

# Sizhu Lu

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Address: 397 Evans Hall, Berkeley, CA

Research interests Causal inference, Semiparametric theory, Clinical trials, AI in causal inference

Education

|   |                |
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| <b>University of California, Berkeley</b>                     | Berkeley, CA   |
| Ph.D. candidate in Statistics                                 |                |
| Advisor: Professor Peng Ding                                  |                |
| <b>University of California, Berkeley</b>                     | Berkeley, CA   |
| Ph.D. in Business Administration, Haas School of Business     | 08/2022        |
| Advisor: Professor Amir Kermani                               |                |
| <b>Peking University</b>                                      | Beijing, China |
| B.S. in Mathematics and Applied Mathematics & B.A. in Finance | 07/2017        |
| <b>Harvard University</b>                                     | Cambridge, MA  |
| Visiting undergraduate student                                | Fall 2016      |

Publications and manuscripts

*Published:*

**Principal stratification with continuous post-treatment variables: nonparametric identification and semiparametric estimation**  
**Sizhu Lu**, Zhichao Jiang, and Peng Ding, 2025, *Journal of the Royal Statistical Society Series B: Statistical Methodology, in press*

**The roles of estimands and assumptions in causal inference: Comment on “Chasing shadows: how implausible assumptions skew our understanding of causal estimands”**

Peng Ding and **Sizhu Lu**, 2025, *Statistics in Biopharmaceutical Research*

*Under revision:*

**Estimating treatment effects with competing intercurrent events in randomized controlled trials**

**Sizhu Lu**, Yanyao Yi, Yongming Qu, Karen Liu, Ting Ye, and Peng Ding, 2025+,  
*Major revision at Journal of the American Statistical Association, arXiv preprint arXiv:2503.03049*

*Under review:*

**Design-based causal inference in bipartite experiments**

**Sizhu Lu\***, Lei Shi\*, Yue Fang, Wenxin Zhang, and Peng Ding, 2025+, *under review, arXiv preprint arXiv:2501.09844*

**Flexible sensitivity analysis for causal inference in observational studies subject to unmeasured confounding**

**Estimating within-cluster and between-cluster spillover effects in randomized saturation designs**

**Sizhu Lu\***, Lei Shi\*, and Peng Ding, 2025+, *under review*

**TERRA: A transformer-enabled recursive R-learner for longitudinal heterogeneous treatment effect estimation**

Lei Shi, **Sizhu Lu**, Rita Qiuran Lyu, Peng Ding, Nikos Vlassis, 2025+, *under review*, [arXiv preprint arXiv:2510.22407](https://arxiv.org/abs/2510.22407)

Selected research in progress **Two-phase sampling for the local average treatment effect: efficient estimation and optimal design**

*joint work with Peng Ding*

Instrumental variable methods are widely used for causal inference with unmeasured confounding, yet practical applications often involve partial data collection due to cost or design constraints. Motivated by modern large-scale randomized experiments with noncompliance and outcomes that are costly to measure, we study the identification and estimation of the local average treatment effect under two-phase sampling. We first show that the canonical two-stage least squares estimator must be weighted properly, and that the corresponding standard error must be modified according to the two-phase sampling design. We then propose a semiparametrically efficient and multiply robust estimator based on the efficient influence function. More importantly, we argue that two-phase sampling can utilize post-treatment variables that are predictive of the outcome, and discuss the corresponding estimation and inference problems. Our theory not only provides the basis for the optimal two-phase sampling but also covers the setting of missing outcomes under the local average treatment effect framework.

**Simple yet efficient weighting estimation for the marginal quantile treatment effect in randomized experiments**

*joint work with Peng Ding*

**Combining treatment policy and hypothetical strategies for competing intercurrent events**

*joint work with Yanyao Yi, Yongming Qu, Ting Ye, and Peng Ding*

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|-------------------------|--|-------------|
| Honors and scholarships | Graduate Division Conference Travel Grant, UC Berkeley         | 2024        |
|                         | San Francisco ASA JSM Travel Award                             | 2024        |
|                         | Society for Political Methodology Polmeth Meeting Travel Award | 2024        |
|                         | Outstanding Graduate Student Instructor                        | 2023        |
|                         | Outstanding Graduate of Beijing (Top 1%)                       | 2017        |
|                         | Merit Student of Peking University (Top 2%)                    | 2014 – 2016 |

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| Teaching experience | <b>Graduate Student Instructor, Department of Statistics, UC Berkeley</b>  |                          |
|                     | STAT 135: Concepts of Statistics   | Spring 2025              |
|                     | STAT 215B: Statistical Models: Theory and Application  | Spring 2024              |
|                     | STAT 156/256: Causal Inference   | Fall 2022, Fall 2023     |
|                     | STAT 230A: Linear Models   | Spring 2021, Spring 2023 |
|                     | <br><b>Guest Lecturer, Department of Statistics, UC Berkeley</b>   |                          |
|                     | STAT 156/256: Causal Inference   | 10/2025, 10/2022         |
|                     | STAT 230A: Linear Models   | 04/2023                  |
|                     | <br><b>Graduate Student Instructor, Haas School of Business, UC Berkeley</b>   |                          |
|                     | MFE 230M: Asset-Backed Security Markets  | Fall 2020 – 2022         |
|                     | MFE 230I: Fixed Income Markets   | Summer 2020              |
|                     | MBA 283: Real Estate Finance and Securitization  | Fall 2019                |
|                     | UGBA 180: Introduction to Real Estate & Urban Land Economics   | Spring 2019              |
|                     | <br><b>Instructor, Haas School of Business, UC Berkeley</b>  |                          |
|                     | Finance Net Present Value, Business Academy for Youth  | Summer 2019              |
| Talks and posters   | <br><b>Principal stratification with continuous post-treatment variables</b>   |                          |
|                     | Talk at School of Management and Economics, CUHK   | 05/2024                  |
|                     | Poster at 2024 American Causal Inference Conference  | 05/2024                  |
|                     | Poster at Winter Workshop: Causal Inference and Its Applications, University of Florida                                  | 01/2024                  |
|                     | Poster at 2023 CLIMB Retreat, UC Berkeley  | 11/2023                  |
|                     | <br><b>Flexible sensitivity analysis for causal inference in observational studies subject to unmeasured confounding</b> |                          |
|                     | Talk at 2024 INFORMS, Invited Paper Session  | 10/2024                  |
|                     | Poster at 2024 PolMeth   | 07/2024                  |
|                     | Talk at Center for Statistical Science, Tsinghua University  | 06/2023                  |
|                     | <br><b>Estimating treatment effects with competing intercurrent events in randomized controlled trials</b>               |                          |
|                     | Talk at Online Causal Inference Seminar  | 09/2025                  |
|                     | Talk at 2024 JSM Topic-Contributed Paper Session   | 08/2024                  |
|                     | Talk at Eli Lilly and Company (G4S Seminar)  | 05/2024                  |
|                     | Talk at 2024 Berkeley Statistics Annual Research Symposium   | 04/2024                  |
|                     | <br><b>Design-based causal inference in bipartite experiments</b>  |                          |
|                     | Poster at 2025 CLIMB Retreat, UC Berkeley  | 11/2025                  |
|                     | Poster at 2025 Berkeley Statistics Annual Research Symposium   | 09/2025                  |
|                     | Poster at Experimental Designs in the Era of Artificial Intelligence Workshop  |                          |

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|   |  | 03/2025                            |
| Poster at 2024 Stanford Berkeley Joint Colloquium   |  | 10/2024                            |
| <b>Estimating within-cluster and between-cluster spillover effects in randomized saturation designs</b> |  |                                    |
| Talk at the Emory Causal Network Analysis Workshop  | 08/2025  |                                    |
| <b>The roles of estimands and assumptions in causal inference</b>                                       |  |                                    |
| Talk at the ASA Biopharmaceutical Webinar   | 11/2025  |                                    |
| Reviewing service   | Journal of the American Statistical Association, Annals of Statistics, Biometrika, Journal of the Royal Statistical Society, Series B, Journal of Causal Inference, Statistica Sinica, Journal of Educational and Behavioral Statistics, Biometrical Journal, Biostatistics, Journal of Computational and Graphical Statistics, Sociological Methods and Research, Transactions on Machine Learning Research.  |                                    |
| Statistical consulting  | <p><b>National Security Agency</b></p> <p><i>Science Advisory Group</i></p> <ul style="list-style-type: none"> <li>Selected as part of a Berkeley-led advisory group that provides consulting on statistical problems posed by the National Security Agency.</li> <li>Analyzed problem statements derived from real-world intelligence and security contexts (with sensitive details removed), discussed solutions through a series of technical meetings, and prepared written reports applying statistical theory.</li> </ul>  | 2024, 2025                         |
|   | <b>Eli Lilly and Company</b>   |                                    |
|   | <i>Academic Contractor: Consulting Statistician</i>  | 09/2024 – Present                  |
|   | <i>Statistician Co-op Intern</i>   | 01/2024 – 05/2024                  |
|   | <ul style="list-style-type: none"> <li>Collaborated with Eli Lilly statisticians to address methodological challenges in the analysis of randomized controlled trials involving intercurrent events.</li> <li>Developed causal estimands and estimators that bridge regulatory estimand strategies with practical trial analysis.</li> <li>This collaboration directly led to my papers “<i>Estimating treatment effects with competing intercurrent events in randomized controlled trials</i>” and “<i>Combining treatment policy and hypothetical strategies for competing intercurrent events</i>”.</li> </ul> |                                    |
| Industry experience   | <p><b>Netflix</b></p> <p><i>Experimentation and Causal Inference Intern</i></p> <ul style="list-style-type: none"> <li>Conducted causal analyses of business decisions using longitudinal observational data.</li> <li>Applied structural nested mean models under parallel-trends assumptions to estimate dynamic treatment effects.</li> </ul>   | Los Gatos, CA<br>05/2023 – 08/2023 |

- This work deepened my understanding of causal inference in longitudinal settings and directly informed the later conference paper “*Transformer-Enabled Recursive R-Learner (TERRA)*”, integrating causal structure with modern machine learning architectures.

Programming skills    Proficient in: R, Python, MATLAB, and Stata.