

# Raúl Astudillo

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## EDUCATION

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### Cornell University

*August 2016-August 2022*

Ph.D. in Operations Research and Information Engineering

Advisor: Peter Frazier

Minors: Computer Science and Statistics

### University of Guanajuato & Center for Research in Mathematics

*August 2011-June 2016*

B.Sc. in Mathematics

GPA: 9.7/10

Highest GPA of the 2011-2016 class

## ACADEMIC POSITIONS

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### California Institute of Technology

*September 2022-Present*

Postdoctoral Scholar

Supervisor: Yisong Yue

## INDUSTRY POSITIONS

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### Facebook

Visiting Researcher

*October 2020-March 2021*

Supervisor: Eytan Bakshy

Research Intern

*June-September 2020*

Supervisor: Daniel Jiang

### ExxonMobil Upstream Research Company

Research Intern

*June-August 2019*

Supervisors: Liz Curry and Xiao-Hui Wu

Research Intern

*June-August 2018*

Supervisors: Damian Burch and Xiao-Hui Wu

## RESEARCH INTERESTS

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Bayesian Optimization, Preference Elicitation, Simulation Optimization, Active Learning, Uncertainty Quantification, Experimental Design, Optimal Learning, AI for Science

## PUBLICATIONS

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1. J. Bowden, [R. Astudillo](#), C. Yeh, J. Song, Y. Chen, T. Desautels, and Y. Yue, “New insights on Bayesian optimization with deep kernel learning”, *Preprint*.
2. J. Yang, R. Lal, J. Bowden, [R. Astudillo](#), M. Hameedi, Y. Yue, and F. Arnold, “Active learning-assisted directed evolution”, *Submitted*.
3. C. Cheng, [R. Astudillo](#), T. Desautels, and Y. Yue, “Practical Bayesian algorithm execution via posterior sampling” (Finalist at the 2024 INFORMS Undergraduate Operations Research Prize Competition), *Submitted*.
4. Q. Xie, [R. Astudillo](#), P. Frazier, Ziv Scully, and A. Terein, “Cost-aware Bayesian optimization via the Pandora’s box Gittins index”, *Submitted*.

5. V. Mishra, R. Astudillo, P. Frazier, and F. Zhang, "Probably-convergent source seeking with mobile agents" (Early version presented at the NeurIPS 2023 Workshop on Adaptive Experimental Design and Active Learning in the Real World), *Submitted*.
6. R. Astudillo, K. Li, M. Tucker, X. Chen, A. Ames, and Y. Yue, "Preferential multi-objective Bayesian optimization" (Early version presented at the ICML 2023 Workshop on The Many Facets of Preference-Based Learning), *Submitted*.
7. B. Sha, R. Astudillo, and P. Frazier, "Multi-attribute optimization under preference uncertainty" (Finalist at the 2020 INFORMS Undergraduate Operations Research Prize Competition), *Winter Simulation Conference, 2024 (Forthcoming)*.
8. P. Buathong, J. Wan, R. Astudillo, S. Daulton, M. Balandat, and P. Frazier, "Bayesian optimization of function networks with partial evaluations", *International Conference on Machine Learning, 2024*.
9. J. Jannink, R. Astudillo, and P. Frazier, "Insight into a two-part plant breeding scheme through Bayesian optimization of budget allocations", *Crop Science, 2023*.
10. R. Astudillo, Z. Lin, E. Bakshy, and P. Frazier, "qEUBO: A decision-theoretic acquisition function for preferential Bayesian optimization", *International Conference on Artificial Intelligence and Statistics, 2023*.
11. Z. Cosenza, R. Astudillo, P. Frazier, K. Baar, and D. Block, "Multi-information source Bayesian optimization of culture media for cellular agriculture" (Spotlight presentation at the ICML 2022 Adaptive Experimental Design and Active Learning in the Real World Workshop, 7%), *Biotechnology and Bioengineering, 2022*.
12. Z. Lin, R. Astudillo, P. Frazier, and E. Bakshy, "Preference exploration for efficient Bayesian optimization with multiple outcomes", *International Conference on Artificial Intelligence and Statistics, 2022*.
13. R. Astudillo, and P. Frazier, "Thinking inside the box: A tutorial on grey-box Bayesian optimization", *Advanced Tutorial at the Winter Simulation Conference, 2021*.
14. R. Astudillo, D.R. Jiang, M. Balandat, E. Bakshy, and P. Frazier, "Multi-step budgeted Bayesian optimization with unknown evaluation costs", *Advances in Neural Information Processing Systems, 2021*.
15. R. Astudillo and P. Frazier, "Bayesian optimization of function networks", *Advances in Neural Information Processing Systems, 2021*.
16. S. Cakmak, R. Astudillo, P. Frazier and E. Zhou, "Bayesian optimization of risk measures", *Advances in Neural Information Processing Systems, 2020*.
17. R. Astudillo and P. Frazier, "Multi-attribute Bayesian optimization with interactive preference learning", *International Conference on Artificial Intelligence and Statistics, 2020*.
18. R. Astudillo and P. Frazier, "Bayesian optimization of composite functions", *International Conference on Machine Learning, 2019*.

## SELECTED AWARDS

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|---|------|
| Rising Star in Data Science - UChicago and UC San Diego                           | 2024 |
| Rising Star in Management Science & Engineering - Stanford University             | 2024 |
| Outstanding Reviewer Award - NeurIPS  | 2021 |
| Second Prize - XXII International Mathematics Competition for University Students | 2015 |

## SELECTED PRESENTATIONS

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1. "Composite Bayesian optimization for efficient and scalable adaptive experimentation", *Online Reading Group on Modern Adaptive Experimental Design and Active Learning in the Real World, Virtual, 2024*.
2. "Thinking inside the box: A tutorial on grey-box Bayesian optimization", *Advanced Tutorial at the Winter Simulation Conference, Phoenix, AZ, October 2021*.
3. "Grey-box Bayesian optimization", *Young Researchers Workshop, Cornell University's School of Operations Research and Information Engineering, Ithaca, NY, 2021*.
4. "Bayesian optimization of function networks", *SIAM Conference on Computational Science and Engineering, Virtual, 2021*.
5. "Interactive Bayesian optimization with uncertain preferences", *Facebook Adaptive Experimentation Workshop, New York City, NY, 2020*.
6. "Bayesian optimization of composite functions with application to computationally expensive inverse problems", *Applied Inverse Problems Conference, Grenoble, France, 2019*.
7. "Bayesian optimization of composite functions", *International Conference on Machine Learning, Long Beach, CA, 2019*.
8. "Bayesian optimization of composite functions", *2nd Uber Science Symposium, San Francisco, CA, 2019*.

## MENTORING EXPERIENCE

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### Graduate Students

- Victor Amaya Carvajal - Duke University *June 2024-Present*
- Felix Huber - University of Stuttgart *June 2024-Present*
- Eliezer Fuentes - Cornell University *Feb 2024-Present*
- Qian Xie - Cornell University *August 2023-Present*
- Poompol Buathong - Cornell University *June 2022-May 2024*

### Undergraduate Students

- Eric Lee - California Institute of Technology *Jul 2024-Present*
- Andrew Zabelo - California Institute of Technology *March 2024-Present*
- Chu Xin (Cloris) Cheng - California Institute of Technology *Nov 2023-Present*
- Bhavik Sha - Cornell University *Feb 2020-October 2020*

## TEACHING EXPERIENCE

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### Instructor

- Uncertainty Quantification (Graduate) - California Institute of Technology *Spring 2023*
- Engineering Stochastic Processes (Undergraduate) - Cornell University *Summer 2021*

### Teaching Assistant

- Statistical Principles (Graduate) - Cornell University *Fall 2018*

- Engineering Stochastic Processes (Undergraduate) - Cornell University *Fall 2017*
- Basic Probability and Statistics (Undergraduate)- Cornell University *Fall 2016*
- Measure Theory and Probability (Graduate) - Center for Research in Mathematics *Fall 2015*
- Complex Analysis (Undergraduate) - University of Guanajuato *Spring 2015*

#### ACADEMIC SERVICE

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##### **Conference Reviewing**

AISTATS, ICLR, ICML, NeurIPS

##### **Journal Reviewing**

Artificial Intelligence, INFORMS Journal on Computing, Neural Computation, Operations Research, SIAM Review, Technometrics

#### LANGUAGES

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English (proficient), Spanish (native)