sez Perugia, Perugia, Italy

[90] Univ Perugia, Perugia, Italy

[91] Scuola Normale Super Pisa, Sez Pisa, INFN, Pisa, Italy

[92] Univ Pisa, Scuola Normale Super Pisa, Pisa, Italy

[93] Scuola Normale Super Pisa, Pisa, Italy

[94] INFN, Sez Roma, Rome, Italy

[95] Sapienza Univ Roma, Rome, Italy

[96] INFN, Sez Torino, Turin, Italy

[97] Univ Torino, Turin, Italy

[98] Univ Piemonte Orientale, Turin, Italy

[99] INFN, Sez Trieste, Trieste, Italy

[100] Univ Trieste, Trieste, Italy

[101] Kyungpook Natl Univ, Daegu, South Korea

[102] Chonnam Natl Univ, Inst Universe & Elementary Particles, Kwangju, South Korea

[103] Hanyang Univ, Seoul, South Korea

[104] Korea Univ, Seoul, South Korea

[105] Sejong Univ, Seoul, South Korea

[106] Seoul Natl Univ, Seoul, South Korea

[107] Univ Seoul, Seoul, South Korea

[108] Sungkyunkwan Univ, Suwon, South Korea

[109] Riga Tech Univ, Riga, Latvia

[110] Vilnius Univ, Vilnius, Lithuania

[111] Univ Malaya, Natl Ctr Particle Phys, Kuala Lumpur, Malaysia

[112] Univ Sonora UNISON, Hermosillo, Sonora, Mexico

[113] IPN, Ctr Invest & Estudios Avanzados, Mexico City, DF, Mexico

[114] Univ Iberoamer, Mexico City, DF, Mexico

[115] Benemerita Univ Autonoma Puebla, Puebla, Mexico

[116] Univ Autonoma San Luis Potosi, San Luis Potosi, Mexico

[117] Univ Montenegro, Podgorica, Montenegro

[118] Univ Auckland, Auckland, New Zealand

[119] Univ Canterbury, Christchurch, New Zealand

[120] Quaid I Azam Univ, Natl Ctr Phys, Islamabad, Pakistan

[121] Natl Ctr Nucl Res, Otwock, Poland

[122] Univ Warsaw, Fac Phys, Inst Expt Phys, Warsaw, Poland

[123] Lab Instrumentacao & Fis Expt Particulas, Lisbon, Portugal

[124] Joint Inst Nucl Res, Dubna, Russia

[125] Petersburg Nucl Phys Inst, St Petersburg, Russia

[126] Inst Nucl Res, Moscow, Russia

[127] NRC Kurchatov Inst, Inst Theoret & Expt Phys, Moscow, Russia

[128] Moscow Inst Phys & Technol, Moscow, Russia

[129] Natl Res Nucl Univ, Moscow Engn Phys Inst MEPhI, Moscow, Russia

[130] PN Lebedev Phys Inst, Moscow, Russia

[131] Lomonosov Moscow State Univ, Skobeltsyn Inst Nucl Phys, Moscow, Russia

[132] Novosibirsk State Univ, Novosibirsk, Russia

[133] Kurchatov Inst, Natl Res Ctr, Inst High Energy Phys, Protvino, Russia

[134] Natl Res Tomsk Polytech Univ, Tomsk, Russia

[135] Univ Belgrade, Fac Phys, Belgrade, Serbia

[136] VINCA Inst Nucl Sci, Belgrade, Serbia

[137] Ctr Invest Energet Medioambientales & Tecnol CIEM, Madrid, Spain

[138] Univ Autonoma Madrid, Madrid, Spain

[139] Univ Oviedo, Oviedo, Spain

[140] Univ Cantabria, Inst Fis Cantabria IFCA, CSIC, Santander, Spain

[141] Univ Ruhuna, Dept Phys, Matara, Sri Lanka

[142] CERN, European Org Nucl Res, Geneva, Switzerland

[143] Paul Scherrer Inst, Villigen, Switzerland

[144] Swiss Fed Inst Technol, Inst Particle Phys & Astrophys IPA, Zurich, Switzerland

[145] Univ Zurich, Zurich, Switzerland

[146] Natl Cent Univ, Chungli, Taiwan

[147] Natl Taiwan Univ, Taipei, Taiwan

[148] Chulalongkorn Univ, Fac Sci, Dept Phys, Bangkok, Thailand

[149] Cukurova Univ, Sci & Art Fac, Phys Dept, Adana, Turkey

[150] Middle East Tech Univ, Phys Dept, Ankara, Turkey

[151] Bogazici Univ, Istanbul, Turkey

[152] Istanbul Tech Univ, Istanbul, Turkey

[153] Natl Acad Sci Ukraine, Inst Scintillat Mat, Kharkov, Ukraine

[154] Natl Sci Ctr, Kharkov Inst Phys & Technol, Kharkov, Ukraine

[155] Univ Bristol, Bristol, Avon, England

[156] Rutherford Appleton Lab, Didcot, Oxon, England

[157] Imperial Coll, London, England

[158] Brunel Univ, Uxbridge, Middx, England

[159] Baylor Univ, Waco, TX 76798 USA

[160] Catholic Univ Amer, Washington, DC 20064 USA

[161] Univ Alabama, Tuscaloosa, AL USA

[162] Boston Univ, Boston, MA 02215 USA

[163] Brown Univ, Providence, RI 02912 USA

[164] Univ Calif Davis, Davis, CA 95616 USA

[165] Univ Calif Los Angeles, Los Angeles, CA USA

[166] Univ Calif Riverside, Riverside, CA 92521 USA

[167] Univ Calif San Diego, La Jolla, CA 92093 USA

[168] Univ Calif Santa Barbara, Dept Phys, Santa Barbara, CA 93106 USA

[169] CALTECH, Pasadena, CA 91125 USA

[170] Carnegie Mellon Univ, Pittsburgh, PA 15213 USA

[171] Univ Colorado, Boulder, CO 80309 USA

[172] Cornell Univ, Ithaca, NY USA

[173] Fermilab Natl Accelerator Lab, POB 500, Batavia, IL 60510 USA

[174] Univ Florida, Gainesville, FL USA

[175] Florida Int Univ, Miami, FL 33199 USA

[176] Florida State Univ, Tallahassee, FL 32306 USA

[177] Florida Inst Technol, Melbourne, FL 32901 USA

[178] Univ Illinois, Chicago, IL USA

[179] Univ Iowa, Iowa City, IA USA

[180] Johns Hopkins Univ, Baltimore, MD USA

[181] Univ Kansas, Lawrence, KS 66045 USA

[182] Kansas State Univ, Manhattan, KS 66506 USA

[183] Lawrence Livermore Natl Lab, Livermore, CA USA

[184] Univ Maryland, College Pk, MD 20742 USA

[185] MIT, 77 Massachusetts Ave, Cambridge, MA 02139 USA

[186] Univ Minnesota, Minneapolis, MN USA

[187] Univ Mississippi, Oxford, MS USA

[188] Univ Nebraska, Lincoln, NE USA

[189] SUNY Buffalo, Buffalo, NY USA

[190] Northeastern Univ, Boston, MA 02115 USA

[191] Northwestern Univ, Evanston, IL USA

[192] Univ Notre Dame, Notre Dame, IN 46556 USA

[193] Ohio State Univ, Columbus, OH 43210 USA

[194] Princeton Univ, Princeton, NJ 08544 USA

[195] Univ Puerto Rico, Mayaguez, PR USA
[196] Purdue Univ, W Lafayette, IN 47907 USA
[197] Purdue Univ Northwest, Hammond, IN USA
[198] Rice Univ, Houston, TX USA
[199] Univ Rochester, Rochester, NY USA
[200] Rutgers State Univ, Piscataway, NJ USA
[201] Univ Tennessee, Knoxville, TN USA
[202] Texas A&M Univ, College Stn, TX USA
[203] Texas Tech Univ, Lubbock, TX 79409 USA
[204] Vanderbilt Univ, 221 Kirkland Hall, Nashville, TN 37235 USA
[205] Univ Virginia, Charlottesville, VA USA
[206] Wayne State Univ, Detroit, MI USA
[207] Univ Wisconsin, Madison, WI USA
[208] Vienna Univ Technol, Vienna, Austria
[209] Univ Estadual Campinas, Campinas, SP, Brazil
[210] Univ Fed Rio Grande do Sul, Porto Alegre, RS, Brazil
[211] Univ Chinese Acad Sci, Beijing, Peoples R China
[212] Cairo Univ, Cairo, Egypt
[213] Helwan Univ, Cairo, Egypt
[214] Zewail City Sci & Technol, Zewail, Egypt
[215] British Univ Egypt, Cairo, Egypt
[216] Univ Haute Alsace, Mulhouse, France
[217] Brandenburg Tech Univ Cottbus, Cottbus, Germany
[218] IIT Bhubaneswar, Bhubaneswar, India
[219] Inst Phys, Bhubaneswar, India
[220] Shoolini Univ, Solan, India
[221] Univ Visva Bharati, Santini Ketan, W Bengal, India
[222] Isfahan Univ Technol, Esfahan, Iran
[223] Islamic Azad Univ, Plasma Phys Res Ctr, Sci & Res Branch, Tehran, Iran
[224] Italian Natl Agcy New Technol Energy & Sustainabl, Rome, Italy
[225] Ctr Siciliano Fis Nucl & Struttura Mat, Catania, Italy
[226] Univ Siena, Siena, Italy
[227] Scuola Normale, Pisa, Italy
[228] Sezione Ist Nazl Fis Nucl, Pisa, Italy
[229] Kyung Hee Univ, Dept Phys, Seoul, South Korea
[230] Int Islamic Univ Malaysia, Kuala Lumpur, Malaysia
[231] Agensi Nuklear Malaysia, MOSTI, Kajang, Malaysia
[232] Consejo Nacl Ciencia & Technol, Mexico City, DF, Mexico
[233] Warsaw Univ Technol, Inst Elect Syst, Warsaw, Poland
[234] St Petersburg State Polytech Univ, St Petersburg, Russia
[235] Budker Inst Nucl Phys, Novosibirsk, Russia
[236] Univ Pavia, INFN, Sez Pavia, Pavia, Italy
[237] Stefan Meyer Inst Subat Phys, Vienna, Austria
[238] Adiyaman Univ, Adiyaman, Turkey
[239] Sirnak Univ, Sirnak, Turkey
[240] Beykent Univ, Istanbul, Turkey
[241] Istanbul Aydin Univ, Istanbul, Turkey
[242] Mersin Univ, Mersin, Turkey
[243] Piri Reis Univ, Istanbul, Turkey
[244] Gaziosmanpasa Univ, Tokat, Turkey
[245] Ozyegin Univ, Istanbul, Turkey
[246] Izmir Inst Technol, Izmir, Turkey
[247] Marmara Univ, Istanbul, Turkey
[248] Kafkas Univ, Kars, Turkey
[249] Istanbul Univ, Istanbul, Turkey
[250] Istanbul Bilgi Univ, Istanbul, Turkey

[251] Hacettepe Univ, Ankara, Turkey
[252] Univ Southampton, Sch Phys & Astron, Southampton, Hants, England
[253] IPPP Durham Univ, Durham, England
[254] Monash Univ, Fac Sci, Clayton, Vic, Australia
[255] Bethel Univ, Minneapolis, MN USA
[256] Karamanoglu Mehmetbey Univ, Karaman, Turkey
[257] Bingol Univ, Bingol, Turkey
[258] Sinop Univ, Sinop, Turkey
[259] Mimar Sinan Univ, Istanbul, Turkey
[260] Texas A&M Univ Qatar, Doha, Qatar
[261] Univ Hyderabad, Hyderabad, India

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