Bibliography

- [1] LHCb collaboration, R. Aaij et al., First observation of $B^+ \to D_s^+ K^+ K^-$ decays and a search for $B^+ \to D_s^+ \phi$ decays, JHEP **01** (2018) 110, arXiv:1711.05637.
- [2] LHCb collaboration, A. A. Alves Jr. et al., The LHCb detector at the LHC, JINST 3 (2008) S08005.
- [3] R. Aaij et al., Performance of the LHCb Vertex Locator, JINST 9 (2014) P09007, arXiv:1405.7808.
- [4] G. Haefeli et al., The LHCb DAQ interface board TELL1, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 560 (2006), no. 2 494.
- [5] LHCb VELO, ST, K. Rinnert, LHCb silicon detectors: the Run 1 to Run 2 transition and first experience of Run 2, PoS VERTEX2015 (2015) 004.
- [6] LHCb collaboration, R. Aaij et al., LHCb detector performance, Int. J. Mod. Phys. A30 (2015) 1530022, arXiv:1412.6352.
- [7] R. Arink et al., Performance of the LHCb Outer Tracker, JINST 9 (2014) P01002, arXiv:1311.3893.
- [8] M. Adinolfi et al., Performance of the LHCb RICH detector at the LHC, Eur. Phys. J. C73 (2013) 2431, arXiv:1211.6759.
- [9] A. Papanestis and C. D'Ambrosio, Performance of the LHCb RICH detectors during the LHC Run II, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment

876 (2017) 221, The 9th international workshop on Ring Imaging Cherenkov Detectors (RICH2016).

- [10] R. V. Gomez and the LHCb collaboration, Commissioning of the Scintillator Pad Detector of LHCb with cosmic rays and first LHC collisions, Journal of Physics: Conference Series 293 (2011), no. 1 012059.
- [11] I. Machikhiliyan, The calibration of an LHCb electromagnetic calorimeter by recovering the invariant mass of neutral pions, Moscow University Physics Bulletin 68 (2013), no. 5 360.
- [12] Y. Guz, The LHCb Calorimeter system: design, performance and upgrade, Journal of Instrumentation 12 (2017), no. 07 C07024.
- [13] R. E. Kalman, A New Approach to Linear Filtering and Prediction Problems, Journal of Basic Engineering 82 (1960) 35.
- [14] R. Frhwirth, Application of Kalman filtering to track and vertex fitting, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 262 (1987), no. 2 444.
- [15] S. Benson, V. Gligorov, M. A. Vesterinen, and J. M. Williams, The LHCb Turbo Stream, Journal of Physics: Conference Series 664 (2015), no. 8 082004.
- [16] The LHCb collaboration, *Precision luminosity measurements at LHCb*, Journal of Instrumentation 9 (2014), no. 12 P12005.
- [17] S. van der Meer, Calibration of the effective beam height in the ISR, CERN-ISR-PO68-31.
- [18] Transverse Emittance Measurements Using LHCb's Beam-Gas Interactions, no. 8 in International Particle Accelerator Conference, (Geneva, Switzerland), JACoW, May, 2017. doi: 10.18429/JACoW-IPAC2017-MOPAB131.

[19] T. Sjöstrand, S. Mrenna, and P. Skands, A brief introduction to PYTHIA 8.1, Comput. Phys. Commun. 178 (2008) 852, arXiv:0710.3820.

- [20] T. Sjöstrand, S. Mrenna, and P. Skands, PYTHIA 6.4 physics and manual, JHEP 05 (2006) 026, arXiv:hep-ph/0603175.
- [21] I. Belyaev et al., Handling of the generation of primary events in Gauss, the LHCb simulation framework, J. Phys. Conf. Ser. **331** (2011) 032047.
- [22] D. J. Lange, The EvtGen particle decay simulation package, Nucl. Instrum. Meth. A462 (2001) 152.
- [23] P. Golonka and Z. Was, *PHOTOS Monte Carlo: A precision tool for QED corrections in Z and W decays*, Eur. Phys. J. **C45** (2006) 97, arXiv:hep-ph/0506026.
- [24] Geant4 collaboration, J. Allison et al., Geant4 developments and applications, IEEE Trans. Nucl. Sci. 53 (2006) 270; Geant4 collaboration, S. Agostinelli et al., Geant4: A simulation toolkit, Nucl. Instrum. Meth. A506 (2003) 250.
- [25] M. Clemencic et al., The LHCb simulation application, Gauss: Design, evolution and experience, J. Phys. Conf. Ser. **331** (2011) 032023.
- [26] V. V. Gligorov and M. Williams, Efficient, reliable and fast high-level triggering using a bonsai boosted decision tree, JINST 8 (2013) P02013, arXiv:1210.6861.
- [27] Particle Data Group, C. Patrignani et al., Review of particle physics, Chin. Phys. C40 (2016) 100001.
- [28] LHCb collaboration, R. Aaij et al., First observations of $\overline{B}^0_s \to D^+D^-$, $D^+_sD^-$ and $D^0\overline{D}^0$ decays, Phys. Rev. **D87** (2013) 092007, arXiv:1302.5854.
- [29] M. Pivk and F. R. Le Diberder, sPlot: A statistical tool to unfold data distributions, Nucl. Instrum. Meth. A555 (2005) 356, arXiv:physics/0402083.

[30] R. Brun and F. Rademakers, ROOT An object oriented data analysis framework, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 389 (1997), no. 1 81, New Computing Techniques in Physics Research V.

- [31] L. Breiman, J. H. Friedman, R. A. Olshen, and C. J. Stone, *Classification and regression trees*, Wadsworth international group, Belmont, California, USA, 1984.
- [32] G. Punzi, Sensitivity of searches for new signals and its optimization, in Statistical Problems in Particle Physics, Astrophysics, and Cosmology (L. Lyons, R. Mount, and R. Reitmeyer, eds.), p. 79, 2003. arXiv:physics/0308063.
- [33] W. D. Hulsbergen, Decay chain fitting with a Kalman filter, Nucl. Instrum. Meth. A552 (2005) 566, arXiv:physics/0503191.
- [34] W. Verkerke and D. Kirkby, *The RooFit toolkit for data modeling*, arXiv:physics/0306116.
- [35] LHCb collaboration, R. Aaij et al., Measurement of CP observables in $B^{\pm} \rightarrow D^{(*)}K^{\pm}$ and $B^{\pm} \rightarrow D^{(*)}\pi^{\pm}$ decays, Phys. Lett. **B777** (2017) 16, arXiv:1708.06370.
- [36] K. S. Cranmer, Kernel estimation in high-energy physics, Comput. Phys. Commun. 136 (2001) 198, arXiv:hep-ex/0011057.
- [37] B. Sen, M. Walker, and M. Woodroofe, On the unified method with nuisance parameters, Statistica Sinica 19 (2009) 301.
- [38] L. Anderlini et al., The PIDCalib package, Tech. Rep. LHCb-PUB-2016-021.
 CERN-LHCb-PUB-2016-021, CERN, Geneva, Jul, 2016.
- [39] A. Poluektov, Kernel density estimation of a multidimensional efficiency profile, Journal of Instrumentation 10 (2015), no. 02 P02011, arXiv:1411.5528.
- [40] J. Back et al., $Laura++: a \ Dalitz \ plot \ fitter, \ arXiv:1711.09854.$

[41] G. Breit and E. Wigner, Capture of Slow Neutrons, Phys. Rev. 49 (1936) 519.

- [42] S. M. Flatt, Coupled-channel analysis of the πη and KK systems near KK threshold, Physics Letters B 63 (1976), no. 2 224 .
- [43] L. Moneta et al., The RooStats Project, arXiv:1009.1003.
- [44] G. Cowan, K. Cranmer, E. Gross, and O. Vitells, Asymptotic formulae for likelihood-based tests of new physics, The European Physical Journal C 71 (2011) 1554.
- [45] G. J. Feldman and R. D. Cousins, A unified approach to the classical statistical analysis of small signals, Phys. Rev. **D57** (1998) 3873, arXiv:physics/9711021.
- [46] LHCb collaboration, R. Aaij et al., First evidence for the annihilation decay mode $B^+ \to D_s^+ \phi$, JHEP **02** (2013) 043, arXiv:1210.1089.