

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 | Student of 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 AND PREPRINTS

- Chentong Wang, Sarah Alamdari, **Carles Domingo-Enrich**, Ava Amini, Kevin K. Yang. Towards deep learning sequence-structure co-generation for protein design. arXiv preprint Oct. 2024.
- **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. arXiv preprint Sept. 2024
- **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**, ~ 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**, ~ 5% of submissions).
- **Domingo-Enrich, C.**, Bietti, A., Gabri e, 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**, ~ 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.

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.

LANGUAGES AND COMPUTER SKILLS

Languages: CATALAN (mother tongue), SPANISH (proficient), ENGLISH (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