LIZHEN LIN

Department of Mathematics
The University of Maryland
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EMPLOYMENT

Professor, Director of the Statistics Program, Department of Mathematics, The University of Maryland (July 1, 2023–current)

Associate Professor, Robert and Sara Lumpkins Associate Professor in Applied and Computational Mathematics and Statistics (July 2019- June 2023), The University of Notre Dame.

Assistant Professor, Huisking Foundation Inc. Assistant Professor (08/ 2016-06/ 2019): Department of Applied and Computational Mathematics and Statistics, The University of Notre Dame.

Assistant Professor (08/2014-07/ 2016): Department of Statistics and Data Sciences, The University of Texas-Austin.

Postdoctoral Associate (06/ 2012-08/ 2014): Department of Statistical Science, Duke University.
Mentor: Prof. David Dunson, Arts and Sciences Distinguished Professor.

Member of Laboratory of Psychiatric Neuroengineering (2012-2014), Duke University Medical Center. Mentor: Prof. Kafui Dzirasa, MD Ph.D.

EDUCATION

Doctor of Philosophy (Ph.D.) in Mathematics.
Department of Mathematics, The University of Arizona (May 2012).
Thesis advisor: Prof. Rabi Bhattacharya.

HONORS/AWARDS

1. 2017 NSF Career award.
2. 2017 DARPA YFA (Young Faculty Award).

RESEARCH INTERESTS

Bayesian modeling and asymptotics; Statistics on manifolds; Geometry & Statistics; Statistical network analysis; Statistical properties of deep neural network models; Foundations of AI.

Applied interests: Bioassay and environmental risk assessment; Machine learning in neuroscience; Persistent DNA analysis.

PUBLICATIONS

Books

1. Bhattacharya, R., **Lin, L.**, and Patrangenaru, V (2016). `A Course in Mathematical Statistics and Large Sample Theory`. Springer Series in Statistics.

Research Articles

2. Ohn, I.$^+$ and **Lin, L.** (2024). Adaptive variational Bayes: optimality, computation and applications. arXiv:2109.03204. *Annals of Statistics*, accepted.
3. Fang, Y*., Ohn, I., Gupta, V. and **Lin, L.** (2024). Intrinsic and extrinsic deep learning on manifold. arXiv: 2302.08606. *Electronic Journal of Statistics*, accepted.
4. Shen, L*., Amini, A., Josephs, N. and **Lin, L.** (2024). Bayesian community detection for networks with covariates `arXiv:2203.02090`. *Bayesian Analysis.* Accepted.
5. S Winter, T Campbell, **L Lin**, S Srivastava, DB Dunson (2024). Engaging directions in Bayesian computation. arXiv:2304.11251. *Statistical Science* 2024, Vol. 39, No. 1, 62-89.
6. Ohn, I.$^+$, **Lin, L.** and Kim, Y. (2023). A Bayesian factor model with adaptive posterior contraction. *Bayesian Statistics*, accepted.
7. Lee, K., You, K, and **Lin, L.** (2023). Bayesian optimal two-sample tests in high-dimension. `arXiv:2112.02580` *Bayesian Analysis.* accepted.
8. Amini, A., Paez., M.,and **Lin, L.** (2023). Hierarchical stochastic block model for community detection in multiplex networks. *Bayesian Analysis.* accepted.
9. Chae, M.$^+$, Kim, D., Kim, Y. and **Lin, L.** (2023). A likelihood approach to nonparametric estimation of a singular distribution using deep generative models. *Journal of the Machine Learning Research*, vol 24, 1-42.
10. Lee, K.$^+$ and **Lin, L.** (2023). Scalable Bayesian high-dimensional local department and dependence learning. *Bayesian analysis.* 18(1): 25-47.
11. Ohn, I.$^+$ and **Lin, L.** (2023). Optimal Bayesian estimation of Gaussian mixtures with growing number of components. *Bernoulli.* Vol. 29 (2), pp. 1195-1218
12. Josephs, N.*, **Lin, L.**, Rosenberg, S. and Kolaczyk, E. (2023). Bayesian classification, anomaly detection, and survival analysis using network inputs with application to the microbiome. `Arxiv:2004.04765`. *Annals of Applied Statistics.* vol 17 (1), 199-224.
13. Chen, L.*, Zhou, J. and **Lin, L.** (2023). Hypothesis testing for population of networks. *Communication in Statistics-Theory and Methods.* vol 52 (11), 3661-3684. `arXiv:1911.03783`
14. Y Fang *, M Niu, P Cheung, **L Lin** (2023). Extrinsic Bayesian Optimization on Manifolds. *Algorithms* vol. 16 (2), 117
15. **Lin, L.**, Lazar, D., Saparbayeva, B., and Dunson, D. B. (2022). Robust optimization and inference on manifolds. *Statistics Sinica,* accepted.
16. Chen, L.*, Josephs, N., **Lin, L.**, Zhou, J. and Kolaczyk, E. (2024). A spectral-based framework for hypothesis testing in populations of networks `arXiv:2011.12416`. *Statistics Sinica* vol 34, 87-110.
17. Jin, I., Jeon, M., Schweinberger, M. and **Lin, L.** (2022). Hierarchical network item response modeling for discovering differences between innovation and regular school systems in Korea. `Arxiv:1810.07876`. *Journal of the Statistical Royal Society, ser. C.* vol 71 (5), 1225–1244.
18. Lee, K.$^+$, **Lin, L.**, and Dunson, D. (2021). Maximum pairwise Bayes factors for covariance structure testing. *Electronic Journal of Statistics.* 15(2): 4384–4419.
19. Thomas, B., You, K., **Lin, L.**$^\#$, Lim, L., and Mukherjee, S (2021). Learning subspaces of different di-

mensions. *Journal of the Computational and Graphical Statistics.* DOI: 10.1080/10618600.2021.2000420. `Arxiv:1404.6841`. #-corresponding.

20. Hong, M, **Lin, L.** and Chen, Y. (2021). Asymptotically corrected person fit statistics for multidimensional constructs with simple structure and mixed item types. `PsyArXiv, 30 Apr.2020.` *Psychometrika.* Vol 86, 464–488.
21. Lee, K.$^+$, Chae, M.$^+$, and **Lin, L.** (2021). Bayesian high-dimensional semi-parametric inference beyond sub-Gaussian errors. *Journal of the Korea Statistical Society*, Vol 50, pp 511–527 .
22. Kolaczyk, E., **Lin, L.**, Rosenberg, S., Xu., J and Jackson, W. (2020). Averages of unlabeled networks: geometric characterization and asymptotic behavior. *Annals of Statistics,*, Vol. 48, No. 1, 514–538.
23. Lee, K.$^+$, and **Lin, L.** (2020). Bayesian bandwidth test and selection for high-dimensional banded precision matrices. *Bayesian Analysis*, Vol 15, No. 3 737–758.
24. Lee, K$^+$., Lee, J. and **Lin, L.** (2019). Minimax posterior convergence rates and model selection consistency in high-dimensional DAG models based on sparse Cholesky factors. *Annals of Statistics 2019,* Vol. 47, No. 6, 3413–3437.
25. Niu, M.,Cheung, P., **Lin, L.**$^\#$, Dai, Z., Lawrence, N. and Dunson, D. B. (2019). Intrinsic Gaussian processes on complex constrained domains. *Journal of the Royal Statistical Society, Ser. B.* **81**: 603–627. #-corresponding.
26. Bhattacharya, R. and **Lin, L.** (2019). Differential geometry for model independent analysis of images and other non-Euclidean data: recent developments. In: *Sidoravicius V. (eds) Sojourns in Probability Theory and Statistical Physics - II.* Springer Proceedings in Mathematics & Statistics, vol 299. Springer.
27. Chae, M.$^+$, **Lin, L** and Dunson, D.B. (2019) Bayesian sparse linear models with unknown symmetric errors. *Information and Inference.* vol 8 (3), 621–653.
28. **Lin, L.**, Niu, M., Pokman, C. and Dunson. D.B. (2019). Extrinsic Gaussian process models for regression and classification on manifolds. *Bayesian Analysis.* vol.14, 907–926. `Arxiv:1706.08757`
29. Li, C., **Lin, L.** and Dunson, D. B. (2019). On posterior consistency of tail index for Bayesian kernel mixture models. *Bernoulli*, Vol. 25, No. 3, 1999–2028.
30. Sarpavayeva, B.$^+$, Zhang, M.* and **Lin, L.** (2018). Communication efficient parallel algorithms for optimization on manifolds. *Neural Information Processing Systems 2018.*
31. Zhang, M.*, Lam, H. and **Lin, L.** (2018). Robust and scalable Bayesian model selection. *Computational Statistics & Data Analysis*, Vol. **127**, 229–247.
32. **Lin, L.**, Thomas, B.*, Zhu, H. and Dunson, D.B (2017). Extrinsic local regression on manifold-valued data. *Journal of the American Statistical Association-Theory and Methods.* **112**(519), 1261-1273.
33. Bhattacharya, R. and **Lin, L.** (2017). Omnibus CLTs for Fréchet means and nonparametric inference on non-Euclidean spaces. *Proceedings of American Mathematical Society.* Vol. **145**, 413-428.
34. Minsker, S., Srivastava, S., **Lin, L.** and Dunson, D.B. (2017). Robust and scalable Bayes via a median of subset posterior measure. *Journal of Machine Learning Research*, **18**(124):1–40.
35. Mukherjee, S. S., Sarkar, P., and **Lin, L.** (2017). On clustering network-valued data. *Neural Information Processing Systems 2017.*
36. **Lin, L.**, Rao, V., and Dunson, D.B (2017). Bayesian nonparametric inference on Stiefel manifold. *Statistics Sinica* **27**, 535–553.
37. Lazar, D. and **Lin, L.** (2017). Scale and curvature effects in principal geodesic analysis. *Journal of the Multivariate Analysis* **153**, 64–82.
38. Borg, J.S., **Lin, L.** et al. (2017) Rat intersubjective decisions are encoded by frequency-specific oscillatory contexts. *Brain and Behavior* **7**: e00710. DOI: 10.1002/brb3.710.
39. Hultman, R., Mague, S.D., Li, Q., Katz, B.M., Michel, N., **Lin, L.,** et.al (2016). Dysregulation of

cortical-mediated slow evolving limbic dynamics drives stress-induced emotional pathology. *Neuron* **91**(2),439–452.

40. Rao, V., **Lin, L.**, and Dunson, D.B (2016). Data augmentation for models based on rejection sampling. *Biometrika* **103** (2): 319–335.
41. Li, D., Wang X., **Lin, L** and Dey, D.(2016). Flexible link functions in nonparametric binary regression with Gaussian process priors. *Biometrics* **72**, 707–719.
42. **Lin, L**, Piegorsch, W., and Bhattacharya, R. (2015). Nonparametric benchmark dose estimation with continuous dose-response data. *Scandinavian Journal of Statistics* **42**, 713–731.
43. **Lin, L.** and Dunson, D. B. (2014). Bayesian monotone regression using Gaussian process projection. *Biometrika*, **101** (2): 303–317.
44. Piegorsch, W., Xiong, H, Bhattacharya, R., and **Lin, L.** (2014). Benchmark dose analysis via nonparametric regression modeling. *Risk Analysis* **34**(1), 135–151.
45. Minsker, S., Srivastava, S., **Lin, L.**, and Dunson, D.B. (2014) Scalable and robust Bayesian inference via the median posterior. *ICML 2014.*
46. Bhattacharya, R. and **Lin, L.** (2013). Recent progress in the nonparametric estimation of monotone curves -with applications to bioassay and environmental risk assessment. *Computational Statistics & Data Analysis*, **63**, 63–80.
47. Bhattacharya, R., Majumdar, M., and **Lin, L.** (2013). Problem of ruin and survival in economics: application of limit theorems in probability. *Sankhyā, Ser.B* **75**(2), 145–180
48. Piegorsch, W., Xiong, H., Bhattacharya, R., and **Lin, L.** (2012). Nonparametric estimation of benchmark doses in environmental risk assessment. *Environmetrics* **23** (8), 717–728.
49. Bhattacharya, R. and **Lin, L.** (2011). Nonparametric benchmark analysis in risk assessment: a comparative study by simulation and data analysis. *Sankhyā, Ser.B* **73**(1), 144-163.
50. Bhattacharya, R. and **Lin, L.** (2010). An adaptive nonparametric method in benchmark analysis for bioassay and environmental Studies. *Stat & Probab. Lett* **80**, 1947-1953.

Topological data analysis, Graph neural networks

51. Bao, D.$^+$, You, K.* and **Lin, L.** (2022). Network distance based Laplacian flow on graphs. `Arxiv:1810.02906`. *IEEE BigData 2022*, 715-720.
52. Hu, Y., Zhao, T., Xu, S., **Lin, L.** and Xu, Z. (2022). Neural-PDE: a RNN based neural network for solving time dependent PDEs. *Communications in Information and Systems.* Volume 22 (2), 223–245.
53. Nguyen, D., Lin, X., Le, P. and **Lin, L.** (2022). A graph-theoretical approach to DNA similarity analysis. `BioArxiv`. *Communications in Information and Systems (CIS),* Volume 22 (3), 383–400.
54. Nguyen, D., Le, P., Lin, X. and **Lin, L.** (2022). A topological characterization of DNA sequences based on chaos geometry and persistent homology. `BioArxiv`. *IEEE CSCI 2022.*.
55. Nguyen, D., Le, P., Hu, Z. and **Lin, L.** (2021). A topological approach to DNA similarity analysis from 5-dimensional representation. `BioArxiv`. Submitted.
56. Hu, Z., Fang, Y., and **Lin, L.** (2021). Training graph neural networks via graphon estimation (2021). `Arxiv2109.01918`. *IEEE BigData 2021.*
57. Nguyen, D., Lin, X. and **Lin, L.** (2020). Community detection, pattern recognition, and hypergraph-based learning: approaches using metric geometry and persistent homology. *Fuzzy Systems and Data Mining VI 457.*
58. Izadi, M.*, Fang, Y., Stevenson, R. and **Lin, L.** (2020). Optimization of Graph Neural Networks with Natural Gradient Descent. `arXiv:2009.09624`. *IEEE BigData 2020.*

Research Articles under review

59. Josephs, N., Amini, A., Paez, M. and **Lin, L.** (2023). Nested stochastic block model for simultaneously clustering networks and nodes. arXiv:2307.09210. Under review.
60. Fazeli-Asl, F., Zhang, M. and **Lin, L.** (2023). A Semi-Bayesian Nonparametric Hypothesis Test Using Maximum Mean Discrepancy with Applications in Generative Adversarial Networks. arXiv:2303.02637. Submitted to *JMLR*.
61. **Lin, L.**, Sarpabayeva, B., Zhang, M. and Dunson, D. (2020). Accelerated algorithms for convex and non-convex optimizations on manifolds. *Machine Learning* Under revision. arXiv:2010.08908

GRANTS

1. **Current**: PI for DMS: Deep Learning on Manifolds: New Architectures and Theoretical Foundations (Co-PI: Nguyen). $180, 000. 07/2021 -06/2024.
2. **Completed**: PI for DMS: Geometric and Statistical Foundations for Modeling Cell Shapes (Co-PI: Xu). $288,000. 07/2019 -06/2022.
3. **Completed**: PI for DMS CAREER: Utilizing Geometry for Statistical Learning and Inference. $400,000. 07/01/2017-06/30/2022.
4. **Completed**: PI for DARPA: Topological, Geometric and Statistical Foundations for Dynamic Networks (Co-PI: Nguyen). $458,744. 07/2017-12/2019.
5. **Completed**: Lead PI for NSF BigData 154633: BIGDATA:Collaborative Research:F:Big Data, it's not so big: exploiting low-dimensional geometry for learning and inference (PIs: Lim and Mukherjee). $1,000,000. 12/01/ 2015-11/30/ 2018.
6. **Completed**: Co-PI for ARO 201403161 (PI for Notre Dame subcontract): Mathematical Foundations for Analyzing Large Collections of Combinatorial-Data; $330,000. 07/01/2015-07/30/ 2018;
7. **Completed**: PI and organizer for NSF CBMS mathematical regional conference: Topological Data Analysis: Topology, Geometry and Statistics. $ 37,500. Summer 2016 at UT-Austin.

TEACHING EXPERIENCE

Courses Taught at Maryland

1. **Instructor**: STAT 741: *Linear Model II*. **Spring 2024.**

Courses Taught at Notre Dame

2. **Instructor:** ACMS 60885, *Applied Bayesian Statistics*, **Fall 2022**.
3. **Instructor:** ACMS 80870, *Topics in Statistics: Bayesian Nonparametric Modeling and Theory*, **Fall 2021**.
4. **Instructor:** ACMS 80870, *Topics in Statistics: Geometry & Statistics*, **Spring 2021**.
5. **Instructor:** ACMS 60850, *Applied Probability*, **Fall 2020**.
6. **Instructor:** ACMS 80870, *Topics in Statistics: High-dimensional Statistics*, **Fall 2019**.
7. **Instructor:** ACMS 60801-01, *Statistical Inference*, **Spring 2018, Spring 2019, Spring 2020, Spring 2023**.
8. **Instructor:** ACMS 80870, *Topics in Statistics: Network Analysis*, **Fall 2018**.
9. **Instructor:** ACMS 30540-01, *Mathematical Statistics*, **Spring 2018, Spring 2019**.

10. **Instructor:** ACMS 30540-1, *Mathematical Statistics*, **Spring 2017**.
11. **Instructor:** ACMS 80870, *Topics in Statistics: Network Analysis*, **Fall 2016**.

Courses Taught at UT-Austin

12. **Instructor:** SDS 383D, *Statistical Modeling II (Bayesian Nonparametrics)*, **Spring 2016.**
13. **Instructor:** SDS 302, *Data Analysis for the Health Sciences,* **Fall 2015**
14. **Instructor:** SSI 2015, *Introduction to Mixed Models with Applications*, **May 26–29, 2015; May 23-26, 2016**
15. **Instructor:** SDS 302, *Data Analysis for the Health Sciences,* **Fall 2014**

Courses Taught at UA

16. **Instructor:** Math 263, *Intro: Stat+Biostatistics,* **Spring 2010**
17. **Instructor:** Math 120R, *Calculus Preparation,* **Fall 2009**
18. **Instructor:** Math 160, *Basic Statistics,* **Spring 2009**
19. **Instructor:** Math 110, *College Algebra,* **Fall 2007, Spring 2008, Summer 2008.**

STUDENTS AND POSTDOC SUPERVISED

1. **Postdocs**:
   Francesco Gaffi (02/2023-). Lumpkins postdoc in statistics.
   Abdul-Nasah Soale (08/2021-). Moreau Academic Diversity postdoc. Co-supervised with Marie Lynn Miranda. Now tenure track at Case Western Reserve University.
   Minho Cho (08/2020-02/2022). Now tenure track at Inha University
   Ilsang Onh (03/2020-01/2022). Now tenure track at Inha University
   Bayan Saparbayeva (08/2017-07/2019, Co-supervise with with Dong Quan Nguyen). Now at University of Rochester.
   Kyoungjae Lee (01/2017-01/2019). Now tenure track at Sungkyunkwan University (SKKU).
   Dianbin Bao (08/2017-,07/2018, Co-supervise with with Dong Quan Nguyen)
   Minwoo Chae (08/2015-2017, Co-supervise with Stephen Walker). Now tenure track at Postech University.
   Prithwish Bhaumik (2014-2016). Now at Quantifind.

2. **Ph.D students**:
   Shivam Kumar (4th year, co-supervise with Daren Wang);
   Shitao Fan (3rd year)

   Graduated:
   Yihao Fang (2023, Co-supervise with Zhiliang Xu): Now Data Scientist at JP Morgan
   Kevin Manley (2022): Now Data Scientist at Army.
   Kisung You (2021, Co-supervise with Ick Hoon Jin): Now tenure track at CUNY
   Yutzu Kuo (2021): Now Principal Biostatistician at INCYTE.
   Luyi Shen (2021): Now Data Scientist at Comerica bank.

3. **Master's students**:
   Notre Dame:
   Meng Qiu (May, 2022);
   Mohammad Rasool Izadi (May, 2020).
   Max Hong (May, 2019).

Philip Pickering (June, 2019).
Zhou Kastner (graduated in August, 2017, now Data Scientist at Epic System).

UT-Austin:
Na Li (August, 2016.) Wanyi Wang (August 2016). Lingjia Zhang (May, 2016). Jiajun Chen (May, 2015). Shuling Malloy (May, 2015).

RECENT TALKS/PRESENTATIONS

1. Invited talk. Department of Statistics, Penn State University. March 14, 2024.
2. Invited talk. Department of Epidemiology and Biostatistics, School of Public Health, University of Maryland. February 22, 2024.
3. Invited talk. Division of Biostatistics and Bioinformatics. School of Medicine, University of Maryland. December 7, 2023.
4. Invited talk. Department of Statistics and Applied Probability. UC Santa Barbara. November 8, 2023.
5. Invited talk. Statistical Inference on Networks and High-Dimensional Data A workshop held in honor of Professor Carey E. Priebe's 60th birthday. October 18-20, 2023.
6. Invited talk. Department of Statistics and Data Science, Washington University at Saint Louis. September 7, 2023.
7. Colloquium talk. University of Science, Vietnam. July 27, 2023.
8. Seminar talk. Fudan Mathematics Center. May 16. 2023.
9. Seminar talk. Zhejiang University. May 12. 2023.
10. Seminar talk. Department of Mathematics. Washington State University. April 19. 2023.
11. Invited talk. Geometry & Statistics conference, Harvard university. Feb 28-Mar. 2, 2023.
12. Invited talk. Probability & Statistics seminar. University of Nottingham. November 3, 2022.
13. Colloquium talk. University of Science, Vietnam. July 28, 2022.
14. Invited talk. New England Statistics Symposium (NESS), May 22 - 25, 2022.
15. Invited talk. Department of Statistics and Data Science, Cornell University. April 20, 2022.
16. Invited talk. Tongji University research seminar. December 14, 2021.
17. Invited talk. Department seminar. Department of Statistics and Data Science. National University of Singapore. November 2, 2021.
18. Invited talk. Iowa State University Statistics Colloquium. October 4, 2021.
19. Invited talk. Applied Math Seminar. University of Kentucky. September 30, 2021;
20. Invited talk. 2021 ICSA Applied Statistics Symposium. September 13, 2021.
21. Invited talk. JSM 2021. August 12, 2021.
22. Invited talk. Tongji University research seminar. July 15, 2021.
23. Invited talk. 2021 ISBA World Meeting. July 1, 2021.
24. Invited talk. Data Science Institute (DSI) Seminar Series. Lawrence Livermore National Laboratory, June 1, 2021.
25. Colloquium talk. Hongkong University. May 12, 2021.
26. Invited Talk, CMStatistics conference, December 19, 2020.
27. Invited talk, Statistics Seminar, Department of Mathematics and Statistics, The University of Massachusetts, November 6, 2020.

28. Invited talk, Colloquium Seminar, Department of Statistics, Penn State University, October 17, 2020.
29. Invited talk for the Introductory Lecture Series on Scalable Bayes, Joint Statistical Meetings, August 6, 2020.
30. Seminar talk. School of Mathematical and Statistical Sciences, Arizona State University October 22, 2019.
31. Seminar talk. School of Mathematics and Computer Science, Wuhan University, China. July 26, 2019.
32. Colloquium talk. Department of Mathematics and Computer Science, University of Science, Ho Chi Minh City, Vietnam. July 8, 2019.
33. Invited keynote talk. 2nd Midwest Statistical Machine Learning Colloquium. May 13, 2019.
34. Colloquium talk. Department of Statistics and Actuarial Science, The University of Iowa. May. 9, 2019.
35. Invited talk. Biostatistics seminar. Indiana University. Jan 11, 2019.
36. Invited talk. Applied and Computational Mathematics Seminar. Department of Mathematics, Georgia Institute of Technology. November 5, 2018.
37. Invited talk. Biostatistics seminar. Northwestern University. October 29, 2018.
38. Invited talk. Machine Learning Seminar series. Michigan State University. October 1, 2018.
39. Invited talk. Eastern Asia Chapter of ISBA, July 12-13, 2018.
40. Lecturer for Summer school on 'Bayesian methods for Machine Learning'. Department of Mathematics and Computer Science, University of Science, Ho Chi Minh City, Vietnam. July 5-6, 2018.
41. Invited talk. IMS Asia Pacific Rim Meeting (IMS-APRM), June 26-29, 2018.
42. Invited talk. TGDA@OSU (Topology, Geometry, and Data Analysis @ OSU) TRIPODS workshop on Theory and Foundations of TGDA. May 21-25, 2018.
43. Invited talk. AMS Special Session on Geometric Methods in Shape Analysis at The Ohio State University. Mar. 17-18, 2018.
44. Invited talk. Special invited session. EcoSta 2017, Hong Kong, June 15-17, 2017.
45. Colloquium talk. Department of Mathematics and Computer Science, University of Science, Ho Chi Minh City, Vietnam. May 31, 2017.
46. Invited talk. 'Geometry, Statistics and Data Analysis'. RTG Statistical Sciences Symposium 2017. May 19-20, 2017.
47. Invited talk. Quantitive psychology seminar, The University of Notre Dame. November 17, 2016.
48. Invited talk. The 2016 IISA International Conference on Statistics. August 18-21, 2016.
49. Invited talk. IMS-APRM conference, Section on Geometry and Statistics, Hong Kong, June 27-30, 2016.
50. Colloquium talk. Department of Mathematics, Zhejiang University. Mar. 18. 2016.
51. Colloquium talk. Department of Statistics and Biostatistics, Rutgers University. Feb 24. 2016.
52. Stochastic seminar. Department of Mathematics, The University of Utah. Feb. 9, 2016.
53. Colloquium talk. Department of Mathematics, The University of Utah. Feb. 8, 2016.
54. Colloquium talk. Department of Statistics, Yale University. Feb. 5, 2016.
55. Colloquium talk. Department of Statistics, Columbia University. Jan. 21, 2016.
56. Colloquium talk. Department of Statistics, The University of California at Los Angeles. Jan. 5, 2016.
57. Colloquium talk. Department of Mathematical Sciences, NJIT. Dec. 2, 2015.
58. Colloquium talk. Department of Applied and Computational Mathematics and Statistics. The University of Notre Dame. November 19, 2015.
59. Invited talk. 15th Annual Red Raider Mini-Symposium on Spatial Inference on Manifolds. Nov. 6-7,

2015.

60. Colloquium talk. Department of Statistics, Purdue University, Oct. 16. 2015.
61. Colloquium talk. College of Mathematics, Sichuan University, June 2nd. 2015.
62. Colloquium talk. Department of Statistics and Actuarial Science, The University of Iowa. Apr. 30, 2015.
63. Invited lectures on Parametric Bayesian models (with Mingyuan Zhou). Machine Learning Summer School. The University of Texas at Austin, Jan. 07-08, 2015.
64. Colloquium talk. Department of Mathematics and Statistics, Boston University. Nov. 14, 2014.
65. Short presentation. ICML, Beijing, Jun. 22-26, 2014.
66. Invited talk. "Computational Methods for Massive/Complex Data" workshop, Imperial College London, UK, Jun. 19-20, 2014
67. Colloquium talk. Department of Statistics, University of Toronto. Feb. 25, 2014.
68. Colloquium talk. The Fariborz Maseeh Department of Mathematics and Statistics, Portland State University. Feb. 21, 2014.
69. Colloquium talk. Department of Statistics, Rice University. Feb. 17, 2014.
70. Colloquium talk. Department of Statistics, University of Pittsburgh. Feb. 7, 2014.
71. Colloquium talk. Department of Mathematical and Statistical Sciences, University of Colorado-Denver. Feb. 3, 2014.
72. Colloquium talk. Department of Statistics, Indiana University. Jan. 31, 2014.
73. Colloquium talk. Department of Mathematics and Statistics, Boston University. Jan.27, 2014.
74. Colloquium talk. Department of Statistics and Data Sciences, University of Texas-Austin. Jan. 24, 2014.
75. Colloquium talk. Department of Statistics, University of South Carolina. Jan. 21, 2014.
76. Colloquium talk. Department of Mathematics, New Mexico State University. Dec. 3, 2013.
77. Colloquium talk. Statistics Graduate Interdisciplinary Program. University of Arizona. Mar. 7th, 2013.
78. Colloquium talk. Trinity University, Texas, Feb. 15th, 2011.

OUTREACH/CONFERENCES ORGANIZED

1. **PI and organizer for NSF CBMS regional conference:** Organized the 2016 NSF-CBMS regional conference on Topological Data Analysis: Topology, Geometry and Statistics, which attracted almost 100 participants including graduate students, junior researchers and others.
2. **Co-organizer for Sonia Kovalevsky High School Mathematics Day:** Organized Sonia Kovalevsky High School Mathematics Day with two other female graduate students which is aimed at promoting women in science and mathematics, March 2010, University of Arizona.

RESEARCH REFERENCES

1. Professor David Dunson.
   Arts and Science Distinguished Professor
   Department of Statistical Science, Duke University, Durham, NC 27708, U.S.A.
   Email: dunson@duke.edu
2. Professor Eric Kolaczyk.
   Director of Hariri Institute of Computing

Department of Mathematics and Statistics, Boston University, Boston, MA 02215, U.S.A
Email: kolaczyk@bu.edu

3. Professor Rabi Bhattacharya.
Department of Mathematics, The University of Arizona, Tucson, AZ 85721, U.S.A.
Email: rabi@math.arizona.edu