

Bhubanjyoti Bhattacharya

Curriculum Vitae, 2019

Field of research: Particle Physics (phenomenology)

Assistant Professor of Physics
Department of Natural Sciences
Lawrence Technological University

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Southfield, MI
bbhattach@ltu.edu

Adjunct Assistant Professor
Department of Physics and Astronomy
Wayne State University

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Employment

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| 2017 – | Assistant Professor of Physics, Lawrence Technological University |
| 2017 – | Adjunct Assistant Professor of Physics, Wayne State University |
| 2016 – 2017 | Postdoctoral Fellow, Wayne State University |
| 2012 – 2016 | Postdoctoral Fellow, Université de Montréal <i>Institute of Particle Physics (IPP) Theory Postdoctoral Fellowship, 2013 – 2015.</i> <i>Value: CA\$20K/yr</i> |

Education

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| 2006 – 2011 | Ph.D. Physics, University of Chicago, (<i>Advisor:</i> Jonathan L. Rosner) <i>Dissertation Title:</i> Relative Phases in Dalitz Plots for $D^0 \rightarrow 3$ Pseudoscalars <i>Subrahmanyam Chandrasekhar Fellowship, 2006–2008</i> |
| 2004 – 2006 | M.Sc. Physics, Indian Institute of Technology Kanpur “ <i>General Proficiency Medal</i> ” for highest GPA in graduating class of 2006 <i>Best Performance Awards, 2005 & 2006</i> |
| 2001 – 2004 | B.Sc. Physics Honours, Presidency College, Calcutta University <i>Jagadis Bose National Science Talent Search Scholarship (JBNSTS), 2001–2006</i> <i>Best Performance Awards, Presidency College, 2002 & 2003</i> |

Grants

- Lawrence Technological University Seed Grant, \$4.75K for the academic year 2018–2019.

Publications (refereed journals)

*=corresponding author

Inspirehep link

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| [33] | B. Bhattacharya*, A. Datta, S. Kamali, and D. London, “CP Violation in $\bar{B}^0 \rightarrow D^{*+} \mu^- \bar{\nu}_\mu$,” JHEP 05 (2019) 191, [arXiv:1903.02567[hep-ph]] |
| [32] | E. Bertholet, E. Ben-Haim, B. Bhattacharya, M. Charles, and D. London, “ <i>Extraction of the CKM phase γ using charmless 3-body decays of B mesons,</i> ” Phys. Rev. D 99 , 114011 (2019), [arXiv:1812.06194[hep-ph]] |
| [31] | B. Bhattacharya, C. M. Grant, and A. A. Petrov, “ <i>Invisible Widths of Heavy Mesons,</i> ” Phys. Rev. D 99 , 093010 (2019), [arXiv:1809.04606[hep-ph]] |

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- [30] B. Bhattacharya, R. Morgan, J. Osborne, and A. A. Petrov, “*Studies of Lepton Flavor Violation at the LHC*,” Phys. Lett. B, 785 (2018) 165 [[arXiv:1802.06082\[hep-ph\]](#)]
 - [29] B. Bhattacharya* and A. A. Petrov*, “*Hadronic decays of B_c mesons with flavor $SU(3)_F$ symmetry*,” Phys. Lett. B, 774 (2017) 430, [[arXiv:1708.07504\[hep-ph\]](#)]
 - [28] A. K. Alok, B. Bhattacharya, A. Datta, D. Kumar, J. Kumar and D. London, “*New Physics in $b \rightarrow s\mu^+\mu^-$ after the Measurement of R_{K^*}* ,” Phys. Rev. D **96**, 095009 (2017), [[arXiv:1704.07397\[hep-ph\]](#)]
 - [27] A. K. Alok, B. Bhattacharya*, D. Kumar, J. Kumar, D. London and S. U. Sankar, “*New Physics in $b \rightarrow s\mu^+\mu^-$: Distinguishing Models through CP-Violating Effects*,” Phys. Rev. D **96**, 015034 (2017), [[arXiv:1703.09247\[hep-ph\]](#)]
 - [26] B. Bhattacharya*, A. Datta, J. P. Guévin, D. London, and R. Watanabe, “*Simultaneous Explanation of the R_K and $R_{D^{(*)}}$ Puzzles: a Model Analysis*,” JHEP 01 (2017) 015, [[arXiv:1609.09078\[hep-ph\]](#)]
 - [25] B. Bhattacharya*, A. Datta, and D. London, “*Is there really a $W \rightarrow \tau\nu$ puzzle?*,” Phys. Rev. D **93**, 093008 (2016), [[arXiv:1603.03779\[hep-ph\]](#)]
 - [24] B. Bhattacharya, G. Paz, and A. J. Tropiano, “*Model-independent determination of the axial-mass parameter in quasielastic antineutrino-nucleon scattering*,” Phys. Rev. D **92**, 113011 (2015), [[arXiv:1510.05652\[hep-ph\]](#)]
 - [23] P. Saha, K. Kiers, B. Bhattacharya, D. London, A. Szynekman, and J. Melendez, “*Measuring CP-Violating Observables in Rare Top Decays at the LHC*,” Phys. Rev. D **93**, 054044 (2016), [[arXiv:1510.00204\[hep-ph\]](#)]
 - [22] B. Bhattacharya, J. M. Cline, A. Datta, G. Dupuis, and D. London, “*Quark-flavored scalar dark matter*,” Phys. Rev. D **92**, 115012 (2015), [[arXiv:1509.04271\[hep-ph\]](#)]
 - [21] B. Bhattacharya and D. London, “*Using U spin to extract γ from charmless $B \rightarrow PPP$ decays*,” JHEP 04 (2015) 154, [[arXiv:1503.00737\[hep-ph\]](#)]
 - [20] B. Bhattacharya*, A. Datta, D. London, and S. Shivashankara, “*Simultaneous Explanation of the R_K and $R(D^{(*)})$ Puzzles*,” Phys. Lett. B, 742 (2015) 370, [[arXiv:1412.7164\[hep-ph\]](#)]
 - [19] B. Bhattacharya*, A. Datta and D. London, “*Probing New Physics in Higgs Couplings to Fermions using an Angular Analysis*,” Phys. Lett. B, 736 (2014) 421, [[arXiv:1407.0695\[hep-ph\]](#)]
 - [18] B. Bhattacharya, M. Gronau, M. Imbeault, D. London and J. L. Rosner, “*Charmless $B \rightarrow PPP$ Decays: the Fully-Symmetric Final State*,” Phys. Rev. D **89**, 074043 (2014), [[arXiv:1402.2909\[hep-ph\]](#)]
 - [17] B. Bhattacharya, M. Imbeault, and D. London, “*Direct measurement of γ using $B \rightarrow K\pi\pi$ and $B \rightarrow KK\bar{K}$ decays*,” Phys. Lett. B, 728 (2014) 206, [[arXiv:1303.0846\[hep-ph\]](#)]
 - [16] B. Bhattacharya, M. Gronau, and J. L. Rosner, “*CP asymmetries in three-body B^\pm decays to charged pions and kaons*,” Phys. Lett. B, 726 (2013) 337, [[arXiv:1306.2625\[hep-ph\]](#)]
 - [15] B. Bhattacharya, A. Datta, M. Duraisamy, and D. London, “*Searching for New Physics with $\bar{b} \rightarrow \bar{s} B_s \rightarrow V_1 V_2$ Penguin Decays*,” Phys. Rev. D **88**, 016007 (2013), [[arXiv:1306.1911\[hep-ph\]](#)]
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- [14] B. Bhattacharya, A. Datta, and D. London, “*Reducing Penguin Pollution*,” Int. J. Mod. Phys. A, **28**, 1350063 (2013), [[arXiv:1209.1413\[hep-ph\]](#)]
 - [13] B. Bhattacharya, D. London, M. Gronau, and J. L. Rosner, “*Shift in weak phase γ due to CP asymmetries in D decays to two pseudoscalar mesons*,” Phys. Rev. D **87**, 074002 (2013), [[arXiv:1301.5631\[hep-ph\]](#)]
 - [12] B. Bhattacharya and J. L. Rosner, “*Flavor SU(3) tests from $D^0 \rightarrow K^0 K^- \pi^+$ and $D^0 \rightarrow \bar{K}^0 K^+ \pi^-$ Dalitz plots*,” Phys. Lett. B, **714** (2012) 276, [[arXiv:1203.6014\[hep-ph\]](#)] (overlap with “*Relative Phases in $D^0 \rightarrow K^0 K^- \pi^+$ and $D^0 \rightarrow \bar{K}^0 K^+ \pi^-$ Dalitz Plots*,” [[arXiv:1104.4962\[hep-ph\]](#)])
 - [11] B. Bhattacharya, A. Datta, M. Imbeault, and D. London, “*Measuring β_s with $B_s \rightarrow K^{0(*)} \bar{K}^{0(*)}$ – a Reappraisal*,” Phys. Lett. B, **717** (2012) 403, [[arXiv:1203.3435\[hep-ph\]](#)]
 - [10] B. Bhattacharya, M. Gronau, and J. L. Rosner, “*CP asymmetries in singly-Cabibbo-suppressed D decays to two pseudoscalar mesons*,” Phys. Rev. D **85**, 054014 (2012), [[arXiv:1201.2351\[hep-ph\]](#)]
 - [9] B. Bhattacharya, A. M. Thalapillil, and C. E. M. Wagner, “*Implications of sterile neutrinos for medium/long-baseline neutrino experiments and the determination of θ_{13}* ,” Phys. Rev. D **85**, 073004 (2012), [[arXiv:1111.4225\[hep-ph\]](#)]
 - [8] B. Bhattacharya, Richard. J. Hill, and Gil Paz, “*Model independent determination of the axial mass parameter in quasielastic neutrino-nucleon scattering*,” Phys. Rev. D **84**, 073006 (2011), [[arXiv:1108.0423\[hep-ph\]](#)]
 - [7] B. Bhattacharya and J. L. Rosner, “*Cross ratios between Dalitz plot amplitudes in three-body D^0 decays*,” Phys. Rev. D **82**, 114032 (2010), [[arXiv:1010.1770\[hep-ph\]](#)]
 - [6] B. Bhattacharya and J. L. Rosner, “*Relative phases in Dalitz plot amplitudes for $D^0 \rightarrow K_S \pi^+ \pi^-$ and $D^0 \rightarrow \pi^0 K^+ K^-$* ,” Phys. Rev. D **82**, 074025 (2010), [[arXiv:1008.4083\[hep-ph\]](#)]
 - [5] B. Bhattacharya and J. L. Rosner, “*Effect of η - η' mixing on $D \rightarrow PV$ decays*,” Phys. Rev. D **82**, 037502 (2010), [[arXiv:1005.2159\[hep-ph\]](#)]
 - [4] B. Bhattacharya, C. W. Chiang, and J. L. Rosner, “*Dalitz Plot Structure in $D^0 \rightarrow \pi^+ \pi^- \pi^0$* ,” Phys. Rev. D **81**, 096008 (2010), [[arXiv:1004.3225\[hep-ph\]](#)]
 - [3] B. Bhattacharya and J. L. Rosner, “*Charmed meson decays to two pseudoscalars*,” Phys. Rev. D **81**, 014026 (2010), [[arXiv:0911.2812\[hep-ph\]](#)]
 - [2] B. Bhattacharya and J. L. Rosner, “*Decays of Charmed Mesons to PV Final States*,” Phys. Rev. D **79**, 034016 (2009); **81**, 099903(E) (2010), [[arXiv:0812.3167\[hep-ph\]](#)]
 - [1] B. Bhattacharya and J. L. Rosner, “*Flavor symmetry and decays of charmed mesons to pairs of light pseudoscalars*,” Phys. Rev. D **77**, 114020 (2008), [[arXiv:0803.2385\[hep-ph\]](#)]

Conference proceedings

- [1] B. Bhattacharya and D. London, “*Extracting γ from three-body B-meson decays*,” Proceedings of CKM 2018, the 10th Workshop on the CKM Unitarity Triangle, University of Heidelberg, Germany, 17–21 September, 2018, doi: 10.5281/zenodo.2565849, [[arXiv:1811.10671\[hep-ph\]](#)].
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- [2] B. Bhattacharya and D. London, “Testing the SM with 3-body B Decays,” in J. H. Alvarenga Nogueira *et al.*, “Summary of the 2015 LHCb workshop on multi-body decays of D and B mesons,” [[arXiv:1605.03889\[hep-ex\]](#)]
- [3] B. Bhattacharya, D. London, and M. Imbeault (speaker), “Measurement of γ from three-body B decays,” in 2013 European Physical Society Conference on High Energy Physics - EPS-HEP 2013, July 18–24 2013, Stockholm, Sweden, [[arXiv:1310.1873\[hep-ph\]](#)]
- [4] B. Bhattacharya, D. London (speaker), and M. Imbeault, “Measurement of γ using $B \rightarrow K\pi\pi$ and $B \rightarrow KK\bar{K}$ decays,” in the Eleventh International Conference on Flavor Physics and CP Violation - FPCP2013, May 19–24 2014, Buzios, Rio de Janeiro, Brazil, [[arXiv:1306.5574\[hep-ph\]](#)]
- [5] B. Bhattacharya, “Direct CPV in Nonleptonic Charm Decays,” Proceedings of CKM 2012, the 7th International Workshop on the CKM Unitarity Triangle, University of Cincinnati, USA, 28 September–2 October, 2012, [[arXiv:1302.3198\[hep-ph\]](#)]
- [6] B. Bhattacharya, M. Imbeault, and D. London, “Extracting γ from three-body B decays,” Proceedings of CKM 2012, the 7th International Workshop on the CKM Unitarity Triangle, University of Cincinnati, USA, 28 September–2 October, 2012, [[arXiv:1212.1167\[hep-ph\]](#)]
- [7] B. Bhattacharya, M. Gronau, and J. L. Rosner, “Nonleptonic charm decays and CP Violation,” presented at Charm 2012, The 5th International Workshop on Charm Physics 14–17 May 2012, Honolulu, Hawai’i, [[arXiv:1207.6390\[hep-ph\]](#)]
- [8] B. Bhattacharya, M. Gronau, and J. L. Rosner, “Direct CP Violation in D Decays in view of LHCb and CDF Results,” in the Tenth International Conference on Flavor Physics and CP Violation - FPCP2012, May 21–25 2012, Hefei, China, [[arXiv:1207.0761\[hep-ph\]](#)]
- [9] B. Bhattacharya and J. L. Rosner, “Flavor Symmetry and Charm Decays,” in Proceedings of International Workshop on Charm Physics (Charm 2007), Ithaca, New York, 5–8 Aug 2007, p. 24 [[arXiv:0710.0336\[hep-ph\]](#)]

Invited Talks

- **“CP Violating New Physics in light of Flavor Anomalies,”** invited plenary talk at Anomalies 2019, a Indo-US Workshop, July 18–20, 2019, Indian Institute of Technology, Hyderabad, India
- **“CP Violation at the Intensity Frontier,”** Faculty Seed Grant research status talk at the 7th Annual Research Day 2019, Lawrence Technological University, Southfield, Apr 5, 2019
- **“Determination of γ using flavor SU(3): Making a case for three-body decays,”** invited talk at workshop on Future Challenges in Non-Leptonic B Decays, January 14–18, 2019, Mainz Institute of Theoretical Physics, Germany
- **“Extracting γ from three-body B -meson decays,”** invited parallel talk, CKM 2018, September 17–21, 2018, Universität Heidelberg, Germany
- **“Can flavor phenomenology provide a window to new physics?,”** invited colloquium, Physics Department, Presidency University, Kolkata (India), July 24, 2018
- **“Anomalies in B -meson decays and Lepton Flavor Violation,”** invited lecture at Post Flavor Physics and CP Violation (FPCP) 2018 Workshop, Indian Institute of Technology and University of Hyderabad, Hyderabad (India), July 19, 2018
- **“Recent developments in Lepton Flavor,”** research status talk at the 6th Annual Research Day 2018, Lawrence Technological University, Southfield, Apr 6, 2018

- **“Toward explaining B decay anomalies,”** invited talk at New Physics Interpretations at the LHC 2 Workshop, Apr 5–7, 2017, Argonne National Laboratory, Chicago
- **“Particle Physics in the LHC Era,”** invited presentation at Lawrence Technological University, Southfield, Feb 28, 2017
- **“Multibody hadronic decays,”** invited talk at workshop on Implications of LHCb measurements and future prospects, Nov 3–5, 2015, CERN, Geneva
- **“Multibody decays & flavor symmetries,”** invited talk at LHCb workshop on multibody decays of B and D mesons, Jul 27–30, 2015, CBPF, Rio-de-Janeiro. Conference Proceeding : B. Bhattacharya and David London, in J. H. Alvarenga Nogueira *et al.*, [[arXiv:1605.03889\[hep-ex\]](#)]
- **“Status and prospects of B Physics,”** invited talk at CAP Congress 2015, Jun 15–19, 2015, University of Alberta, Edmonton
- **“New Physics with $B_s \rightarrow VV$,”** invited talk at workshop on Implications of LHCb measurements and future prospects, Oct 14–16, 2013, CERN, Geneva
- **“CP Violation in D decays and the extraction of the CKM phase γ ,”** invited talk at CAP Congress 2013, May 27–31, 2013, Université de Montréal
- **“CP Violation,”** invited colloquium, Physics Department, University of Mississippi, Oxford, March 26, 2013
- **“Why is Direct CP Violation in D decays interesting?”** HEP Seminar at University of Michigan, Ann Arbor, October 5, 2012
- **“Why is Direct CP Violation in D decays interesting?”** HEP Journal Club Seminar at Michigan State University, East Lansing, October 4, 2012
- **“New approaches to extracting CKM Unitarity angles,”** Theory Group Seminar at Wayne State University, Detroit, October 3, 2012
- **“Direct CPV in Nonleptonic Charm Decays,”** invited parallel talk, CKM 2012, September 28–October 2, 2012, University of Cincinnati. Conference Proceeding : [[arXiv:1302.3198\[hep-ph\]](#)]
- **“Extracting γ from three-body B decays,”** invited parallel talk, CKM 2012, September 28–October 2, 2012, University of Cincinnati. Conference Proceeding : B. Bhattacharya (speaker), Maxime Imbeault and David London, [[arXiv:1212.1167\[hep-ph\]](#)]
- **“Nonleptonic charm decays and CP Violation,”** HEP Lunch Talk at University of Chicago, July 2, 2012
- **“Nonleptonic charm decays and CP Violation,”** invited plenary talk, Charm 2012, University of Hawaii at Manoa, Honolulu. Conference Proceeding : B. Bhattacharya (speaker), M. Gronau and J. L. Rosner, [[arXiv:1207.6390\[hep-ph\]](#)]
- **“CP Asymmetries in two-body D decays,”** Montreal Joint High Energy Physics Seminars, Feb 22, 2012

Summer schools attended

- 2017 Wolfram Summer School, WSS 2017
Bentley University, Waltham, Massachusetts
- 2009 Theoretical Advanced Study Institute in Elementary Particle Physics, TASI
University of Colorado, Boulder, Colorado
- 2008 Prospects in Theoretical Physics, PiTP
Institute for Advanced Study, Princeton, New Jersey
- 2005 Visiting Students Research Program, VSRP
Tata Institute of Fundamental Research, Mumbai, India

Professional activities

- Referee for Physical Review D, and Physical Review Letters
- Referee for Physics Letters B
- Referee for Journal of High Energy Physics
- Referee for European Journal of Physics A
- Referee for Advances in High Energy Physics
- Referee for Chinese Physics C
- Chaired parallel sessions at Pheno 2012, CAP 2015 conferences

Teaching experience

- *Teaching Undergraduate Courses (as the primary instructor):*
 - University Physics I (lecture and laboratory) for Science and Engineering majors, LTU (Classical Mechanics, Gravity, Fluids and Thermodynamics), Fall 2017, Spring 2018, Fall 2019
 - Quantum Mechanics (lecture) for Physics majors, LTU
- *Teaching Undergraduate Courses (as a teaching assistant):*
 - General Physics for Undergraduates, UChicago (Classical Mechanics, Electromagnetism, Wave Mechanics) 2006, 2008, 2009, 2011
 - Experimental Physics for Undergraduates, UChicago, 2009
- *Grading Graduate Courses:*
 - Quantum Field Theory I, II, and III, UChicago, 2008 – 2009
 - Graduate Quantum Mechanics I and II, UChicago, 2010 – 2011
- *Developing material for Graduate Courses:*
 - Quantum Field Theory III, UChicago, 2009 : Complete solutions for problem sets
 - Advanced Electrodynamics II, UChicago, 2010 : Complete solutions and course material
 - Physics of the LHC, UChicago, 2010 : Computational environments based on *MADGRAPH*, *PGS*, *PYTHIA 6.4* and its interfacing with *ROOT*

Student supervision (research)

- Julien Gabouriad, UG student, Université de Montreal.
Summer project titled “BSM physics with diquarks,” May – August, 2015
- Nicolas Boisvert Beaudry, Masters student, Université de Montreal.
Summer project on “ $B \rightarrow K\pi$ puzzle,” May – August, 2016
- Jean-Pascal Guévin, UG student, Université de Montreal.

Summer project on “Relating R_K and $R_{D^{(*)}}$ puzzles in various new physics models,” May – August, 2016, JHEP 01 (2017) 015, [[arXiv:1609.09078\[hep-ph\]](#)]

- Robert Morgan, UG student, Wayne State University.
Project on “Lepton flavor violation at colliders,” 2016 – 2017.
- Jameson Tockstein, UG student, Wayne State University.
Project on “Neutrino-nucleus scattering,” 2016 – 2017
- Francis Walz, UG student, Towson Univeristy.
Research Experience for Undergraduates (REU) 2017 program at Wayne State University.
Project on “New physics in $b \rightarrow s\mu^+\mu^-$ decays,” June – August, 2017
- Joseph Wieske, UG student, Wayne State University.
Research Experience for Undergraduates (REU) 2017 program at Wayne State University (Supervisor: Professor G. Paz). Project on “Neutrino-nucleus scattering,” 2016 – 2017
- Cody M. Grant, Graduate student, Wayne State University.
Project on “Invisible decays of mesons,” and other topics 2017 – current.
- Kylie LeBlanc, UG student, Lawrence Technological University.
Research Experience for Undergraduates (REU) 2018 program at Wayne State University.
Project on “Angular distribution in $\bar{B} \rightarrow D^*\ell^-\bar{\nu}$ ” Advised Senior Project I at Lawrence Technological University, August - December, 2018