Measurement of the weak mixing angle using the forward-backward asymmetry of Drell-Yan events in pp collisions at 8 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]; Brondolin, E (Brondolin, E.)[2]; Dragicevic, M (Dragicevic, M.)[2]; Ero, J (Eroe, J.)[2] ...More

Group Author(s): CMS Collaboration

View ResearcherID and ORCID

EUROPEAN PHYSICAL JOURNAL C
Volume: 78 **Issue:** 9
Article Number: 701
DOI: 10.1140/epjc/s10052-018-6148-7
Published: SEP 1 2018
Document Type: Article
View Journal Impact

Abstract

A measurement is presented of the effective leptonic weak mixing angle (sin(2) theta(effl))using the forward- backward asymmetry of Drell-Yan lepton pairs (mu mu and ee) produced in proton-proton collisions at N root s = 8 TeV at the CMS experiment of the LHC. The data correspond to integrated luminosities of 18.8 and 19.6 fb(-1) in the dimuon and dielectron channels, respectively, containing 8.2 million dimuon and 4.9 million dielectron events. With more events and new analysis techniques, including constraints obtained on the parton distribution functions from the measured forward-backward asymmetry, the statistical and systematic uncertainties are significantly reduced relative to previous CMS measurements. The extracted value of sin(2) theta(effl) from the combined dilepton data is sin(2) theta(effl) = 0.23101 +/- 0.00036 (stat) +/- 0.00018 (syst) 0.00016 (theo) +/- 0.00031 (parton distributions in proton) = 0.23101 +/- 0.00053.

Keywords

KeyWords Plus: MONTE-CARLO; PHYSICS DOCUMENTATION; RADIATIVE-CORRECTIONS; HADRON COLLIDERS; PLUS PLUS; PHOTOS; INTERFACE; PROGRAM

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, 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 Split, Fac Elect Engn Mech Engn & Naval Architecture, Split, Croatia
[21] Univ Split, Fac Sci, Split, Croatia
[22] Inst Rudjer Boskovic, Zagreb, Croatia
[23] Univ Cyprus, Nicosia, Cyprus
[24] Charles Univ Prague, Prague, Czech Republic
[25] Escuela Politec Nacl, Quito, Ecuador
[26] Univ San Francisco Quito, Quito, Ecuador
[27] Acad Sci Res & Technol Arab Republ Egypt, Egyptian Network High Energy Phys, Cairo, Egypt
[28] NICPB, Tallinn, Estonia
[29] Univ Helsinki, Dept Phys, Helsinki, Finland
[30] Helsinki Inst Phys, Helsinki, Finland
[31] Lappeenranta Univ Technol, Lappeenranta, Finland
[32] Univ Paris Saclay, CEA, IRFU, Gif Sur Yvette, France
[33] Univ Paris Saclay, Lab Leprince Ringuet, Ecole Polytech, CNRS,IN2P3, Palaiseau, France
[34] Univ Strasbourg, CNRS, IPHC UMR 7178, F-67000 Strasbourg, France
[35] IN2P3, Ctr Calcul, CNRS, Villeurbanne, France
[36] Univ Claude Bernard Lyon 1, Univ Lyon, CNRS IN2P3, Inst Phys Nucl Lyon, Villeurbanne, France
[37] Georgian Tech Univ, Tbilisi, Rep of Georgia
[38] Tbilisi State Univ, Tbilisi, Rep of Georgia
[39] Rhein Westfal TH Aachen, Phys Inst 1, Aachen, Germany
[40] Rhein Westfal TH Aachen, Phys Inst A 3, Aachen, Germany
[41] Rhein Westfal TH Aachen, Phys Inst B 3, Aachen, Germany
[42] DESY, Hamburg, Germany
[43] Univ Hamburg, Hamburg, Germany
[44] Karlsruher Inst Technol, Karlsruhe, Germany
[45] NCSR Demokritos, INPP, Aghia Paraskevi, Greece
[46] Univ Athens, Athens, Greece
[47] Natl Tech Univ Athens, Athens, Greece
[48] Univ Ioannina, Ioannina, Greece
[49] Eotvos Lorand Univ, MTA ELTE Lendulet CMS Particle & Nucl Phys Grp, Budapest, Hungary
[50] Wigner Res Ctr Phys, Budapest, Hungary
[51] Inst Nucl Res ATOMKI, Debrecen, Hungary
[52] Univ Debrecen, Inst Phys, Debrecen, Hungary
[53] Indian Inst Sci IISc, Bangalore, Karnataka, India
[54] HBNI, Natl Inst Sci Educ & Res, Bhubaneswar, India
[55] Panjab Univ, Chandigarh, India
[56] Univ Delhi, Delhi, India
[57] HBNI, Saha Inst Nucl Phys, Kolkata, India
[58] Indian Inst Technol Madras, Madras, Tamil Nadu, India
[59] Bhabha Atom Res Ctr, Bombay, Maharashtra, India
[60] Tata Inst Fundamental Res A, Bombay, Maharashtra, India
[61] Tata Inst Fundamental Res B, Bombay, Maharashtra, India
[62] IISER, Pune, Maharashtra, India
[63] Inst Res Fundamental Sci IPM, Tehran, Iran

[64] Univ Coll Dublin, Dublin, Ireland
[65] INFN, Sez Bari, Bari, Italy
[66] Univ Bari, Bari, Italy
[67] Politecn Bari, Bari, Italy
[68] INFN, Sez Bologna, Bologna, Italy
[69] Univ Bologna, Bologna, Italy
[70] INFN, Sez Catania, Catania, Italy
[71] Univ Catania, Catania, Italy
[72] INFN, Sez Firenze, Florence, Italy
[73] Univ Firenze, Florence, Italy
[74] INFN, Lab Nazl Frascati, Frascati, Italy
[75] INFN, Sez Genova, Genoa, Italy
[76] Univ Genoa, Genoa, Italy
[77] INFN, Sez Milano Bicocca, Milan, Italy
[78] Univ Milano Bicocca, Milan, Italy
[79] INFN, Sez Napoli, Naples, Italy
[80] Univ Napoli Federico II, Naples, Italy
[81] Univ Basilicata, Potenza, Italy
[82] Univ G Marconi, Rome, Italy
[83] INFN, Sez Padova, Padua, Italy
[84] Univ Padua, Padua, Italy
[85] Univ Trento, Trento, Italy
[86] INFN, Sez Pavia, Pavia, Italy
[87] Univ Pavia, Pavia, Italy
[88] INFN, Sez Perugia, Perugia, Italy
[89] Univ Perugia, Perugia, Italy
[90] INFN, Sez Pisa, Pisa, Italy
[91] Univ Pisa, Pisa, Italy
[92] Scuola Normale Super Pisa, Pisa, Italy
[93] INFN, Sez Roma, Rome, Italy
[94] Univ Roma, Rome, Italy
[95] INFN, Sez Torino, Turin, Italy
[96] Univ Torino, Turin, Italy
[97] Univ Piemonte Orientale, Novara, Italy
[98] INFN, Sez Trieste, Trieste, Italy
[99] Univ Trieste, Trieste, Italy
[100] Kyungpook Natl Univ, Daegu, South Korea
[101] Chonnam Natl Univ, Inst Universe & Elementary Particles, Kwangju, South Korea
[102] Hanyang Univ, Seoul, South Korea
[103] Korea Univ, Seoul, South Korea
[104] Sejong Univ, Seoul, South Korea
[105] Seoul Natl Univ, Seoul, South Korea
[106] Univ Seoul, Seoul, South Korea
[107] Sungkyunkwan Univ, Suwon, South Korea
[108] Vilnius Univ, Vilnius, Lithuania
[109] Univ Malaya, Natl Ctr Particle Phys, Kuala Lumpur, Malaysia
[110] IPN, Ctr Invest & Estudios Avanzados, Mexico City, DF, Mexico
[111] Univ Iberoamer, Mexico City, DF, Mexico
[112] Benemerita Univ Autonoma Puebla, Puebla, Mexico

[113] Univ Autonoma San Luis Potosi, San Luis Potosi, Mexico
[114] Univ Auckland, Auckland, New Zealand
[115] Univ Canterbury, Christchurch, New Zealand
[116] Quaid I Azam Univ, Natl Ctr Phys, Islamabad, Pakistan
[117] Natl Ctr Nucl Res, Otwock, Poland
[118] Univ Warsaw, Fac Phys, Inst Expt Phys, Warsaw, Poland
[119] Lab Instrumentacao & Fis Expt Particulas, Lisbon, Portugal
[120] Joint Inst Nucl Res, Dubna, Russia
[121] Petersburg Nucl Phys Inst, St Petersburg, Russia
[122] Inst Nucl Res, Moscow, Russia
[123] Inst Theoret & Expt Phys, Moscow, Russia
[124] Moscow Inst Phys & Technol, Moscow, Russia
[125] Natl Res Nucl Univ, Moscow Engn Phys Inst MEPhI, Moscow, Russia
[126] PN Lebedev Phys Inst, Moscow, Russia
[127] Lomonosov Moscow State Univ, Skobeltsyn Inst Nucl Phys, Moscow, Russia
[128] NSU, Novosibirsk, Russia
[129] Inst High Energy Phys NRC, Kurchatov Inst, State Res Ctr Russian Federat, Protvino, Russia
[130] Natl Res Tomsk Polytech Univ, Tomsk, Russia
[131] Univ Belgrade, Fac Phys, Belgrade, Serbia
[132] Univ Belgrade, Vinca Inst Nucl Sci, Belgrade, Serbia
[133] Ctr Invest Energet Medioambientales & Tecnol CIEM, Madrid, Spain
[134] Univ Autonoma Madrid, Madrid, Spain
[135] Univ Oviedo, Oviedo, Spain
[136] Univ Cantabria, Inst Fis Cantabria IFCA, CSIC, Santander, Spain
[137] CERN, European Org Nucl Res, Geneva, Switzerland
[138] Paul Scherrer Inst, Villigen, Switzerland
[139] Swiss Fed Inst Technol, Inst Particle Phys & Astrophys IPA, Zurich, Switzerland
[140] Univ Zurich, Zurich, Switzerland
[141] Natl Cent Univ, Chungli, Taiwan
[142] NTU, Taipei, Taiwan
[143] Chulalongkorn Univ, Fac Sci, Dept Phys, Bangkok, Thailand
[144] Cukurova Univ, Sci & Art Fac, Phys Dept, Adana, Turkey
[145] Middle East Tech Univ, Phys Dept, Ankara, Turkey
[146] Bogazici Univ, Istanbul, Turkey
[147] Istanbul Tech Univ, Istanbul, Turkey
[148] Natl Acad Sci Ukraine, Inst Scintillat Mat, Kharkov, Ukraine
[149] Natl Sci Ctr, Kharkov Inst Phys & Technol, Kharkov, Ukraine
[150] Univ Bristol, Bristol, Avon, England
[151] Rutherford Appleton Lab, Didcot, Oxon, England
[152] Imperial Coll, London, England
[153] Brunel Univ, Uxbridge, Middx, England
[154] Baylor Univ, Waco, TX 76798 USA
[155] Catholic Univ Amer, Washington, DC 20064 USA
[156] Univ Alabama, Tuscaloosa, AL USA
[157] Boston Univ, Boston, MA 02215 USA
[158] Brown Univ, Providence, RI 02912 USA
[159] Univ Calif Davis, Davis, CA 95616 USA
[160] Univ Calif Los Angeles, Los Angeles, CA USA
[161] Univ Calif Riverside, Riverside, CA 92521 USA

[162] Univ Calif San Diego, La Jolla, CA 92093 USA
[163] Univ Calif Santa Barbara, Dept Phys, Santa Barbara, CA 93106 USA
[164] CALTECH, Pasadena, CA 91125 USA
[165] Carnegie Mellon Univ, Pittsburgh, PA 15213 USA
[166] Univ Colorado, Boulder, CO 80309 USA
[167] Cornell Univ, Ithaca, NY USA
[168] Fermilab Natl Accelerator Lab, POB 500, Batavia, IL 60510 USA
[169] Univ Florida, Gainesville, FL USA
[170] Florida Int Univ, Miami, FL 33199 USA
[171] Florida State Univ, Tallahassee, FL 32306 USA
[172] Florida Inst Technol, Melbourne, FL 32901 USA
[173] UIC, Chicago, IL USA
[174] Univ Iowa, Iowa City, IA USA
[175] Johns Hopkins Univ, Baltimore, MD USA
[176] Univ Kansas, Lawrence, KS 66045 USA
[177] Kansas State Univ, Manhattan, KS 66506 USA
[178] Lawrence Livermore Natl Lab, Livermore, CA USA
[179] Univ Maryland, College Pk, MD 20742 USA
[180] MIT, Cambridge, MA 02139 USA
[181] Univ Minnesota, Minneapolis, MN USA
[182] Univ Mississippi, Oxford, MS USA
[183] Univ Nebraska, Lincoln, NE USA
[184] SUNY Buffalo, Buffalo, NY USA
[185] Northeastern Univ, Boston, MA 02115 USA
[186] Northwestern Univ, Evanston, IL USA
[187] Univ Notre Dame, Notre Dame, IN 46556 USA
[188] Ohio State Univ, Columbus, OH 43210 USA
[189] Princeton Univ, Princeton, NJ 08544 USA
[190] Univ Puerto Rico, Mayaguez, PR USA
[191] Purdue Univ, W Lafayette, IN 47907 USA
[192] Purdue Univ Northwest, Hammond, LA USA
[193] Rice Univ, Houston, TX USA
[194] Univ Rochester, Rochester, NY 14627 USA
[195] Rutgers State Univ, Piscataway, NJ USA
[196] Univ Tennessee, Knoxville, TN USA
[197] Texas A&M Univ, College Stn, TX USA
[198] Texas Tech Univ, Lubbock, TX 79409 USA
[199] Vanderbilt Univ, 221 Kirkland Hall, Nashville, TN 37235 USA
[200] Univ Virginia, Charlottesville, VA USA
[201] Wayne State Univ, Detroit, MI USA
[202] Univ Wisconsin, Madison, WI USA
[203] Vienna Univ Technol, Vienna, Austria
[204] Univ Estadual Campinas, Campinas, SP, Brazil
[205] Univ Fed Rio Grande do Sul, Porto Alegre, RS, Brazil
[206] Cairo Univ, Cairo, Egypt
[207] Zewail City Sci & Technol, Zewail, Egypt
[208] British Univ Egypt, Cairo, Egypt
[209] Ain Univ, Cairo, Egypt
[210] King Abdulaziz Univ, Dept Phys, Jeddah, Saudi Arabia

[211] Univ Haute Alsace, Mulhouse, France
[212] Brandenburg Tech Univ Cottbus, Cottbus, Germany
[213] Indian Inst Technol Bhubaneswar, Bhubaneswar, India
[214] Inst Phys, Bhubaneswar, India
[215] Shoolini Univ, Solan, India
[216] Univ Visva Bharati, Santini Ketan, W Bengal, India
[217] Isfahan Univ Technol, Esfahan, Iran
[218] Islamic Azad Univ, Plasma Phys Res Ctr, Sci & Res Branch, Tehran, Iran
[219] Univ Siena, Siena, Italy
[220] Int Islamic Univ Malaysia, Kuala Lumpur, Malaysia
[221] Agensi Nuklear Malaysia, MOSTI, Kajang, Malaysia
[222] Consejo Nacl Invest Cient & Tecn, Mexico City, DF, Mexico
[223] Warsaw Univ Technol, Inst Elect Syst, Warsaw, Poland
[224] St Petersburg State Polytech Univ, St Petersburg, Russia
[225] Budker Inst Nucl Phys, Novosibirsk, Russia
[226] Scuola Normale, Pisa, Italy
[227] Sezione Ist Nazl Fis Nucl, Pisa, Italy
[228] Riga Tech Univ, Riga, Latvia
[229] Stefan Meyer Inst Subat Phys SMI, Vienna, Austria
[230] Adiyaman Univ, Adiyaman, Turkey
[231] Istanbul Aydin Univ, Istanbul, Turkey
[232] Mersin Univ, Mersin, Turkey
[233] Piri Reis Univ, Istanbul, Turkey
[234] Gaziosmanpasa Univ, Tokat, Turkey
[235] Ozyegin Univ, Istanbul, Turkey
[236] Izmir Inst Technol, Izmir, Turkey
[237] Marmara Univ, Istanbul, Turkey
[238] Kafkas Univ, Kars, Turkey
[239] Istanbul Bilgi Univ, Istanbul, Turkey
[240] Hacettepe Univ, Ankara, Turkey
[241] Univ Southampton, Sch Phys & Astron, Southampton, Hants, England
[242] Monash Univ, Fac Sci, Clayton, Vic, Australia
[243] Bethel Univ, St Paul, MN USA
[244] Karamanoglu Mehmetbey Univ, Karaman, Turkey
[245] Utah Valley Univ, Orem, UT USA
[246] USA Beykent Univ, Istanbul, Turkey
[247] Bingol Univ, Bingol, Turkey
[248] Sinop Univ, Sinop, Turkey
[249] Mimar Sinan Univ, Istanbul, Turkey
[250] Texas A&M Univ Qatar, Doha, Qatar

Funding

Funding Agency	Grant Number
BMWFW (Austria)	
FWF (Austria)	
FNRS (Belgium)	
FWO (Belgium)	
CNPq (Brazil)	
CAPES (Brazil)	

FAPERJ (Brazil)	
FAPESP (Brazil)	
MES (Bulgaria)	
CERN	
CAS (China)	
MoST (China)	
NSFC (China)	
COLCIENCIAS (Colombia)	
MSES (Croatia)	
CSF (Croatia)	
RPF (Cyprus)	
SENESCYT (Ecuador)	
MoER (Estonia)	
ERC IUT (Estonia)	
ERDF (Estonia)	
Academy of Finland (Finland)	
MEC (Finland)	
HIP (Finland)	
CEA (France)	
CNRS/IN2P3 (France)	
BMBF (Germany)	
DFG (Germany)	
HGF (Germany)	
GSRT (Greece)	
OTKA (Hungary)	
NIH (Hungary)	
DAE (India)	
DST (India)	
IPM (Iran)	
SFI (Ireland)	
INFN (Italy)	
MSIP (Republic of Korea)	
NRF (Republic of Korea)	
LAS (Lithuania)	
MOE (Malaysia)	
UM (Malaysia)	
BUAP (Mexico)	
CIN-VESTAV (Mexico)	
CONACYT (Mexico)	
LNS (Mexico)	
SEP (Mexico)	
UASLP-FAI (Mexico)	
MBIE (NewZealand)	
PAEC (Pakistan)	
MSHE (Poland)	
NSC (Poland)	
FCT (Portugal)	

JINR (Dubna)	
MON (Russia)	
RosAtom (Russia)	
RAS (Russia)	
RFBR (Russia)	
RAEP (Russia)	
MESTD (Serbia)	
SEIDI (Spain)	
CPAN (Spain)	
PCTI (Spain)	
FEDER (Spain)	
Swiss Funding Agencies (Switzerland)	
MST (Taipei)	
ThEPCenter (Thailand)	
IPST (Thailand)	
STAR (Thailand)	
NSTDA (Thailand)	
TUBITAK (Turkey)	
TAEK (Turkey)	
NASU (Ukraine)	
SFFR (Ukraine)	
STFC (UK)	
DOE (USA)	
NSF (USA)	
Marie-Curie program (European Union)	
European Research Council (European Union)	675440
Leventis Foundation	
A. P. Sloan Foundation	
Alexander von Humboldt Foundation	
Belgian Federal Science Policy Office	
Fonds pour la Formation a la Recherche dans l'Industrie et dans l'Agriculture (FRIA-Belgium)	
Agentschap voor Innovatie door Wetenschap en Technologie (IWT-Belgium)	
F.R.S.-FNRS (Belgium) under the "Excellence of Science - EOS" - be.h project	30820817
FWO (Belgium) under the "Excellence of Science - EOS" - be.h project	30820817
Ministry of Education, Youth and Sports (MEYS) of the Czech Republic	
Council of Science and Industrial Research, India	
HOMING PLUS program of the Foundation for Polish Science	
European Union, Regional Development Fund	
Mobility Plus program of the Ministry of Science and Higher Education	
National Science Center (Poland)	Harmonia 2014/14/M/ST2/00428 Opus 2014/13/B/ST2/02543 2014/15/B/ST2/03998 2015/19/B/ST2/02861 Sonata-bis 2012/07/E/ST2/01406
National Priorities Research Program by Qatar National Research Fund	
Programa Severo Ochoa del Principado de Asturias	
Thalis program - EU-ESF	

Thalis program - Greek NSRF	
Rachadapisek Sompot Fund for Postdoctoral Fellowship	
Chulalongkorn University (Thailand)	
Chulalongkorn Academic into Its 2nd Century Project Advancement Project (Thailand)	
Welch Foundation	C-1845
Weston Havens Foundation (USA)	
Horizon 2020 Grant (European Union)	675440

View funding text

Publisher

SPRINGER, 233 SPRING ST, NEW YORK, NY 10013 USA

Categories / Classification

Research Areas: Physics

Web of Science Categories: Physics, Particles & Fields

See more data fields

Cited References: 53

Showing 30 of 53 **View All in Cited References page** *(from Web of Science Core Collection)*

1. **GEANT4-a simulation toolkit** — **Times Cited: 10,211**
   By: Agostinelli, S; Allison, J; Amako, K; et al.
   NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION A-ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT Volume: 506 Issue: 3 Pages: 250-303 Published: JUL 1 2003

2. Title: [not available] — **Times Cited: 15**
   By: ALIOLI S
   J HIGH ENERGY PHYS Published: 2008

3. **A general framework for implementing NLO calculations in shower Monte Carlo programs: the POWHEG BOX** — **Times Cited: 836**
   By: Alioli, Simone; Nason, Paolo; Oleari, Carlo; et al.
   JOURNAL OF HIGH ENERGY PHYSICS Issue: 6 Article Number: 043 Published: JUN 2010

4. **Collaboration, Measurement of the forward-backward charge asymmetry and extraction of sin². eff in pp. Z/ . * + X . v W e + e-+ X events produced at &RADIC;s = 1. 96TeV** — **Times Cited: 1**
   By: [Anonymous].
   Phys. Rev. Lett Volume: 101 Article Number: 191801 Published: 2008
   URL: https://doi.org/10.1103/PhysRevLett.101.191801

5. **Measurement of the forward-backward asymmetry of electron and muon pair-production in pp collisions at ??s = 7 TeV with the ATLAS detector** — **Times Cited: 12**
   Group Author(s): ATLAS collaboration
   JHEP Volume: 09 Published: 2015
   inSPIRE

6. **Parton distributions for the LHC run II** — **Times Cited: 581**
   By: Ball, Richard D.; Bertone, Valerio; Carrazza, Stefano; et al.
   Group Author(s): NNPDF Collaboration
   JOURNAL OF HIGH ENERGY PHYSICS Issue: 4 Article Number: 040 Published: APR 8 2015

7. **PHOTOS - A UNIVERSAL MONTE-CARLO FOR QED RADIATIVE-CORRECTIONS - VERSION 2.0** — **Times Cited: 490**
   By: BARBERIO, E; WAS, Z
   COMPUTER PHYSICS COMMUNICATIONS Volume: 79 Issue: 2 Pages: 291-308 Published: APR 1994

8. **ZFITTER v.6.21: A semi-analytical program for fermion pair production in e(+)e(-) annihilation** Times Cited: 187
By: Bardin, D; Bilenky, M; Christova, P; et al.
COMPUTER PHYSICS COMMUNICATIONS Volume: 133 Issue: 2-3 Pages: 229-395 Published: JAN 15 2001

9. **Reports of the working group on precision calculations for the z resonance** Times Cited: 1
By: Bardin, D. Y.; Hollik, W. F. L.; Passarino, G.
Technical report Published: 1995
Publisher: CERN
URL: https://doi.org/10.5170/CERN-1995-003

10. **Electroweak radiative corrections to neutral-current Drell-Yan processes at hadron colliders** Times Cited: 142
By: Baur, U; Brein, O; Hollik, W; et al.
PHYSICAL REVIEW D Volume: 65 Issue: 3 Article Number: 033007 Published: FEB 1 2002

11. **Using Drell-Yan forward-backward asymmetry to reduce PDF uncertainties in the measurement of electroweak parameters** Times Cited: 4
By: Bodek, A.; Han, J.; Khukhunaishvili, A.; et al.
EUROPEAN PHYSICAL JOURNAL C Volume: 76 Issue: 3 Article Number: 115 Published: MAR 2 2016

12. **Extracting muon momentum scale corrections for hadron collider experiments** Times Cited: 19
By: Bodek, A.; van Dyne, A.; Han, J. Y.; et al.
EUROPEAN PHYSICAL JOURNAL C Volume: 72 Issue: 10 Article Number: 2194 Published: OCT 2012

13. **A simple event weighting technique: optimizing the measurement of the forward-backward asymmetry of Drell-Yan dilepton and top-antitop pairs at hadron colliders** Times Cited: 9
By: Bodek, A.
EUROPEAN PHYSICAL JOURNAL C Volume: 67 Issue: 1-2 Pages: 321-334 Published: MAY 2010

14. **Photon-induced background for dilepton searches and measurements in pp collisions at 13 TeV** Times Cited: 4
By: Bourilkov, D.
arXiv: 1606.00523 Published: 2016

15. **An unbiased Hessian representation for Monte Carlo PDFs** Times Cited: 43
By: Carrazza, Stefano; Forte, Stefano; Kassabov, Zahari; et al.
EUROPEAN PHYSICAL JOURNAL C Volume: 75 Issue: 8 Article Number: 369 Published: AUG 12 2015

16. **Tevatron Run II combination of the effective leptonic electroweak mixing angle** Times Cited: 1
Group Author(s): CDF and D0 Collaborations
arXiv: 1801.06283 Published: 2018
Submitted to

17. **Measurement of sin². lept eff using e + e-pairs from . * / Z bosons produced in p <overline>p collisions at a center-of-momentum energy of 1.96 TeV** Times Cited: 2
Group Author(s): CDF Collaboration
Phys. Rev. D Volume: 93 Article Number: 112016 Published: 2016

18. **Indirect measurement of sin². W (or MW) using +-<mu><mu>pairs from * . / Z bosons produced in ppcolli-sions at a center-of-momentum energy of 1.96 TeV** Times Cited: 4
Group Author(s): CDF Collaboration
Phys. Rev. D Volume: 89 Article Number: 072005 Published: 2014

19. **Indirect measurement of sin². W (MW) using e + e-pairs in the Z-boson region with pp collisions at a center-of-momentum energy of 1.96 TeV** Times Cited: 2
Group Author(s): CDF Collaboration
Phys. Rev. D Volume: 88 Article Number: 072002 Published: 2013

20. **Study of the underlying event at forward rapidity in pp collisions at root s=0.9, 2.76, and 7 TeV** Times Cited: 61
By: Chatrchyan, S.; Khachatryan, V.; Sirunyan, A. M.; et al.
Group Author(s): CMS Collaboration
JOURNAL OF HIGH ENERGY PHYSICS Issue: 4 Article Number: 072 Published: APR 2013

21. **Performance of CMS muon reconstruction in pp collision events at root s=7Tev** Times Cited: 337
By: Chatrchyan, S.; Khachatryan, V.; Sirunyan, A. M.; et al.
Group Author(s): CMS Collaboration
JOURNAL OF INSTRUMENTATION Volume: 7 Article Number: P10002 Published: OCT 2012

22. **The CMS experiment at the CERN LHC** Times Cited: 1,505
By: Chatrchyan, S.; Hmayakyan, G.; Khachatryan, V.; et al.
Group Author(s): CMS Collaboration
JOURNAL OF INSTRUMENTATION Volume: 3 Article Number: S08004 Published: AUG 2008

23. **Measurement of the weak mixing angle with the Drell-Yan process in proton-proton collisions at the LHC** Times Cited: 33
By: Chatrchyan, S.; Khachatryan, V.; Sirunyan, A. M.; et al.
Group Author(s): CMS Collaboration
PHYSICAL REVIEW D Volume: 84 Issue: 11 Article Number: 112002 Published: DEC 8 2011

24. **CMS luminosity based on pixel cluster counting Summer 2013 Update** Times Cited: 89
Group Author(s): CMS collaboration
CMS-PAS-LUM-13-001 Published: 2013

25. **ANGULAR-DISTRIBUTION OF DILEPTONS IN HIGH-ENERGY HADRON COLLISIONS** Times Cited: 498
By: COLLINS, JC; SOPER, DE
PHYSICAL REVIEW D Volume: 16 Issue: 7 Pages: 2219-2225 Published: 1977

26. **Top plus plus : A program for the calculation of the top-pair cross-section at hadron colliders** Times Cited: 376
By: Czakon, Michal; Mitov, Alexander
COMPUTER PHYSICS COMMUNICATIONS Volume: 185 Issue: 11 Pages: 2930-2938 Published: NOV 2014

27. **Measurement of the effective weak mixing angle in pp &RARR; Z/γ* &RARR; l⁺l⁻events** Times Cited: 1
Group Author(s): D0 Collaboration
Phys. Rev. Lett Volume: 120 Article Number: 241802 Published: 2018

28. **PHOTOS interface in C plus plus Technical and physics documentation** Times Cited: 30
By: Davidson, N.; Przedzinski, T.; Was, Z.
COMPUTER PHYSICS COMMUNICATIONS Volume: 199 Pages: 86-101 Published: FEB 2016

29. **Universal interface of TAUOLA: Technical and physics documentation** Times Cited: 75
By: Davidson, N.; Nanava, G.; Przedzinski, T.; et al.
COMPUTER PHYSICS COMMUNICATIONS Volume: 183 Issue: 3 Pages: 821-843 Published: MAR 2012

30. **Measurement of sin². leff and Z-light quark couplings using the forward-backward charge asymmetry in pp. v Z/ * . . e + e-events with L = 5.0 fb-1 at s = 1.96 TeV** Times Cited: 1
Group Author(s): DO Collaboration
Phys. Rev. D Volume: 84 Article Number: 012007 Published: 2011

Showing 30 of 53 **View All in Cited References page**