

Carles DOMINGO-ENRICH

CONTACT DATA

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EDUCATION

MAY 2024 | PhD in **Computer Science** at the **Courant Institute of Mathematical Sciences, New York University**. Advisor: Joan Bruna. Topics of research: diffusion models, generative modeling, theory of deep learning, hypothesis testing, optimization for continuous games.
SEPT 2019 |
SEPT 2014 | Bachelor's degrees in **Mathematics** and **Engineering Physics**
- MAY 2019 | at **Universitat Politècnica de Catalunya (UPC)**, Barcelona. Student at CFIS (Interdisciplinary Higher Education Center). FINAL GRADES: 8.63/10 (Math.), 8.98/10 (Eng. Physics)

RESEARCH AND WORK EXPERIENCE

Current
SEPT 2024 | Senior Researcher at **Microsoft Research** New England in Cambridge, MA, working on generative AI models
AUG 2024 | Visiting Researcher (part-time) at **Meta FAIR Labs** in New York City, NY, working with
OCT 2022 | Ricky T. Q. Chen and Brandon Amos.
MAY-AUG 2022 | Intern at **Microsoft Research** New England in Cambridge, MA (remote), working with Lester Mackey.
MAY-AUG 2021 | Intern at **IBM Research AI** in Yorktown Heights, NY (remote), working with Youssef Mroueh.
2020-2022 | TA for the courses DS-GA 1014 Optimization and Computational Linear Algebra for Data Science (Fall 2020), and CSCI-GA 3033-079 Special Topic: Mathematics of Deep Learning (Spring 2022). TA and grader for the course DS-GA 1005 Inference and Representation (Fall 2021).
SEPT '18-MAY '19 | Student intern at NYU, Courant Institute of Mathematical Sciences
MAY-AUG 2018 | Data scientist intern at Gauss & Neumann (SEM firm) in Barcelona
JUL-SEPT 2017 | Summer research intern at Nokia Bell Labs in Paris (Nokia Paris-Saclay)

PUBLICATIONS, PREPRINTS AND REPORTS

- He, J., Blessing, D., Cheng, M., Du, Y., **Domingo-Enrich, C.** Fixed-point neural samplers on discrete spaces. arXiv preprint Oct. 2026.
- Char, S., **Domingo-Enrich, C.**, Balestrieri, R. Bigger Text Encoders Can Hurt CLIP Zero-Shot Performance. arXiv preprint Sept. 2026.
- Blessing, D.^{*}, Cheng, M.^{*}, Schebek, M., Rogal, J., Li, M., **Domingo-Enrich, C.**[†], Du, Y.[†]. JANUS: A Multi-modal Foundation Neural Sampler for Disordered Materials. arXiv preprint Aug. 2026.
- Cheng, M.^{*}, Blessing, D.^{*}, Yu, B., Neumann, G., Li, M., **Domingo-Enrich, C.**[†], Du, Y.[†]. ATLAS: A Foundation Neural Sampler for Amorphous Materials. arXiv preprint Jul. 2026.
- He, J., Ou, Z., Vargas, F., Li, Y., Hernández-Lobato, J. M., **Domingo-Enrich, C.**, Du, Y. Free energy Estimation on Any State Space. NeurIPS 2026.
- Bergmeister, A., Jegelka, S., Nüsken, N., **Domingo-Enrich, C.**[†], Pidstrigach, J.[†]. Reinforce Adjoint Matching: Scaling RL Post-Training of Diffusion and Flow-Matching Models. NeurIPS 2026.

- **Domingo-Enrich, C.**, Du, Y., Albergo, M. S. A unified perspective on fine-tuning and sampling with diffusion and flow models. arXiv preprint Apr. 2026.
- Du, Y., He, J., Zhang, D., Vanden-Eijnden, E., **Domingo-Enrich, C.** Rare Event Analysis via Stochastic Optimal Control. arXiv preprint Apr. 2026.
- **Domingo-Enrich, C.**, Han, J. Adjoint Matching through the Lens of the Stochastic Maximum Principle in Optimal Control. TMLR 2026.
- Jelassi, S.*, Kwun, M.*, Zhao, R.*, Li, Y., Fusi, N., Du, Y., Kakade, S. M., **Domingo-Enrich, C.***. Matching Features, Not Tokens: Energy-Based Fine-Tuning of Language Models. arXiv preprint Mar. 2026.
- Golowich, N., Chen, F., Rohatgi, D., Singhal, R., **Domingo-Enrich, C.**, Foster, D. J., Krishnamurthy, A. Reject, Resample, Repeat: Understanding Parallel Reasoning in Language Model Inference. NeurIPS 2026.
- Sabour, A.*, Albergo, M. S.*, **Domingo-Enrich, C.***, Boffi, N. M., Fidler, S., Kreis, K., Vanden-Eijnden, E. Test-time scaling of diffusions with flow maps. NeurIPS 2026.
- Horvitz, Z., Singhal, R., Zou, H., **Domingo-Enrich, C.**, Yu, Z., Ranganath, R., McKeown, K. Rethinking Reasoning with MDLMs: Early Exits, Post-hoc Reasoning, and Beyond. COLM 2026.
- Liu, Z., Xiao, T. Z., **Domingo-Enrich, C.**, Liu, W., Zhang, D. Value Gradient Guidance for Flow Matching Alignment. NeurIPS 2025.
- Kim, J.*, Lee, C.-K.*, **Domingo-Enrich, C.**, Du, Y., Kakade, S., Ngotiaoco, T., Chen, S.[†], Albergo, M.[†]. Any-Order Flexible Length Masked Diffusion. ICLR 2026. *Equal contribution, [†]Senior equal contribution
- Blessing, D., Berner, J.*, Richter, L.*, **Domingo-Enrich, C.***, Du Y., Vahdat, A., Neumann, G. Trust Region Constrained Measure Transport in Path Space for Stochastic Optimal Control and Inference. NeurIPS 2025 (**spotlight**, ~ 4% of submissions). *Equal contribution
- Yang, K. K., Alamdari, S., Lee, A., Kaymak-Loveless, K., Char, S., Brix, G., **Domingo-Enrich, C.**, Wang, C., Lyu, S., Fusi, N., Tenenholz, N., Amini, A. P. The Dayhoff Atlas: scaling sequence diversity for improved protein generation. bioRxiv preprint Jul. 2025.
- Havens, A., Kurt Miller, B., Yan, B., **Domingo-Enrich, C.**, Sriram, A., Wood, B., Levine, D., Hu, B., Amos, B., Karrer, B., Fu, X., Liu, G.-H., Chen, R. T. Q. Adjoint Sampling: Highly Scalable Diffusion Samplers via Adjoint Matching. ICML 2025.
- Pidstrigach, J., Baker, E., **Domingo-Enrich, C.**, Deligiannidis, G., Nüsken, N. Conditioning Diffusions Using Malliavin Calculus. ICML 2025.
- **Domingo-Enrich, C.**, Dwivedi, R., Mackey, L. Cheap permutation testing. Annals of Statistics (to appear).
- Wang, C., Alamdari, S., **Domingo-Enrich, C.**, Amini, A., Yang, K. K. Towards deep learning sequence-structure co-generation for protein design. Current Opinion in Structural Biology, 2025.
- **Domingo-Enrich, C.** A taxonomy of loss functions for stochastic optimal control. arXiv preprint Oct. 2024.
- **Domingo-Enrich, C.**, Drozdal, M., Karrer, B., Chen, R.T.Q. Adjoint matching: fine-tuning flow and diffusion generative models with memoryless stochastic optimal control. ICLR 2025 (**spotlight**, ~ 5% of submissions).
- **Domingo-Enrich, C.**, Han, J., Amos, B., Bruna, J., Chen, R.T.Q. Stochastic optimal control matching. NeurIPS 2024.
- Pooladian, A.-A., **Domingo-Enrich, C.**, Chen, R.T.Q., Amos, B. Neural optimal transport with Lagrangian costs. UAI 2024.

- Jelassi, S., d’Ascoli, S., **Domingo-Enrich, C.**, Wu, Y., Li, Y., Charton, F. Length generalization in arithmetic transformers. arXiv preprint Jun. 2023.
- Cabannes, V., **Domingo-Enrich, C.** Open problem: learning with variational objectives on measures. arXiv preprint Jun. 2023.
- **Domingo-Enrich, C.**, Pooladian, A.-A. An explicit expansion of the Kullback-Leibler divergence along its Fisher-Rao gradient flow. TMLR 2023.
- Pooladian, A.-A.*, Ben-Hamu, H.*, **Domingo-Enrich, C.***, Amos, B., Lipman, Y., Chen, R.T.Q. Multisample flow matching: straightening flows with minibatch couplings. ICML 2023. *Equal contribution
- **Domingo-Enrich, C.**, Dwivedi, R., Mackey, L. Compress then test: powerful kernel testing in near-linear time. AISTATS 2023.
- **Domingo-Enrich, C.** Computing the variance of shuffling stochastic gradient algorithms via power spectral density analysis. arXiv preprint Jun. 2022.
- **Domingo-Enrich, C.**, Mroueh, Y. Auditing differential privacy in high dimensions with the kernel quantum Rényi divergence. arXiv preprint May 2022.
- **Domingo-Enrich, C.**, Schiff, Y., Mroueh, Y. Learning with stochastic orders. ICLR 2023 (**spotlight**, $\sim 8\%$ of submissions).
- **Domingo-Enrich, C.**, Bruna, J. Simultaneous transport evolution for minimax equilibria on measures. arXiv preprint Feb. 2022.
- **Domingo-Enrich, C.** Depth and feature learning are provably beneficial for neural network discriminators. COLT 2022.
- **Domingo-Enrich, C.**, Mroueh, Y. Tighter sparse approximation bounds for ReLU neural networks. ICLR 2022 (**spotlight**, $\sim 5\%$ of submissions).
- **Domingo-Enrich, C.**, Bietti, A., Gabrié, M., Bruna, J., Vanden-Eijnden E. Dual training of energy-based models with overparametrized shallow neural networks. arXiv preprint July 2021.
- **Domingo-Enrich, C.**, Mroueh Y. Separation results between fixed-kernel and feature-learning probability metrics. NeurIPS 2021 (**oral**, $< 1\%$ of submissions).
- **Domingo-Enrich, C.**, Bietti, A., Vanden-Eijnden, E., Bruna, J. On energy-based models with overparametrized shallow neural networks. ICML 2021 (**long talk**, $\sim 3\%$ of submissions).
- **Domingo-Enrich, C.**, Pedregosa, F., Scieur, D. Average-case acceleration for bilinear games and normal matrices. ICLR 2021.
- **Domingo-Enrich, C.**, Jelassi, S., Mensch, A., Rotskoff, G., Bruna, J. A mean-field analysis of two-player zero-sum games. NeurIPS 2020.
- Jelassi, S.*, **Domingo-Enrich, C.***, Scieur, D., Mensch, A., Bruna, J. Extragradient with player sampling for faster Nash equilibrium finding. ICML 2020. *Equal contribution.
- Domingo-Ferrer, J., Ricci, S., **Domingo-Enrich, C.** Outsourcing scalar products and matrix products on privacy-protected unencrypted data stored in untrusted clouds. Information Sciences, vol. 436-437, pp. 320-342, April 2018.

TALKS AND PANEL DISCUSSIONS

- Talk at the [Emerging Directions in Probabilistic Modeling: Methods and Scientific Applications](#) workshop, Flatiron Institute, New York, NY. October 2026. *Continuous and discrete neural samplers for materials*.

- Talk at the Simons Institute workshop *Diffusion Generative Modeling: Progress and Next Steps*, Berkeley, CA. August 2026. *Rare event analysis via stochastic optimal control*.
- Talk at *ChemAI NYC*, New York University, New York, NY. June 2026. *Rare Event Analysis via Stochastic Optimal Control*.
- Panelist at the *ReALM-GEN workshop*, ICLR 2026, Rio de Janeiro. April 2026. *Alignment, control, and real-world constraints in generative models*.
- Panelist at the *Structured Probabilistic Inference and Generative Modeling (SPIGM) workshop*, NeurIPS 2025, San Diego. December 2025. *Is probabilistic inference still relevant in the era of foundation models?*
- Invited talk at Boston Diffusion Day (Harvard University). October 2025. *Test-time scaling of diffusions with flow maps*.
- Talk at Columbia Statistics Department. October 2025. *Adjoint Matching & Sampling: fine-tuning and sampling with stochastic optimal control*.
- Talk at Microsoft AI4Science BioEmu reading group. June 2025. *Adjoint Matching & Sampling: fine-tuning and sampling with stochastic optimal control*.
- Talk at Aaditya Ramdas' group at CMU. April 2025. *Cheap permutation testing*.
- Talk at the Diffusion Reading Group of Harvard University. March 2025. *Adjoint matching: fine-tuning flow and diffusion generative models with memoryless stochastic optimal control*.
- Invited talk on diffusion alignment at the MIT course *An Introduction to Flow Matching and Diffusion Models*. Jan. 2025.
- Talk at the Diffusions Seminar of UT Austin. Nov. 2024. *Adjoint matching: fine-tuning flow and diffusion generative models with memoryless stochastic optimal control*.
- Talk at Xaira Therapeutics. Oct. 2024. *Adjoint matching: fine-tuning flow and diffusion generative models with memoryless stochastic optimal control*.
- Talk at the ML Theory seminar at the Center for Computational Mathematics, Flatiron Institute. Oct. 2024. *Adjoint matching: fine-tuning flow and diffusion generative models with memoryless stochastic optimal control*.
- Talk at the NYU generative models foundations seminar. Oct. 2024. *Adjoint matching: fine-tuning flow and diffusion generative models with memoryless stochastic optimal control*.
- Talk & discussion at the Learning on Graphs & Geometry Reading Group. Sept. 2024. *Adjoint matching: fine-tuning flow and diffusion generative models with memoryless stochastic optimal control*.
- Talk at TransferLab Seminar. Sept. 2024. *Stochastic Optimal Control Matching*.
- Talk at Microsoft Research New England. March 2024. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields*.
- Talk at Cornell Tech, Volodymyr Kuleshov's group. Feb. 2024. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields*.
- Talk at Google Deepmind. Jan. 2024. *Stochastic Optimal Control Matching*.
- Talk at Flatiron Institute. Jan. 2024. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields*.
- Talk at Kempner Institute, Harvard University. Dec. 2023. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields*.

- Talk at Meta FAIR Labs. Nov. 2023. *Improving Generative Modeling and Stochastic Control by Matching Vector Fields*.
- Talk at Nvidia's Fundamental Generative AI group, Sept. 2023. *Speeding up generative modeling and distribution testing*.
- Microsoft Research New England Seminar, Feb. 2023. *Speeding up generative modeling and distribution testing*.
- Yingzhen Li's group meeting, Imperial College, July 2022. *Separation results between fixed-kernel and feature-learning probability metrics & Depth and Feature Learning are Provably Beneficial for Neural Network Discriminators*.
- Joan Bruna & Jason Lee's joint group meeting, June 2022. *Depth and Feature Learning are Provably Beneficial for Neural Network Discriminators*.
- IBM Research AI seminar, June 2022. *Auditing Differential Privacy in High Dimensions with the Kernel Quantum Rényi Divergence*.
- MIT - IBM Watson AI Lab invited seminar, March 2022. *Depth and Feature Learning are Provably Beneficial for Neural Network Discriminators*.
- MIT - IBM Watson AI Lab invited seminar, Nov. 2021. *Tighter sparse approximation bounds for ReLU neural networks*.
- MIT - IBM Watson AI Lab invited seminar, July 2021. *Separation results between fixed-kernel and feature-learning probability metrics*.
- Weinan E's group meeting at Princeton, April 2020. *A mean-field analysis of two-player zero-sum games*.
- Princeton PACM Graduate Student Seminar, March 2020. *A mean-field analysis of two-player zero-sum games*.

FELLOWSHIPS AND ACHIEVEMENTS

OCT 2021	NeurIPS 2021 Outstanding Reviewer award
JUL 2018	La Caixa Fellowship for postgraduate studies in North America and the Asia-Pacific region. 55 fellowships were awarded among 446 Spanish applicants. The fellowship covers tuition of the PhD program and a stipend of around \$30k/year for 24 months.
JUN 2014	First student ever to achieve a perfect score (10/10) in the general phase of the University Entrance Examinations of Catalonia (Proves d'Accés a la Universitat - PAU). These examinations have taken place every year for more than 30 years. The general phase consists of 5 tests that all students applying for a degree in a Catalan university must take. Newspaper article (in Spanish): http://ccaa.elpais.com/ccaa/2014/06/27/catalunya/1403862593_090989.html
2014	Bronze medal at the 2014 Spanish Mathematical Olympiad and silver medal at the 2014 Spanish Physics Olympiad.

MENTORSHIP

- Co-mentored 4 summer research interns at Microsoft Research New England (Summer 2026)
 - Jiajun He (co-mentored with Yuanqi Du)
 - Denis Blessing (co-mentored with Yuanqi Du)
 - Mouyang Cheng (co-mentored with Yuanqi Du)
 - Paula Cordero Encinar (co-mentored with Lester Mackey)

- Supervised 2 summer research interns at Microsoft Research New England (Summer 2025)
 - Yuanqi Du, PhD student at Cornell University
 - Raghav Singhal, PhD student at New York University (co-mentored with Dinghui Zhang)

EVENTS ORGANIZED

- Organizer, [Microsoft Research New England Generative Modeling & Sampling Seminar](#) (June 2025–present).
- Co-organizer, [Microsoft Research New England Generative Modeling & Sampling Workshop](#), Cambridge, MA (August 10–11, 2026).

LANGUAGES AND COMPUTER SKILLS

Languages: CATALAN (mother tongue), SPANISH (proficient), ENGLISH (proficient, Cambridge English: Advanced, TOEFL 113), FRENCH (Upper intermediate, DELF B2), GERMAN (Intermediate, B1+, EOI - Official Language School of Catalonia)

Programming languages: PYTHON, PYTORCH, C++, MATLAB, OCAML, R, MYSQL