## Bibliographie de thèse

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## Références

- [1] G. AAD & coll. « Combined measurement of the Higgs boson mass in pp collisions at  $\sqrt{s} = 7$  and 8 TeV with the ATLAS and CMS Experiments ». Physical Review Letters 114.19 (mai 2015). DOI: 10.1103/physrevlett.114.191803.
- [2] G. AAD & coll. « Measurements of the Higgs boson production and decay rates and constraints on its couplings from a combined ATLAS and CMS analysis of the LHC pp collision data at  $\sqrt{s} = 7$  and 8 TeV ». *Journal of High Energy Physics* **08** (août 2016). DOI: 10.1007/jhep08(2016) 045.
- [3] M. Abadi & coll. TensorFlow: Large-scale machine learning on heterogeneous distributed systems. Software available from tensorflow.org. 2015. URL: https://www.tensorflow.org/.
- [4] S. Abdullin & coll. « The Fast Simulation of the CMS Detector at LHC ». *Journal of Physics : Conference Series* **331**.3 (déc. 2011). DOI: 10.1088/1742-6596/331/3/032049.
- [5] P. A. R. Ade & coll. « Planck 2013 results. I. Overview of products and scientific results ». *Astronomy & Astrophysics* **571** (oct. 2014). DOI: 10.1051/0004-6361/201321529.
- [6] S. AGOSTINELLI & coll. «GEANT4 A simulation toolkit ». Nuclear Instruments and Methods in Physics Research A506.3 (2003), p. 250-303. DOI: 10.1016/S0168-9002(03)01368-8. URL: http://www.sciencedirect.com/science/article/pii/S0168900203013688.
- [7] S. ALIOLI & coll. « A general framework for implementing NLO calculations in shower Monte Carlo programs: the POWHEG BOX ». *Journal of High Energy Physics* **06** (2010). DOI: 10.1007/jhep06(2010)043. arXiv: 1002.2581 [hep-ph].
- [8] J. Allison & coll. « Geant4 developments and applications ». *IEEE Transactions on Nuclear Science* **53**.1 (fév. 2006), p. 270-278. doi: 10.1109/tns.2006.869826.
- [9] J. Allison & coll. « Recent developments in GEANT4 ». Nuclear Instruments and Methods in Physics Research A835 (2016), p. 186-225. DOI: 10.1016/j.nima.2016.06.125. URL: http://www.sciencedirect.com/science/article/pii/S0168900216306957.
- [10] D. Alspach & H. Sorenson. « Nonlinear Bayesian estimation using Gaussian sum approximations ». *IEEE Transactions on Automatic Control* **17**.4 (1972), p. 439-448. DOI: 10.1109/TAC. 1972.1100034.
- [11] J. Alwall & coll. « The automated computation of tree-level and next-to-leading order differential cross sections, and their matching to parton shower simulations ». *Journal of High Energy Physics* **07** (2014), p. 079. DOI: 10.1007/JHEP07 (2014) 079. arXiv: 1405.0301 [hep-ph].
- [12] J. Alwall & coll. « MadGraph 5 : Going Beyond ». Journal of High Energy Physics **06** (2011). DOI: 10.1007/jhep06(2011)128. arXiv: 1106.0522 [hep-ph].
- [13] H. L. Anderson & coll. « Total Cross Sections of Negative Pions in Hydrogen ». *Physical Review* 85.5 (mar. 1952), p. 934-935. DOI: 10.1103/PhysRev.85.934.2.
- [14] H. L. Anderson & coll. « Total Cross Sections of Positive Pions in Hydrogen ». *Physical Review* **85**.5 (mar. 1952), p. 936. doi: 10.1103/PhysRev.85.936.
- [15] B. Andersson & coll. « Parton fragmentation and string dynamics » (avr. 1983). URL: http://cds.cern.ch/record/143980.
- [16] J. Andrejkovic & coll. « BSM  $H \to \tau\tau$  analysis on full Run 2 CMS data at  $\sqrt{s}=13\,\text{TeV}$  ». CMS analysis Note (2021). URL: https://cms.cern.ch/iCMS/jsp/db\_notes/noteInfo.jsp? cmsnoteid=CMS%5C%20AN-2020/218.

- [17] J. Andrejkovic & J. Bechtel. « Data-driven background estimation of fake-tau backgrounds in di-tau final states with the full Run-II dataset ». CMS analysis Note (juin 2020). URL: https://cms.cern.ch/iCMS/jsp/db\_notes/noteInfo.jsp?cmsnoteid=CMS%5C%20AN-2019/170.
- [18] J. Andrejkovic & coll. « Data-driven background estimation of fake-tau backgrounds in di-tau final states with 2016 and 2017 data ». CMS analysis Note (oct. 2018).
- [19] J. Andrejkovic & coll. « Measurement of Higgs(125) boson properties in decays to a pair of tau leptons with full Run II data using Machine-Learning techniques ». CMS analysis Note (sept. 2020). URL: https://cms.cern.ch/iCMS/jsp/db\_notes/noteInfo.jsp?cmsnoteid=CMS%5C%20AN-2019/177.
- [20] J. Andrejkovic & coll. « Multi-class neural network architecture and training for measurements of Higgs(125) boson decays to two tau leptons on full Run II data ». CMS analysis Note (mai 2020). URL: https://cms.cern.ch/iCMS/jsp/db\_notes/noteInfo.jsp?cmsnoteid= CMS%5C%20AN-2019/178.
- [21] K. Androsov. « DeepTau ID ». Meeting calcolo CMS Italia. Juin 2019. URL: https://indico.cern.ch/event/819693/contributions/3438506/attachments/1858497/3053529/2019-06-07\_DeepTau\_ID.pdf.
- [22] P. Arce & coll. « The network of photodetectors and diode lasers of the CMS Link alignment system ». *Nuclear Instruments and Methods in Physics Research* **A896** (2018), p. 1-23. DOI: 10.1016/j.nima.2018.04.004. URL: http://cds.cern.ch/record/2637152.
- [23] C. Armand & coll. JRJC 2019. Book of Proceedings. Août 2020. URL: https://hal.archives-ouvertes.fr/hal-02971995.
- [24] G. Arnison & coll. « Experimental observation of isolated large transverse energy electrons with associated missing energy at  $\sqrt{s}=540\,\text{GeV}$  ». Physics Letters B122.1 (1983), p. 103-116. DOI: 10.1016/0370-2693(83)91177-2. URL: http://www.sciencedirect.com/science/article/pii/0370269383911772.
- [25] G. Arnison & coll. « Experimental observation of lepton pairs of invariant mass around  $95\,\text{GeV}\cdot c^{-2}$  at the CERN SPS collider ». *Physics Letters* **B126**.5 (1983), p. 398-410. DOI: 10.1016/0370-2693(83)90188-0. URL: http://www.sciencedirect.com/science/article/pii/0370269383901880.
- [26] G. Arnison & coll. « Further evidence for charged intermediate vector bosons at the SPS collider ». *Physics Letters* **B129**.3 (1983), p. 273-282. DOI: 10.1016/0370-2693(83)90860-2. URL: http://www.sciencedirect.com/science/article/pii/0370269383908602.
- [27] E. AŞILAR. How to produce nanoAOD events of  $h \to \tau\tau$  where Higgs has a 130 GeV mass. URL: https://github.com/easilar/cmssw/blob/from-CMSSW\_10\_2\_22/README.
- [28] P. BAGNAIA & coll. « Evidence for  $Z^0 \to e^+e^-$  at the CERN pp collider ». Physics Letters **B129**.1 (1983), p. 130-140. DOI: 10.1016/0370-2693(83)90744-X. URL: http://www.sciencedirect.com/science/article/pii/037026938390744X.
- [29] E. BAGNASCHI & coll. « MSSM Higgs boson searches at the LHC: benchmark scenarios for Run 2 and beyond ». *The European Physical Journal* **C79**.7 (juil. 2019). DOI: 10.1140/epjc/s10052-019-7114-8.
- [30] E. BAGNASCHI & A. VICINI. « The Higgs transverse momentum distribution in gluon fusion as a multiscale problem ». *Journal of High Energy Physics* **01** (2016). DOI: 10.1007/JHEP01(2016)056.
- [31] E. BAGNASCHI & coll. « Resummation ambiguities in the Higgs transverse-momentum spectrum in the Standard Model and beyond ». *Journal of High Energy Physics* **01** (2016). DOI: 10.1007/JHEP01(2016)090.
- [32] P. Baldi, P. Sadowski & D. Whiteson. « Enhanced Higgs Boson to  $\tau^+\tau^-$  Search with Deep Learning ». *Physical Review Letters* **114**.11 (mar. 2015). Doi: 10.1103/physrevlett.114.111801.

- [33] R. D. Ball & coll. « Parton distributions for the LHC Run II ». *Journal of High Energy Physics* 4 (avr. 2015). DOI: 10.1007/jhep04(2015)040.
- [34] M. Banner & coll. « Observation of single isolated electrons of high transverse momentum in events with missing transverse energy at the CERN pp collider ». Physics Letters B122.5 (1983), p. 476-485. DOI: 10.1016/0370-2693(83)91605-2. URL: http://www.sciencedirect.com/science/article/pii/0370269383916052.
- [35] R. Barlow & C. Beeston. « Fitting using finite Monte Carlo samples ». Computer Physics Communications 77.2 (1993), p. 219-228. DOI: 10.1016/0010-4655(93)90005-W.
- [36] V. E. Barnes & coll. « Observation of a Hyperon with Strangeness Minus Three ». *Physical Review Letters* **12**.8 (fév. 1964), p. 204-206. doi: 10.1103/PhysRevLett.12.204.
- [37] D. Barney. Sketchup images highlighting the sub-detectors. CMS Document Database. Nov. 2013. URL: https://cms-docdb.cern.ch/cgi-bin/PublicDocDB/ShowDocument?docid=11982.
- [38] P. BÄRTSCHI & coll. « Reconstruction of τ lepton pair invariant mass using an artificial neural network ». Nuclear Instruments and Methods in Physics Research A929 (2019), p. 29-33. DOI: 10.1016/j.nima.2019.03.029. URL: http://www.sciencedirect.com/science/article/pii/S0168900219303377.
- [39] G. Bellini, I. Bigi & P. Dornan. « Lifetimes of charm and beauty hadrons ». *Physics Reports* **289**.1 (1997), p. 1-155. doi: 10.1016/S0370-1573(97)00005-7. URL: http://www.sciencedirect.com/science/article/pii/S0370157397000057.
- [40] J. Bellm & coll. « Herwig 7.0/Herwig++ 3.0 release note ». European Physical Journal C76.196 (avr. 2016). DOI: 10.1140/epjc/s10052-016-4018-8.
- [41] M. Benedikt & coll. « The LHC Injector Chain ». LHC Design Report. 3. CERN Yellow Reports: Monographs. Geneva: CERN, 2004. DOI: 10.5170/CERN-2004-003-V-3. URL: https://cds.cern.ch/record/823808.
- [42] J. L. Bentley. « Multidimensional Binary Search Trees Used for Associative Searching ». *Communications of the ACM* **18**.9 (sept. 1975), p. 509-517. DOI: 10.1145/361002.361007.
- [43] C. Bernet. « Caractérisation des détecteurs Micromégas et mesure de la polarisation des gluons sur COMPASS ». Thèse de doct. Paris 7 Denis Diderot, mai 2004. URL: http://cds.cern.ch/record/1482660.
- [44] C. Bernet. Heppy: a python framework for high-energy physics data analysis. URL: https://github.com/cbernet/heppy.
- [45] C. Bernet. « Reconstruction du flux de particules et mise en évidence de la désintégration du boson de Higgs en paire de τ avec CMS ». Thèse d'HDR. Université Claude Bernard Lyon 1, avr. 2017. URL: https://drive.google.com/open?id=0B3nnTYQibadjVkVvUi03cGRiYlk.
- [46] C. Bernet. The Data Frog Image Recognition: Dogs vs Cats! URL: https://thedatafrog.com/en/articles/dogs-vs-cats/.
- [47] D. Bertolini & coll. « Pileup per particle identification ». *Journal of High Energy Physics* **10** (oct. 2014). Doi: 10.1007/jhep10(2014)059.
- [48] H. A. Bethe. « Molière's Theory of Multiple Scattering ». *Physical Review* **89** (6 mar. 1953). DOI: 10.1103/PhysRev.89.1256.
- [49] L. BIANCHINI & coll. « Reconstruction of the Higgs mass in  $H \to \tau\tau$  Events by Dynamical Likelihood techniques ». *Journal of Physics : Conference Series* **513**.2 (juin 2014). DOI : 10.1088/1742-6596/513/2/022035.
- [50] P. Bolzoni & coll. « Vector boson fusion at next-to-next-to-leading order in QCD: Standard model Higgs boson and beyond ». *Physical Review* **D85** (3 fév. 2012). DOI: 10.1103/PhysRevD. 85.035002.
- [51] P. S. L. BOOTH. «The DELPHI Experiment ». *Philosophical Transactions : Physical Sciences and Engineering* **336**.1642 (1991), p. 213-222. URL: http://www.jstor.org/stable/53784.

- [52] T. Bose & coll. « Measurement of Higgs boson production and decay to a pair of tau leptons on the full Run 2 data set using a cut-based approach ». CMS analysis Note (juil. 2020). URL: https://cms.cern.ch/iCMS/jsp/db\_notes/noteInfo.jsp?cmsnoteid=CMS%5C%20AN-2019/109.
- [53] O. S. Brüning & coll. « The LHC Infrastructure and General Services ». LHC Design Report. 2. CERN Yellow Reports: Monographs. Geneva: CERN, 2004. DOI: 10.5170/CERN-2004-003-V-2. URL: https://cds.cern.ch/record/815187.
- [54] O. S. Brüning & coll. « The LHC Main Ring ». LHC Design Report. 1. CERN Yellow Reports: Monographs. Geneva: CERN, 2004. DOI: 10.5170/CERN-2004-003-V-1. URL: https://cds.cern.ch/record/782076.
- [55] A. Buckley & coll. « General-purpose event generators for LHC physics ». *Physics Reports* **504** (jan. 2011). DOI: 10.1016/j.physrep.2011.03.005. URL: http://cds.cern.ch/record/1322340.
- [56] B. Bullock, K. Hagiwara & A. Martin. « Tau polarization and its correlations as a probe of new physics ». *Nuclear Physics* **B395**.3 (1993), p. 499-533. doi: 10.1016/0550-3213(93)90045-Q. URL: http://www.sciencedirect.com/science/article/pii/055032139390045Q.
- [57] N. Cabibbo. « Unitary Symmetry and Leptonic Decays ». *Physical Review Letters* **10** (12 juin 1963), p. 531-533. doi: 10.1103/PhysRevLett.10.531.
- [58] N. Cabibbo. « Unitary Symmetry and Nonleptonic Decays ». *Physical Review Letters* **12** (2 jan. 1964), p. 62-63. doi: 10.1103/PhysRevLett.12.62.
- [59] M. CACCIARI & G. P. SALAM. « Dispelling the  $N^3$  myth for the  $k_T$  jet-finder ». *Physics Letters* **B641**.1 (sept. 2006), p. 57-61. DOI: 10.1016/j.physletb.2006.08.037.
- [60] M. CACCIARI & G. P. SALAM. « Pileup subtraction using jet areas ». *Physics Letters* **B659** (jan. 2008), p. 119-126. doi: 10.1016/j.physletb.2007.09.077.
- [61] M. CACCIARI, G. P. SALAM & G. SOYEZ. « FASTJET user manual ». European Physical Journal C72 (nov. 2012). DOI: 10.1140/epjc/s10052-012-1896-2. arXiv: 1111.6097 [hep-ph].
- [62] M. CACCIARI, G. P. SALAM & G. SOYEZ. «The Anti-k<sub>T</sub> jet clustering algorithm ». *Journal of High Energy Physics* **04** (avr. 2008). DOI: 10.1088/1126-6708/2008/04/063. arXiv: 0802.1189 [hep-ph].
- [63] M. Carena & coll. « MSSM Higgs boson searches at the LHC: benchmark scenarios after the discovery of a Higgs-like particle ». *European Physical Journal* C73.9 (sept. 2013). DOI: 10.1140/epjc/s10052-013-2552-1.
- [64] S. Catani & coll. « New clustering algorithm for multijet cross sections in  $e^+e^-$  annihilation ». *Physics Letters* **B269**.3 (1991), p. 432-438. doi: 10.1016/0370-2693(91)90196-W.
- [65] CERN. MapCERN. url: https://maps.web.cern.ch/.
- [66] CERN. The first touchscreen used at CERN. URL: https://www.youtube.com/watch?v=tQe5dlzScwU.
- [67] CERN. The Higgs Discovery Explained Ep. 1/3. URL: https://www.youtube.com/watch?v=so2nCu2Jkbc.
- [68] CERN. The Higgs Discovery Explained Ep. 2/3. URL: https://www.youtube.com/watch?v=pW4LTunlXS4.
- [69] CERN. The Higgs Discovery Explained Ep. 3/3. URL: https://www.youtube.com/watch?v=8-WFBGCvv-w.
- [70] CERN. The World Wide Web Project. 1989. URL: http://info.cern.ch/hypertext/WWW/TheProject.html.
- [71] T. Chen & C. Guestrin. « XGBoost : A Scalable Tree Boosting System ». Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (août 2016). DOI: 10.1145/2939672.2939785.

- [72] F. CHOLLET & coll. KERAS. https://keras.io. 2015.
- [73] N. D. Christensen, T. Han & S. Su. « MSSM Higgs Bosons at The LHC ». *Physical Review* **D85** (2012). DOI: 10.1103/PhysRevD.85.115018. arXiv: 1203.3207 [hep-ph].
- [74] J. H. Christenson & coll. « Evidence for the  $2\pi$  Decay of the  $K_2^0$  Meson ». *Physical Review Letters* 13 (4 juil. 1964), p. 138-140. doi: 10.1103/PhysRevLett.13.138.
- [75] D. Clowe & coll. « A Direct Empirical Proof of the Existence of Dark Matter ». *Astrophysical Journal* **648**.2 (août 2006). DOI: 10.1086/508162.
- [76] J. S. Conway. « Incorporating Nuisance Parameters in Likelihoods for Multisource Spectra » (2011), p. 115-120. doi: 10.5170/CERN-2011-006.115.
- [77] Dask: Scalable analytics in Python. url: https://dask.org/.
- [78] A. DAVIDSON & K. C. WALI. « Family mass hierarchy from universal seesaw mechanism ». *Physical Review Letters* **60** (18 mai 1988), p. 1813-1816. DOI: 10.1103/PhysRevLett.60.1813.
- [79] S. DAWSON, A. DJOUADI & M. SPIRA. « QCD Corrections to Supersymmetric Higgs Boson Production: The Role of Squark Loops ». *Physical Review Letters* 77.1 (juil. 1996), p. 16-19. doi: 10.1103/physrevlett.77.16.
- [80] DELPHI, OPAL, ALEPH, LEP Working Group for Higgs Boson Searches, L3. « Search for neutral MSSM Higgs bosons at LEP ». European Physical Journal C47 (2006), p. 547-587. DOI: 10.1140/epjc/s2006-02569-7. arXiv: hep-ex/0602042 [hep-ex].
- [81] A. DJOUADI & coll. « The post-Higgs MSSM scenario : Habemus MSSM? » European Physical Journal C 73.12 (19 juil. 2013). DOI: 10.1140/epjc/s10052-013-2650-0. arXiv: 1307.5205v1 [hep-ph].
- [82] Y. L. Dokshitzer & coll. « Better Jet Clustering Algorithms » (1997). arXiv: hep-ph/9707323 [hep-ph].
- [83] A. Dominguez & coll. CMS Technical Design Report for the Pixel Detector Upgrade. Rapp. tech. Sept. 2012. URL: https://cds.cern.ch/record/1481838.
- [84] P. J. DORNAN. «The ALEPH Experiment ». *Philosophical Transactions: Physical Sciences and Engineering* **336**.1642 (1991), p. 201-211. URL: http://www.jstor.org/stable/53783.
- [85] S. Dürr & coll. « Ab Initio Determination of Light Hadron Masses ». *Science* **322**.5905 (nov. 2008), p. 1224-1227. doi: 10.1126/science.1163233.
- [86] F. Englert & R. Brout. « Broken symmetry and the mass of gauge vector mesons ». *Physical Review Letters* **13**.9 (9 août 1964), p. 321-323. DOI: 10.1103/PhysRevLett.13.321.
- [87] J. de FAVEREAU & coll. « DELPHES 3 : a modular framework for fast simulation of a generic collider experiment ». *Journal of High Energy Physics* **2** (fév. 2014). DOI : 10.1007/jhep02(2014) 057.
- [88] P. FAYET. « Spontaneously broken supersymmetric theories of weak, electromagnetic and strong interactions ». *Physics Letters* **B69**.4 (1977), p. 489-494. DOI: 10.1016/0370-2693(77)90852-8. URL: http://www.sciencedirect.com/science/article/pii/0370269377908528.
- [89] P. FAYET. « Supergauge invariant extension of the Higgs mechanism and a model for the electron and its neutrino ». *Nuclear Physics* **B90** (1975), p. 104-124. DOI: 10.1016/0550-3213(75) 90636-7. URL: http://www.sciencedirect.com/science/article/pii/0550321375906367.
- [90] R. P. Feynman. « Space-Time Approach to Quantum Electrodynamics ». *Physical Review* **76**.6 (sept. 1949), p. 769-789. doi: 10.1103/PhysRev.76.769.
- [91] S. Frixione, P. Nason & B. R. Webber. « Matching NLO QCD and parton showers in heavy flavour production ». *Journal of High Energy Physics* 8 (août 2003). Doi: 10.1088/1126-6708/2003/08/007.
- [92] R. Frühwirth. « Application of Kalman filtering to track and vertex fitting ». *Nuclear Instruments and Methods in Physics Research* **A262**.2 (1987), p. 444-450. DOI: 10.1016/0168-9002(87)90887-4.

- [93] J. GAO, L. HARLAND-LANG & J. ROJO. « The structure of the proton in the LHC precision era ». *Physics Reports* **742** (mai 2018). DOI: 10.1016/j.physrep.2018.03.002.
- [94] M. Gell-Mann, P. Ramond & R. Slansky. « Complex Spinors and Unified Theories » (1979). arXiv: 1306.4669 [hep-th]. url: http://cds.cern.ch/record/133618.
- [95] A. GIAMMANCO. « The Fast Simulation of the CMS Experiment ». *Journal of Physics : Conference Series* **513.2** (juin 2014). DOI: 10.1088/1742-6596/513/2/022012.
- [96] S. L. Glashow. « Partial symmetries of weak interactions ». *Nuclear Physics* **22**.4 (1961), p. 579-588. doi: 10.1016/0029-5582(61)90469-2.
- [97] S. L. Glashow. « The renormalizability of vector meson interactions ». *Nuclear Physics* **10** (1959), p. 107-117. doi: 10.1016/0029-5582(59)90196-8. URL: http://www.sciencedirect.com/science/article/pii/0029558259901968.
- [98] Y. A. Gol'fand & E. P. Likhtman. « Extension of the algebra of Poincare group generators and violation of *P* invariance ». *Journal of Experimental and Theoretical Physics Letters* **13**.8 (1971), p. 323-325. URL: http://cds.cern.ch/record/433516.
- [99] I. GOODFELLOW, Y. BENGIO & A. COURVILLE. Deep Learning. http://www.deeplearningbook.org. MIT Press, 2016.
- [100] V. Gori. «The CMS High Level Trigger». International Journal of Modern Physics: Conference Series 31 (mar. 2014). DOI: 10.1142/S201019451460297X. URL: https://cds.cern.ch/record/1666961.
- [101] A. GOTTMANN. « Global Interpretation of ττ Events in the Context of the Standard Model and Beyond ». Thèse de doct. Fakultät für Physik des Karlsruher Instituts für Technologie (KIT), juin 2020. URL: https://publish.etp.kit.edu/record/22014.
- [102] D. J. Gross & F. Wilczek. « Ultraviolet Behavior of Non-Abelian Gauge Theories ». *Physical Review Letters* **30** (26 juin 1973), p. 1343-1346. DOI: 10.1103/PhysRevLett.30.1343.
- [103] D. Guest & coll. « Jet flavor classification in high-energy physics with deep neural networks ». *Physical Review* **D94**.11 (déc. 2016). DOI: 10.1103/physrevd.94.112002.
- [104] J. F. Gunion & coll. Errata for "The Higgs Hunter's Guide". Rapp. tech. hep-ph/9302272. Fév. 1993. URL: https://cds.cern.ch/record/559892.
- [105] J. F. Gunion & coll. *The Higgs hunter's guide*. T. **80**. Upton, NY: Brookhaven Nat. Lab., 1989. URL: https://cds.cern.ch/record/425736.
- [106] G. S. GURALNIK, C. R. HAGEN & T. W. B. KIBBLE. « Global Conservation Laws and Massless Particles ». *Physical Review Letters* **13**.20 (20 nov. 1964), p. 585-587. doi: 10.1103/PhysRevLett. 13.585.
- [107] T. M. Hahn & coll. « Neutrons and Gamma-Rays from the Proton Bombardment of Beryllium ». *Physical Review* **85**.5 (mar. 1952), p. 934. DOI: 10.1103/PhysRev.85.934.
- [108] F. J. HASERT & coll. « Observation of neutrino-like interactions without muon or electron in the Gargamelle neutrino experiment ». *Nuclear Physics* **B73**.1 (1974), p. 1-22. DOI: 10.1016/0550-3213(74)90038-8. URL: http://cds.cern.ch/record/203096.
- [109] F. J. HASERT & coll. « Search for elastic muon neutrino electron scattering ». *Physics Letters* **B46**.1 (1973), p. 121-124. DOI: 10.1016/0370-2693(73)90494-2. URL: http://cds.cern.ch/record/243640.
- [110] F. HASERT & coll. « Observation of neutrino-like interactions without muon or electron in the gargamelle neutrino experiment ». *Physics Letters* **B46**.1 (1973), p. 138-140. DOI: 10.1016/0370-2693(73)90499-1. URL: http://www.sciencedirect.com/science/article/pii/0370269373904991.
- [111] P. W. Higgs. « Broken symmetries and the masses of gauge bosons ». *Physics Letters* **13**.16 (oct. 1964). DOI: 10.1103/physrevlett.13.508.

- [112] P. W. Higgs. « Broken symmetries, massless particles and gauge fields ». *Physics Letters* 12.2 (sept. 1964). DOI: 10.1016/0031-9163(64)91136-9. URL: https://cds.cern.ch/record/641590.
- [113] P. W. Higgs. «Spontaneous symmetry breakdown without massless bosons ». *Physical Review* 145 (4 mai 1966), p. 1156-1163. DOI: 10.1103/PhysRev.145.1156. URL: https://link.aps.org/doi/10.1103/PhysRev.145.1156.
- [114] D. Jang. « Search for MSSM Higgs decaying to tau pairs in  $p\bar{p}$  collision at  $\sqrt{s}=1,96\,\text{TeV}$  at CDF ». Thèse de doct. Rutgers, The State University of New Jersey, mai 2006. URL: https://lss.fnal.gov/archive/thesis/2000/fermilab-thesis-2006-11.pdf.
- [115] T. Junk. « Confidence level computation for combining searches with small statistics ». *Nuclear Instruments and Methods in Physics Research* **A434**.2–3 (sept. 1999), p. 435-443. DOI: 10.1016/S0168-9002(99)00498-2. arXiv: hep-ex/9902006 [hep-ex].
- [116] T. W. B. Kibble. «Symmetry Breaking in Non-Abelian Gauge Theories ». *Physical Review* **155** (5 mar. 1967), p. 1554-1561. DOI: 10.1103/PhysRev.155.1554. URL: https://link.aps.org/doi/10.1103/PhysRev.155.1554.
- [117] M. Kobayashi & T. Maskawa. « CP-Violation in the Renormalizable Theory of Weak Interaction ». *Progress of Theoretical Physics* **49.2** (fév. 1973), p. 652-657. doi: 10.1143/PTP.49.652. eprint: https://academic.oup.com/ptp/article-pdf/49/2/652/5257692/49-2-652.pdf.
- [118] M. Komm. « Fast emulation of track reconstruction in the CMS simulation ». *Journal of Physics : Conference Series* **898** (oct. 2017). DOI: 10.1088/1742-6596/898/4/042034.
- [119] T. KOPF. « Recoil Calibration as a Neural Network Task ». Mém. de mast. Fakultät für Physik des Karlsruher Instituts für Technologie (KIT), fév. 2019. URL: https://publish.etp.kit.edu/record/21500.
- [120] A. J. LARKOSKI. « An Unorthodox Introduction to QCD » (2017). arXiv: 1709.06195 [hep-ph].
- [121] H. LATTAUD. « Photon et jets avec l'expérience CMS du LHC : de la calibration à la mesure ». Thèse de doct. Université Claude Bernard Lyon 1, sept. 2019. URL : https://tel.archivesouvertes.fr/tel-02422226.
- [122] LHC Higgs Cross Section Working Group. « Differential Distributions ». *Handbook of LHC Higgs Cross Sections*. **2**. CERN Yellow Reports : Monographs. Geneva : CERN, 2012. DOI: 10.5170/CERN-2012-002. URL: https://cds.cern.ch/record/1416519.
- [123] LHC Higgs Cross Section Working Group. « Inclusive Observables ». *Handbook of LHC Higgs Cross Sections*. **1**. CERN Yellow Reports : Monographs. Geneva : CERN, 2011. DOI : 10.5170/CERN-2011-002. URL : https://cds.cern.ch/record/1318996.
- [124] LHC Higgs Cross Section Working Group. « Deciphering the Nature of the Higgs Sector ». Handbook of LHC Higgs Cross Sections. 4. CERN Yellow Reports: Monographs. Geneva: CERN, oct. 2016. DOI: 10.23731/CYRM-2017-002. URL: http://cds.cern.ch/record/2227475.
- [125] LHC Higgs Cross Section Working Group. « Higgs Properties ». *Handbook of LHC Higgs Cross Sections*. **3**. CERN Yellow Reports : Monographs. Geneva : CERN, 2013. DOI : 10.5170/CERN-2013-004. URL : https://cds.cern.ch/record/1559921.
- [126] Long term LHC schedule. URL: https://lhc-commissioning.web.cern.ch/.
- [127] Z. MAKI, M. NAKAGAWA & S. SAKATA. « Remarks on the Unified Model of Elementary Particles ». *Progress of Theoretical Physics* **28**.5 (nov. 1962), p. 870-880. DOI: 10.1143/PTP.28.870. eprint: https://academic.oup.com/ptp/article-pdf/28/5/870/5258750/28-5-870.pdf.
- [128] J. Mans & coll. CMS Technical Design Report for the Phase 1 Upgrade of the Hadron Calorimeter. Rapp. tech. Sept. 2012. URL: https://cds.cern.ch/record/1481837.
- [129] S. P. Martin. « A Supersymmetry primer ». *Advanced Series on Directions in High Energy Physics* (juil. 1998), p. 1-98. doi: 10.1142/9789812839657\_0001.

- [130] S. Mele. «The Measurement of the Number of Light Neutrino Species at LEP ». Advanced Series on Directions in High Energy Physics 23 (2015), p. 89-106. DOI: 10.1142/9789814644150\_0004. URL: http://cds.cern.ch/record/2103251.
- [131] A. Mertens. « New features in Delphes 3 ». *Journal of Physics : Conference Series* **608**.1 (2015). Sous la dir. de L. Fiala, M. Lokajicek & N. Tumova. doi : 10.1088/1742-6596/608/1/012045.
- [132] A. MICHELINI. « OPAL Detector Performance ». *Philosophical Transactions : Physical Sciences and Engineering* **336**.1642 (1991), p. 237-246. URL: http://www.jstor.org/stable/53786.
- [133] R. N. Mohapatra & G. Senjanović. « Neutrino Mass and Spontaneous Parity Nonconservation ». *Physical Review Letters* **44** (14 avr. 1980), p. 912-915. doi: 10.1103/PhysRevLett.44.912.
- [134] R. N. Mohapatra & G. Senjanović. « Neutrino masses and mixings in gauge models with spontaneous parity violation ». *Physical Review* **D23** (1 jan. 1981), p. 165-180. doi: 10.1103/PhysRevD.23.165.
- [135] L. Moneta & coll. « The RooStats Project ». 13<sup>th</sup> International Workshop on Advanced Computing and Analysis Techniques in Physics Research (ACAT2010). 2010. URL: http://pos.sissa.it/archive/conferences/093/057/ACAT2010\_057.pdf.
- [136] Y. NAGASHIMA. Beyond the Standard Model of Elementary Particle Physics. Weinheim: Wiley-VCH, juin 2014. URL: http://cds.cern.ch/record/1620277.
- [137] Y. NAGASHIMA. « Foundations of the Standard Model ». *Elementary Particle Physics.* **2**. Weinheim: Wiley-VCH, 2013.
- [138] Y. NAGASHIMA. « Quantum Field Theory and Particles ». *Elementary Particle Physics*. **1**. Weinheim: Wiley-VCH, 2010.
- [139] S. H. Neddermeyer & C. D. Anderson. « Note on the Nature of Cosmic-Ray Particles ». *Physical Review* **51** (10 mai 1937), p. 884-886. doi: 10.1103/PhysRev.51.884.
- [140] B. P. NIGAM, M. K. SUNDARESAN & T.-Y. Wu. « Theory of Multiple Scattering : Second Born Approximation and Corrections to Molière's Work ». *Physical Review* **115** (3 août 1959). DOI: 10.1103/PhysRev.115.491.
- [141] OPAL, DELPHI, LEP Working Group for Higgs boson searches, ALEPH, L3. « Search for the standard model Higgs boson at LEP ». *Physics Letters* **B565** (2003), p. 61-75. DOI: 10.1016/S0370-2693(03)00614-2. arXiv: hep-ex/0306033 [hep-ex].
- [142] Particle Data Group. « Review of Particle Physics ». *Chinese Physics* C38 (août 2014). DOI: 10.1088/1674-1137/38/9/090001.
- [143] Particle Data Group. « Review of Particle Physics ». *Chinese Physics* **C40** (oct. 2016). DOI: 10.1088/1674-1137/40/10/100001.
- [144] Particle Data Group. « Review of Particle Physics ». *Physical Review* **D98** (août 2018). DOI: 10.1103/PhysRevD.98.030001.
- [145] Particle Data Group. « Review of Particle Physics ». *Progress of Theoretical and Experimental Physics* 8 (août 2020). DOI: 10.1093/ptep/ptaa104.
- [146] H. D. POLITZER. « Reliable Perturbative Results for Strong Interactions? » *Physical Review Letters* **30** (26 juin 1973), p. 1346-1349. DOI: 10.1103/PhysRevLett.30.1346.
- [147] A. RASPEREZA. Recoil Corrections for the 2017 Dataset. Oct. 2018. URL: https://indico.cern.ch/event/762837/contributions/3172618/attachments/1731302/2798220/Recoils\_20181010.pdf.
- [148] S. RAYCHAUDHURI & D. P. ROY. « Charged Higgs boson search at the Fermilab Tevatron upgrade using τ polarization ». *Physical Review* **D52**.3 (3 août 1995), p. 1556-1564. DOI: 10.1103/PhysRevD.52.1556.

- [149] A. L. READ. « Modified frequentist analysis of search results (the  $CL_s$  method) ». Workshop on confidence limits, CERN, Geneva, Switzerland, 17-18 Jan 2000: Proceedings. CERN-OPEN-2000-205. Mai 2000. DOI: 10.5170/CERN-2000-005.81. URL: http://cds.cern.ch/record/451614.
- [150] A. L. Read. « Presentation of search results : The CL(s) technique ». *Journal of Physics* **G28**.10 (sept. 2002), p. 2693-2704. doi: 10.1088/0954-3899/28/10/313.
- [151] G. RIDOLFI, G. ROSS & F. ZWIRNER. « Supersymmetry ». Large Hadron Collider Workshop Proceedings. II. CERN. Geneva: CERN, oct. 1990, p. 606-683.
- [152] J. Rojo & coll. « The PDF4LHC report on PDFs and LHC data: results from Run I and preparation for Run II ». *Journal of Physics* **G42**.10 (sept. 2015). DOI: 10.1088/0954-3899/42/10/103103.
- [153] T. SAKUMA. 3D SketchUp images of the CMS detector. CMS Document Database. Sept. 2018. URL: https://cms-docdb.cern.ch/cgi-bin/PublicDocDB/ShowDocument?docid=13631.
- [154] A. Salam & J. Ward. « Weak and electromagnetic interactions ». *Nuovo Cim* **11** (fév. 1959), p. 568-577. doi: 10.1007/BF02726525.
- [155] G. P. SALAM. Elements of QCD for hadron colliders. 2010. arXiv: 1011.5131 [hep-ph]. URL: https://arxiv.org/pdf/1011.5131.pdf.
- [156] G. P. Salam. « Towards jetography ». European Physical Journal C67.3-4 (mai 2010), p. 637-686. DOI: 10.1140/epjc/s10052-010-1314-6.
- [157] G. P. Salam & G. Soyez. « A practical seedless infrared-safe cone jet algorithm ». *Journal of High Energy Physics* **05** (mai 2007). DOI: 10.1088/1126-6708/2007/05/086.
- [158] W. Sarle. « Neural Networks and Statistical Models ». 1994. URL: https://people.orie.cornell.edu/davidr/or474/nn\_sas.pdf.
- [159] A. Schälicke & coll. « An event generator for particle production in high-energy collisions ». Progress in Particle and Nuclear Physics 53.1 (2004), p. 329-338. DOI: 10.1016/j.ppnp.2004.02. 031. URL: http://www.sciencedirect.com/science/article/pii/S014664100400047X.
- [160] M. Scham. « Standard Model  $H \to \tau\tau$  Analysis with a Neural Network Trained on a Mix of Simulation and Data Samples ». Mém. de mast. Fakultät für Physik des Karlsruher Instituts für Technologie (KIT), juin 2020. URL: https://publish.etp.kit.edu/record/21993.
- [161] J. Schechter & J. W. F. Valle. « Neutrino masses in  $SU(2) \times U(1)$  theories ». *Physical Review* **D22** (9 nov. 1980), p. 2227-2235. DoI: 10.1103/PhysRevD.22.2227.
- [162] S. Sekmen. Recent Developments in CMS Fast Simulation. 2017. arXiv: 1701.03850.
- [163] Site internet du CERN. URL: https://home.cern/.
- [164] T. SJÖSTRAND, S. MRENNA & P. SKANDS. « PYTHIA 6.4 physics and manual ». *Journal of High Energy Physics* **05** (mai 2006). DOI: 10.1088/1126-6708/2006/05/026.
- [165] T. SJÖSTRAND, S. MRENNA & P. SKANDS. « A brief introduction to PYTHIA 8.1 ». Computer Physics Communications 178.11 (2008), p. 852-867. DOI: 10.1016/j.cpc.2008.01.036.
- [166] T. SJÖSTRAND & coll. « An Introduction to PYTHIA 8.2 ». Computer Physics Communications 191 (2015), p. 159-177. DOI: 10.1016/j.cpc.2015.01.024. arXiv: 1410.3012 [hep-ph].
- [167] T. Speer & coll. Track Reconstruction in the CMS Tracker. Rapp. tech. CMS-CR-2005-014. Geneva: CERN, juil. 2005. DOI: 10.1016/j.nima.2005.11.207. URL: http://cds.cern.ch/record/884424.
- [168] D. P. STICKLAND. « The L3 Experiment ». *Philosophical Transactions : Physical Sciences and Engineering* **336**.1642 (1991), p. 223-236. URL: http://www.jstor.org/stable/53785.
- [169] A. TAPPER & D. Acosta. CMS Technical Design Report for the Level-1 Trigger Upgrade. Rapp. tech. Juin 2013. URL: https://cds.cern.ch/record/1556311.
- [170] The ALICE Collaboration. « The ALICE experiment at the CERN LHC. A Large Ion Collider Experiment ». *Journal of Instrumentation* 3.S08002 (2008). DOI: 10.1088/1748-0221/3/08/S08002. URL: http://cds.cern.ch/record/1129812.

- [171] The ATLAS Collaboration. « Search for additional heavy neutral Higgs and gauge bosons in the ditau final state produced in  $36 \, \text{fb}^{-1}$  of pp collisions at  $\sqrt{s} = 13 \, \text{TeV}$  with the ATLAS detector ». *Journal of High Energy Physics* 1 (jan. 2018). DOI: 10.1007/jhep01(2018)055.
- [172] The ATLAS Collaboration. « Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC ». *Physics Letters* **B716**.1 (2012), p. 1-29. DOI: 10.1016/j.physletb.2012.08.020. URL: http://www.sciencedirect.com/science/article/pii/S037026931200857X.
- [173] The ATLAS Collaboration. « Search for the neutral Higgs bosons of the Minimal Supersymmetric Standard Model in pp collisions at  $\sqrt{s} = 7$  TeV with the ATLAS detector ». *Journal of High Energy Physics* **02** (2013). DOI: 10.1007/JHEP02(2013)095. arXiv: 1211.6956 [hep-ex].
- [174] The ATLAS Collaboration. « Search for Heavy Higgs Bosons Decaying into Two Tau Leptons with the ATLAS Detector Using pp Collisions at  $\sqrt{s}=13\,\text{TeV}$  ». Physical Review Letters 125 (5 juil. 2020), p. 051801. DOI: 10.1103/PhysRevLett.125.051801. URL: https://link.aps.org/doi/10.1103/PhysRevLett.125.051801.
- [175] The ATLAS Collaboration. « The ATLAS Experiment at the CERN Large Hadron Collider ». Journal of Instrumentation 3.S08003 (2008). DOI: 10.1088/1748-0221/3/08/S08003. URL: http://cds.cern.ch/record/1129811.
- [176] The ATLAS Collaboration, The CMS Collaboration, The LHC Higgs Combination Group. Procedure for the LHC Higgs boson search combination in Summer 2011. Rapp. tech. CMS-NOTE-2011-005. ATL-PHYS-PUB-2011-11. Geneva: CERN, août 2011. URL: https://cds.cern.ch/record/1379837.
- [177] The CDF Collaboration. « Search for Higgs bosons predicted in two-Higgs-doublet models via decays to tau lepton pairs in 1,96 TeV  $p\bar{p}$  collisions ». *Physical Review Letters* **103** (2009). DOI: 10.1103/PhysRevLett.103.201801. arXiv: 0906.1014 [hep-ex].
- [178] The CDF Collaboration. « Observation of top quark production in  $p\bar{p}$  collisions with the collider detector at Fermilab ». *Physical Review Letters* **74**.14 (avr. 1995), p. 2626-2631. DOI: 10.1103/physrevlett.74.2626.
- [179] The CMS Collaboration. *Journal of Instrumentation* **10**.06 (juin 2015). DOI: 10.1088/1748-0221/10/06/p06005.
- [180] The CMS Collaboration. « Precise mapping of the magnetic field in the CMS barrel yoke using cosmic rays ». *Journal of Instrumentation* **5** (mar. 2010). DOI: 10.1088/1748-0221/5/03/t03021.
- [181] The CMS Collaboration. Baseline muon selections for Run-II. URL: https://twiki.cern.ch/twiki/bin/viewauth/CMS/SWGuideMuonIdRun2.
- [182] The CMS Collaboration. « Detector Performance and Software ». CMS Physics: Technical Design Report. 1. Technical Design Report CMS. Geneva: CERN, 2006. URL: http://cds.cern.ch/record/922757.
- [183] The CMS Collaboration. CMS TriDAS project: Technical Design Report. T. 1. Technical Design Report CMS. Geneva: CERN. url: http://cds.cern.ch/record/706847.
- [184] The CMS Collaboration. « Calibration of hadron calorimeter using isolated charged hadrons » (mai 2017). URL: https://cds.cern.ch/record/2263758.
- [185] The CMS Collaboration. « Description and performance of track and primary-vertex reconstruction with the CMS tracker ». *Journal of Instrumentation* **9** (mai 2014). DOI: 10.1088/1748-0221/9/10/P10009. URL: http://cds.cern.ch/record/1704291.
- [186] The CMS Collaboration. « Evidence for the 125 GeV Higgs boson decaying to a pair of  $\tau$  leptons ». *Journal of High Energy Physics* **05** (20 jan. 2014). DOI: 10.1007/JHEP05(2014)104. arXiv: 1401.5041v2 [hep-ex].
- [187] The CMS Collaboration. « Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC ». *Physics Letters* **B716**.1 (2012), p. 30-61. DOI: 10.1016/j.physletb.2012. 08.021. URL: http://www.sciencedirect.com/science/article/pii/S0370269312008581.

- [188] The CMS Collaboration. « Observation of a new boson with mass near 125 GeV in pp collisions at  $\sqrt{s} = 7$  and 8 TeV ». *Journal of High Energy Physics* **06** (juin 2013). DOI: 10.1007/jhep06(2013)081.
- [189] The CMS Collaboration. « Search for a Higgs boson decaying into a *b*-quark pair and produced in association with *b* quarks in proton-proton collisions at 7 TeV ». *Physics Letters* **B722** (2013), p. 207-232. DOI: 10.1016/j.physletb.2013.04.017. arXiv: 1302.2892 [hep-ex].
- [190] The CMS Collaboration. « Search for neutral Higgs bosons decaying to tau pairs in pp collisions at  $\sqrt{s} = 7 \,\text{TeV}$  ». Physics Letters B713 (2012), p. 68-90. DOI: 10.1016/j.physletb. 2012.05.028. arXiv: 1202.4083 [hep-ex].
- [191] The CMS Collaboration. « The performance of the CMS muon detector in proton-proton collisions at  $\sqrt{s} = 7 \,\text{TeV}$  at the LHC ». *Journal of Instrumentation* 8 (juin 2013). DOI: 10.1088/1748-0221/8/11/P11002. URL: https://cds.cern.ch/record/1558674.
- [192] The CMS Collaboration. Performance of the CMS electromagnetic calorimeter during the LHC Run II and its role in precision physics measurements. Rapp. tech. Geneva: CERN, août 2018. DOI: 10.22323/1.321.0084. URL: https://cds.cern.ch/record/2637093.
- [193] The CMS Collaboration. CMS TriDAS project: Technical Design Report. T. 2. Technical Design Report CMS. Geneva: CERN, 2002. URL: http://cds.cern.ch/record/578006.
- [194] The CMS Collaboration. « CMS ECAL first results with 2016 data » (juin 2016). URL: http://cds.cern.ch/record/2194169.
- [195] The CMS Collaboration. « CMS ECAL Response to Laser Light » (mar. 2019). URL: https://cds.cern.ch/record/2668200.
- [196] The CMS Collaboration. CMS Luminosity Public Results. URL: https://twiki.cern.ch/twiki/bin/view/CMSPublic/LumiPublicResults.
- [197] The CMS Collaboration. CMS luminosity measurement for the 2017 data-taking period at  $\sqrt{s}=13\,\text{TeV}$ . Rapp. tech. CMS-PAS-LUM-17-004. Geneva: CERN, 2018. URL: http://cds.cern.ch/record/2621960.
- [198] The CMS Collaboration. CMS luminosity measurement for the 2018 data-taking period at  $\sqrt{s} = 13$  TeV. Rapp. tech. CMS-PAS-LUM-18-002. Geneva: CERN, 2019. URL: http://cds.cern.ch/record/2676164.
- [199] The CMS Collaboration. CMS Luminosity Measurements for the 2016 Data Taking Period. Rapp. tech. CMS-PAS-LUM-17-001. Geneva: CERN, 2017. URL: http://cds.cern.ch/record/2257069.
- [200] The CMS Collaboration. « First results from the CMS SiPM-based hadronic endcap calorimeter ». Geneva, août 2018. DOI: 10.1088/1742-6596/1162/1/012009. URL: https://cds.cern.ch/record/2636475.
- [201] The CMS Collaboration. DeepJet: deep learning based on physics objects for jet reconstruction. URL: https://twiki.cern.ch/twiki/bin/viewauth/CMS/DeepFlavour.
- [202] The CMS Collaboration. CMS: letter of intent by the CMS Collaboration for a general purpose detector at LHC. Rapp. tech. CERN-LHCC-92-003. LHCC-I-1. Geneva: CERN, 1992. URL: https://cds.cern.ch/record/290808.
- [203] The CMS Collaboration. « Determination of jet energy calibration and transverse momentum resolution in CMS ». *Journal of Instrumentation* **6**.11 (nov. 2011). DOI: 10.1088/1748-0221/6/11/p11002.
- [204] The CMS Collaboration. CMS electromagnetic calorimeter calibration and timing performance during LHC Run I and future prospects. Rapp. tech. Geneva: CERN, nov. 2014. URL: https://cds.cern.ch/record/1975982.
- [205] The CMS Collaboration. « The CMS Particle Flow Algorithm ». EPJ Web of Conferences 191 (2018). DOI: 10.1051/epjconf/201819102016. URL: https://cds.cern.ch/record/2678077.

- [206] The CMS Collaboration. E/gamma Physics Object Group. URL: https://twiki.cern.ch/twiki/bin/view/CMS/EgammaPOG.
- [207] The CMS Collaboration. « ECAL 2016 refined calibration and Run2 summary plots » (avr. 2020). URL: https://cds.cern.ch/record/2717925.
- [208] The CMS Collaboration. Egamma Run II recommendations. URL: https://twiki.cern.ch/twiki/bin/view/CMS/EgammaRunIIRecommendations.
- [209] The CMS Collaboration. « Energy calibration and resolution of the CMS electromagnetic calorimeter in pp collisions at  $\sqrt{s}=7\,\mathrm{TeV}$  ». Journal of Instrumentation 8 (juin 2013). DOI: 10.1088/1748-0221/8/09/P09009. URL: https://cds.cern.ch/record/1554142.
- [210] The CMS Collaboration. Overview of the CMS electromagnetic calorimeter. Rapp. tech. Geneva: CERN, 1999. DOI: 10.1016/S0920-5632(99)00544-7. URL: https://cds.cern.ch/record/421977.
- [211] The CMS Collaboration. « HCAL Calibration in 2016 » (mai 2017). URL: https://cds.cern.ch/record/2263759.
- [212] The CMS Collaboration. « HCAL Calibration Status in Summer 2017 » (mai 2017). URL: https://cds.cern.ch/record/2281146.
- [213] The CMS Collaboration. « HCAL Energy Reconstruction Performance » (nov. 2016). URL: https://cds.cern.ch/record/2235509.
- [214] The CMS Collaboration. « HCAL Out Of Time Pileup Subtraction and Energy Reconstruction » (mai 2018). URL: https://cds.cern.ch/record/2320408.
- [215] The CMS Collaboration. « The CMS detector magnet ». *IEEE Transactions on Applied Superconductivity* **10**.1 (2000). DOI: 10.1109/77.828255. URL: http://cds.cern.ch/record/438917.
- [216] The CMS Collaboration. « HF and HEP17 : phase1 upgrade performances » (oct. 2017). URL : https://cds.cern.ch/record/2288359.
- [217] The CMS Collaboration. « Higgs to tau tau (MSSM) ». CMS-PAS-HIG-13-021 (2013). URL: http://cds.cern.ch/record/1623367.
- [218] The CMS Collaboration. « Identification of b-quark jets with the CMS experiment ». *Journal of Instrumentation* **8.**04 (avr. 2013). DOI: 10.1088/1748-0221/8/04/p04013.
- [219] The CMS Collaboration. Jet Energy Resolution. URL: https://twiki.cern.ch/twiki/bin/view/CMS/JetResolution.
- [220] The CMS Collaboration. « Jet energy scale and resolution performance with 13 TeV data collected by CMS in 2016 » (juin 2018). URL: http://cds.cern.ch/record/2622157.
- [221] The CMS Collaboration. « Jet energy scale and resolution performance with 13 TeV data collected by CMS in 2016-2018 » (avr. 2020). URL: https://cds.cern.ch/record/2715872.
- [222] The CMS Collaboration. « Search for neutral MSSM Higgs bosons decaying to a pair of tau leptons in *pp* collisions ». *Journal of High Energy Physics* **10** (oct. 2014). DOI: 10.1007/jhep10(2014)160.
- [223] The CMS Collaboration. « Jet energy scale and resolution in the CMS experiment in pp collisions at 8 TeV ». *Journal of Instrumentation* **12**.02 (fév. 2017). DOI: 10.1088/1748-0221/12/02/p02014.
- [224] The CMS Collaboration. « Event generator tunes obtained from underlying event and multiparton scattering measurements ». *European Physical Journal* C76.3 (2016). DOI: 10.1140/epjc/s10052-016-3988-x. arXiv: 1512.00815 [hep-ex].
- [225] The CMS Collaboration. « Performance of photon reconstruction and identification with the CMS detector in proton-proton collisions at  $\sqrt{s}=8\,\text{TeV}$  ». *Journal of Instrumentation* **10** (fév. 2015). DOI: 10.1088/1748-0221/10/08/P08010. URL: https://cds.cern.ch/record/1988093.

- [226] The CMS Collaboration. « Reconstruction and identification of tau lepton decays to hadrons and tau neutrino at CMS ». *Journal of Instrumentation* **11**.1 (2016). DOI: 10.1088/1748-0221/11/01/P01019. arXiv: 1510.07488 [physics.ins-det].
- [227] The CMS Collaboration. «Search for neutral MSSM Higgs bosons decaying into a pair of bottom quarks ». *Journal of High Energy Physics* **11** (2015). DOI: 10.1007/JHEP11(2015)071. arXiv: 1506.08329 [hep-ex].
- [228] The CMS Collaboration. « Search for neutral MSSM Higgs bosons decaying to  $\mu^+\mu^-$  in pp collisions at  $\sqrt{s}=7$  and 8 TeV ». *Physics Letters* **B752** (2016), p. 221-246. DOI: 10.1016/j. physletb.2015.11.042. arXiv:1508.01437 [hep-ex].
- [229] The CMS Collaboration. « The CMS trigger system ». *Journal of Instrumentation* **12**.1 (jan. 2017). DOI: 10.1088/1748-0221/12/01/P01020. URL: https://cds.cern.ch/record/2212926.
- [230] The CMS Collaboration. « CMS set of posters (En & Fr) updated 2019 » (mar. 2020). URL: https://cds.cern.ch/record/2712624.
- [231] The CMS Collaboration. *The Phase-1 Upgrade of the CMS Pixel Detector*. Rapp. tech. CMS-CR-2017-135. 06. Geneva: CERN, mai 2017. DOI: 10.1088/1748-0221/12/07/C07009. URL: https://cds.cern.ch/record/2265423.
- [232] The CMS Collaboration. Luminosity Physics Object Group (Lumi POG). URL: https://twiki.cern.ch/twiki/bin/viewauth/CMS/TWikiLUM.
- [233] The CMS Collaboration. Measurement of Higgs boson production and decay to the ττ final state. Rapp. tech. CMS-PAS-HIG-18-032. Geneva: CERN, 2019. URL: https://cds.cern.ch/record/2668685.
- [234] The CMS Collaboration. Measurement of Higgs boson production in the decay channel with a pair of τ leptons. Rapp. tech. CMS-PAS-HIG-19-010. Geneva: CERN, 2020. URL: http://cds.cern.ch/record/2725590.
- [235] The CMS Collaboration. MET Filter Recommendations for Run II. URL: https://twiki.cern.ch/twiki/bin/viewauth/CMS/MissingETOptionalFiltersRun2.
- [236] The CMS Collaboration. MET Uncertainties. URL: https://twiki.cern.ch/twiki/bin/viewauth/CMS/MissingETRun2Corrections#MET\_Uncertainties.
- [237] The CMS Collaboration. « MSSM  $H/A \rightarrow \tau\tau$  search with full Run-2 data ». 2021. URL: https://cms.cern.ch/iCMS/analysisadmin/cadilines?line=HIG-21-001&tp=an&id=2409&ancode=HIG-21-001.
- [238] The CMS Collaboration. MSSM Neutral Higgs. URL: https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHWGMSSMNeutral.
- [239] The CMS Collaboration. Multivariate Electron Identification for Run2. URL: https://twiki.cern.ch/twiki/bin/view/CMS/MultivariateElectronIdentificationRun2.
- [240] The CMS Collaboration. « Noise in Phase 1 HF detector in 2017 » (mai 2017). URL: https://cds.cern.ch/record/2281147.
- [241] The CMS Collaboration. Performance of missing transverse momentum in pp collisions at  $\sqrt{s} = 13 \, \text{TeV}$  using the CMS detector. Rapp. tech. Geneva: CERN, 2018. URL: https://cds.cern.ch/record/2628600.
- [242] The CMS Collaboration. *Performance of quark/gluon discrimination in* 8 TeV *pp data*. Rapp. tech. CMS-PAS-JME-13-002. Geneva: CERN, 2013. URL: http://cds.cern.ch/record/1599732.
- [243] The CMS Collaboration. « Performance of the DeepTau algorithm for the discrimination of taus against jets, electron, and muons » (oct. 2019). URL: https://cds.cern.ch/record/2694158.
- [244] The CMS Collaboration. *Pileup Removal Algorithms*. Rapp. tech. CMS-PAS-JME-14-001. Geneva: CERN, 2014. URL: https://cds.cern.ch/record/1751454.

- [245] The CMS Collaboration. Properties of the Higgs-like boson in the decay  $H \to ZZ \to 4\ell$  in pp collisions at  $\sqrt{s}=7$  and 8 TeV. URL: https://twiki.cern.ch/twiki/bin/view/CMSPublic/Hig13002TWiki.
- [246] The CMS Collaboration. Properties of the Higgs-like boson in the decay  $H \to ZZ \to 4\ell$  in pp collisions at  $\sqrt{s}=7$  and 8 TeV. Rapp. tech. CMS-PAS-HIG-13-002. Geneva: CERN, 2013. URL: https://cds.cern.ch/record/1523767.
- [247] The CMS Collaboration. Recommendation for Using b-tag Objects in Physics Analyses. URL: https://twiki.cern.ch/twiki/bin/view/CMS/BtagRecommendation.
- [248] The CMS Collaboration. « Results related to the Phase1 HE upgrade » (mai 2018). URL: https://cds.cern.ch/record/2320857.
- [249] The CMS Collaboration. « « ZOOOM »: Drawings of the CMS detector with SketchUp » (juin 2012). URL: https://cds.cern.ch/record/2629326.
- [250] The CMS Collaboration. « Search for additional neutral Higgs bosons decaying to a pair of tau leptons in pp collisions at  $\sqrt{s}=7$  and 8 TeV ». CMS-PAS-HIG-14-029 (2015). URL: https://cds.cern.ch/record/2041463.
- [251] The CMS Collaboration. « An embedding technique to determine  $\tau\tau$  backgrounds in proton-proton collision data ». *Journal of Instrumentation* **14**.06 (juin 2019). DOI: 10.1088/1748-0221/14/06/p06032.
- [252] The CMS Collaboration. « Particle-flow reconstruction and global event description with the CMS detector ». *Journal of Instrumentation* 12.10 (juin 2017). DOI: 10.1088/1748-0221/12/10/P10003. arXiv:1706.04965v2 [physics.ins-det]. URL: http://stacks.iop.org/1748-0221/12/i=10/a=P10003.
- [253] The CMS Collaboration. « Performance of reconstruction and identification of  $\tau$  leptons decaying to hadrons and  $\nu_{\tau}$  in pp collisions at  $\sqrt{s}=13\,\text{TeV}$  ». Journal of Instrumentation 13.10 (2018). DOI: 10.1088/1748-0221/13/10/P10005. arXiv: 1809.02816 [hep-ex].
- [254] The CMS Collaboration. « Performance of the CMS muon detector and muon reconstruction with proton-proton collisions at  $\sqrt{s}=13\,\text{TeV}$  ». Journal of Instrumentation 13 (avr. 2018). DOI: 10.1088/1748-0221/13/06/P06015. URL: https://cds.cern.ch/record/2313130.
- [255] The CMS Collaboration. « Search for additional neutral MSSM Higgs bosons in the di-tau final state in pp collisions at  $\sqrt{s} = 13 \,\text{TeV}$  ». *Journal of High Energy Physics* **09**.007 (sept. 2018). DOI: 10.1007/JHEP09(2018)007.
- [256] The CMS Collaboration. « Identification of heavy-flavour jets with the CMS detector in *pp* collisions at 13 TeV ». *Journal of Instrumentation* **13**.05 (mai 2018). DOI: 10.1088/1748-0221/13/05/p05011.
- [257] The CMS Collaboration. « Observation of the Higgs boson decay to a pair of  $\tau$  leptons with the CMS detector ». *Physics Letters* **B779** (avr. 2018), p. 283-316. Doi: 10.1016/j.physletb. 2018.02.004.
- [258] The CMS Collaboration. « Extraction and validation of a new set of CMS PYTHIA 8 tunes from underlying-event measurements ». *European Physical Journal* C80 (mar. 2019). DOI: 10.1140/epjc/s10052-019-7499-4. URL: https://cds.cern.ch/record/2669320.
- [259] The CMS Collaboration. « Measurement of differential cross sections for inclusive isolated-photon and photon+jets production in proton-proton collisions at  $\sqrt{s}=13\,\text{TeV}$  ». European Physical Journal C79.20 (juil. 2018). DOI: 10.1140/epjc/s10052-018-6482-9. URL: http://cds.cern.ch/record/2628267.
- [260] The CMS Collaboration. « Precision measurement of the structure of the CMS inner tracking system using nuclear interactions ». *Journal of Instrumentation* **13** (juil. 2018). DOI: 10.1088/1748-0221/13/10/P10034. URL: https://cds.cern.ch/record/2629890.
- [261] The CMS Collaboration. Standard Model Cross Sections for CMS at 13 TeV. URL: https://twiki.cern.ch/twiki/bin/viewauth/CMS/StandardModelCrossSectionsat13TeV.

- [262] The CMS Collaboration. *Studies of Tracker Material*. Rapp. tech. CMS-PAS-TRK-10-003. 2010. URL: https://cds.cern.ch/record/1279138.
- [263] The CMS Collaboration. Tau ID recommendations for Run-2. URL: https://twiki.cern.ch/twiki/bin/viewauth/CMS/TauIDRecommendationForRun2.
- [264] The CMS Collaboration. *The CMS electromagnetic calorimeter project : Technical Design Report*. Technical Design Report CMS. Geneva : CERN, 1997. URL: https://cds.cern.ch/record/349375.
- [265] The CMS Collaboration. « The CMS experiment at the CERN LHC. The Compact Muon Solenoid experiment ». *Journal of Instrumentation* 3.S08004 (2008). DOI: 10.1088/1748-0221/3/08/S08004. URL: http://cds.cern.ch/record/1129810.
- [266] The CMS Collaboration. *The CMS hadron calorimeter project : Technical Design Report*. Technical Design Report CMS. Geneva : CERN, 1997. URL : https://cds.cern.ch/record/357153.
- [267] The CMS Collaboration. *The CMS magnet project : Technical Design Report*. Technical Design Report CMS. Geneva : CERN, 1997. URL : http://cds.cern.ch/record/331056.
- [268] The CMS Collaboration. *The CMS muon project : Technical Design Report*. Technical Design Report CMS. Geneva : CERN, 1997. URL : https://cds.cern.ch/record/343814.
- [269] The CMS Collaboration. *The CMS tracker system project : Technical Design Report*. Technical Design Report CMS. Geneva : CERN, 1997. URL : https://cds.cern.ch/record/368412.
- [270] The DØ Collaboration. « Observation of the top quark ». *Physical Review Letters* **74**.14 (avr. 1995), p. 2632-2637. DOI: 10.1103/physrevlett.74.2632.
- [271] The DØ Collaboration. « Search for Higgs bosons decaying to  $\tau\tau$  pairs in  $p\bar{p}$  collisions at  $\sqrt{s}=1,96\,\text{TeV}$  ». Physics Letters B707 (2012), p. 323-329. DOI: 10.1016/j.physletb.2011.12. 050. arXiv: 1106.4555 [hep-ex].
- [272] The DØ Collaboration. « Measurement of the  $B^0_s$  lifetime in the exclusive decay channel  $B^0_s \to I/\Psi \phi$  ». *Physical Review Letters* **94** (fév. 2005). DOI: 10.1103/physrevlett.94.042001.
- [273] The LHCb Collaboration. « The LHCb Detector at the LHC ». Journal of Instrumentation 3.S08005 (2008). DOI: 10.1088/1748-0221/3/08/S08005. URL: http://cds.cern.ch/record/1129809.
- [274] The LHCf Collaboration. « The LHCf detector at the CERN Large Hadron Collider ». *Journal of Instrumentation* 3.S08006 (2008). DOI: 10.1088/1748-0221/3/08/S08006. URL: http://cds.cern.ch/record/1129808.
- [275] The MoEDAL Collaboration. *Technical Design Report of the MoEDAL Experiment*. Rapp. tech. CERN-LHCC-2009-006. MoEDAL-TDR-001. Juin 2009. URL: https://cds.cern.ch/record/1181486.
- [276] The SNO Collaboration. « Direct Evidence for Neutrino Flavor Transformation from Neutral-Current Interactions in the Sudbury Neutrino Observatory ». *Physical Review Letters* **89** (1 juin 2002). DOI: 10.1103/PhysRevLett.89.011301.
- [277] The Super-Kamiokande Collaboration. « Evidence for oscillation of atmospheric neutrinos ». *Physical Review Letters* **81** (8 août 1998), p. 1562-1567. DOI: 10.1103/PhysRevLett.81.1562.
- [278] The TOTEM Collaboration. « The TOTEM Experiment at the CERN Large Hadron Collider ». Journal of Instrumentation 3.S08007 (2008). DOI: 10.1088/1748-0221/3/08/S08007. URL: http://cds.cern.ch/record/1129807.
- [279] L. Torterotot. CMSTransverseTikZ: event displays in the CMS transverse plane with TikZ. url: https://gitlab.com/lucastorterotot/cmstransversetikz.
- [280] L. TORTEROTOT. « Search for additional neutral Higgs bosons decaying to τ leptons pairs in the CMS experiment at the LHC ». *JRJC 2019. Book of Proceedings*. Août 2020, p. 53-56. URL: https://hal.archives-ouvertes.fr/hal-02971995.
- [281] L. TORTEROTOT, E. AŞILAR & C. BERNET. Reconstruction of di-tau mass using Machine Learning. URL: https://github.com/lucastorterotot/DL\_for\_HTT\_mass.

- [282] L. TORTEROTOT, C. BERNET & E. AŞILAR. MergeBinErrors fix on total bin error. Fév. 2020. URL: https://github.com/cms-analysis/CombineHarvester/pull/243.
- [283] G. Touquet. « Search for an additional neutral MSSM Higgs boson decaying to tau leptons with the CMS experiment ». Thèse de doct. Université Claude Bernard Lyon 1, oct. 2019. URL: https://hal.archives-ouvertes.fr/tel-02526393.
- [284] S. Weinberg. « A model of leptons ». *Physical Review Letters* **19** (21 nov. 1967), p. 1264-1266. Doi: 10.1103/PhysRevLett.19.1264.
- [285] J. Wess & B. Zumino. « Supergauge transformations in four dimensions ». *Nuclear Physics* **B70**.1 (1974), p. 39-50. doi: 10.1016/0550-3213(74)90355-1. URL: http://www.sciencedirect.com/science/article/pii/0550321374903551.
- [286] J.-C. WINTER, F. KRAUSS & G. SOFF. « A modified cluster-hadronisation model ». *European Physical Journal* C36.3 (août 2004), p. 381-395. DOI: 10.1140/epjc/s2004-01960-8.
- [287] M. Wobisch & T. Wengler. « Hadronization Corrections to Jet Cross Sections in Deep-Inelastic Scattering » (1999). arXiv: hep-ph/9907280 [hep-ph].
- [288] C. S. Wu & coll. « Experimental Test of Parity Conservation in Beta Decay ». *Physical Review* **105** (4 fév. 1957), p. 1413-1415. DOI: 10.1103/PhysRev.105.1413.