STÉPHANE D'ASCOLI

AI4science Research Fellow, EPFL

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EXPERIENCE

AI Research Scientist
Meta AI

Sep 2023 – Present Paris

- Research interests: decoding neural activity, with the aim to better understand how the brain works, and perhaps one day help those which have difficulties to speak or type.

AI4science Research Fellow
École Polytechnique Fédérale de Lausanne (EPFL)

Mar 2023 – Present Lausanne

- Research interests: understanding reasoning abilities in large language models and applying them for scientific discovery in the fields of biology, chemistry, neuroscience and mathematics.
- The AI4science program is a 2-year fellowship covering independent research in collaboration with a board of faculty members. I was the inaugural AI4science fellow.

Ph.D. student and Teacher Assistant
École Normale Supérieure (ENS) & Facebook AI Research (FAIR)

Sep 2018 – Sep 2022 Paris

- Research interests: theory of overparametrization and applications of transformers to vision and symbolic mathematics.
- Open-sourced several deep learning codebases, implemented demos and gave an interview with Yannic Kilcher.
- Teacher assistant of Marc Lelarge, Giulio Biroli and Francis Bach for graduate courses at ENS.

AI research intern
Snips.ai

Feb 2020 – Aug 2020 Paris

Developed an open-source deep learning codebase to generate text for data-privacy focused vocal assistants.

Visiting researcher
NASA Goddard & Rochester Institute of Technology

Feb 2017 – Aug 2017 Rochester, NY

Built a large-scale computational simulation of the light coming from a binary black hole and produced an explanatory video.

"Classe préparatoire" examiner
Lycées Henri-4, Saint-Louis, Michelet

Sep 2016 – Sep 2019 Paris

Oral examinations for undergraduate students in top institutions.

EDUCATION

M.Sc. in Theoretical Physics
École Normale Supérieure, Paris

Sep 2016 – Sep 2018

First class honours (top 10%).

B.Sc. in Physics
École Normale Supérieure, Paris

Sep 2015 – Sep 2016

First class honours (top 10%).

"Classe préparatiore"
Lycée Thiers, Marseille

Sep 2013 – Sep 2015

Entered ENS Paris (ranked 6th out of 1000+ nationwide). Also accepted at other top institutions such as École Polytechnique.
Prior to this, obtained a scientific baccalaureate with first class honours (average grade: 19.63/20).

SKILLS

Programming: Python | Jax | C/C++ | Mathematica

Tools: PyTorch | Git | Unix | Slurm | Docker | Kubernetes | Streamlit

Other: Driving license

LANGUAGES

English (native) ●●●●●

French (native) ●●●●●

Spanish ●●●○○

German ●●●○○

PUBLICATIONS

For a complete and up-to-date publication record, use my Google Scholar profile.

Conference Proceedings

- **d'Ascoli, Stéphane**, Kamienny, P.-A., Lample, G., & Charton, F. (2022a). Deep symbolic regression for recurrent sequences. In ***ICML***.
- **d'Ascoli, Stéphane**, Kamienny, P.-A., Lample, G., & Charton, F. (2022b). End-to-end symbolic regression with transformers. In ***NeurIPS***.
- **d'Ascoli, Stéphane**, Gabrié, M., Sagun, L., & Biroli, G. (2021). On the interplay between loss function and data structure in classification problems. In ***NeurIPS***.
- **d'Ascoli, Stéphane**, Touvron, H., Leavitt, M., Morcos, A., Biroli, G., & Sagun, L. (2021). Convit: Improving vision transformers with soft convolutional inductive biases. In ***ICML***.
- **d'Ascoli, Stéphane**, Coucke, A., Caltagirone, F., Caulier, A., & Lelarge, M. (2020). Conditioned text generation with transfer for closed-domain dialogue systems. In ***SLSP***.
- **d'Ascoli, Stéphane**, Refinetti, M., Biroli, G., & Krzakala, F. (2020). Double trouble in double descent: Bias and variance (s) in the lazy regime. In ***ICML***.
- **d'Ascoli, Stéphane**, Refinetti, M., Ohana, R., & Goldt, S. (2020). The dynamics of learning with feedback alignment. In ***ICML***.
- **d'Ascoli, Stéphane**, Sagun, L., & Biroli, G. (2020). Triple descent and the two kinds of overfitting: Where and why do they appear? In ***NeurIPS***.
- **d'Ascoli, Stéphane**, Sagun, L., Biroli, G., & Bruna, J. (2019). Finding the needle in the haystack with convolutions: On the benefits of architectural bias. In ***NeurIPS***.

Journal Articles

- **d'Ascoli, Stéphane**, Refinetti, M., Ohana, R., & Goldt, S. (2022). The dynamics of learning with feedback alignment. ***J. Phys. A***.
- **d'Ascoli, Stéphane**, Sagun, L., & Biroli, G. (2022). Triple descent and the two kinds of overfitting: Where and why do they appear? ***J. Stat. Mech***.
- **d'Ascoli, Stéphane**, Touvron, H., Leavitt, M., Morcos, A., Biroli, G., & Sagun, L. (2022). Convit: Improving vision transformers with soft convolutional inductive biases. ***J. Stat. Mech***.
- Geiger, M., Jacot, A., Spigler, S., Gabriel, F., Sagun, L., **d'Ascoli, Stéphane**, … Wyart, M. (2020). Scaling description of generalization with number of parameters in deep learning. ***J. Stat. Mech***.
- Geiger, M., Spigler, S., **d'Ascoli, Stéphane**, Sagun, L., Baity-Jesi, M., Biroli, G., & Wyart, M. (2019). Jamming transition as a paradigm to understand the loss landscape of deep neural networks. ***Phys. Rev. E***.
- Spigler, S., Geiger, M., **d'Ascoli, Stéphane**, Sagun, L., Biroli, G., & Wyart, M. (2019). A jamming transition from under-to over-parametrization affects generalization in deep learning. ***J. Phys. A***.
- **d'Ascoli, Stéphane**, Noble, S. C., Bowen, D. B., Campanelli, M., Krolik, J. H., & Mewes, V. (2018). Electromagnetic emission from supermassive binary black holes approaching merger. ***The Astrophysical Journal***.

Preprints

- Jelassi, S., **Stéphane d'Ascoli**, Domingo-Enrich, C., Wu, Y., Li, Y., & Charton, F. (2023). Length generalization in arithmetic transformers.
- **Stéphane d'Ascoli**, Becker, S., Schwaller, P., Mathis, A., & Kilbertus, N. (2023). Odeformer: Symbolic regression of dynamical systems with transformers.
- **Stéphane d'Ascoli**, Bengio, S., Susskind, J., & Abbe, E. (2023). Boolformer: Symbolic regression of logic functions with transformers.
- **d'Ascoli, Stéphane**, Refinetti, M., & Biroli, G. (2022). On the optimal learning rate schedule in non-convex optimization landscapes.
- **d'Ascoli, Stéphane**, Sagun, L., Biroli, G., & Morcos, A. (2021). Transformed cnns: Recasting pre-trained convolutional layers with self-attention.

Books

- **d'Ascoli, Stéphane**, & Bouscal, A. (2022). *Voyage au coeur de l'atome*. **First**.
- **d'Ascoli, Stéphane**, & Jaspers, J.-M. (2022). *Petit livret tricolore sur l'intelligence artificielle*. **First**.
- **d'Ascoli, Stéphane**, & Touati, A. (2021). *Voyage au coeur de l'espace-temps*. **First**.
- **d'Ascoli, Stéphane**. (2020a). *Comprendre la révolution de l'intelligence artificielle*. **First**.
- **d'Ascoli, Stéphane**. (2020b). *L'intelligence artificielle en 5 minutes par jour*. **First**.

COMMUNITY SERVICE

Participated in organization

- Data Science seminars at ENS
- AI4science days at EPFL
- Applied Machine Learning Days at EPFL

Journal reviews

- Nature Machine Intelligence
- Nature Communications
- PNAS
- Information and Inference
- International Journal of Computer Vision
- IEEE Machine Intelligence
- Machine Learning
- Physical Review E
- Journal of Physics A
- Journal of Statistical Mechanics

Conference reviews

- ICML (since 2019)
- NeurIPS (since 2019)
- ICLR (since 2020)

INVITED TALKS

Invited talks in 2019

- Machine Learning Seminar - Snips, Paris
- Inria Summer School on DL - UPMC, Paris
- Theoretical Advances in DL - CMS, Istanbul
- NeurIPS 2019 - Montreal

Invited talks in 2020

- Youth in High-dimensions - ICTP, Trieste
- Summer School on Stat Phys and ML - Les Houches
- DeepMath Conference - Online
- ICML 2020 - Online
- NeurIPS 2020 (Spotlight talk) - Online

Invited talks in 2021

- ML Seminar - G-Research, London
- ML Seminar - RISE, Gothenburg
- ICML 2021 - Online
- NeurIPS 2021 - Online
- Weights and Biases Reading Group - Online

Invited talks in 2022

- Yannic Kilcher interview - YouTube
- Statistical Physics Colloquium - ENS, Paris
- Random Matrix Theory Workshop - ENS, Paris
- PSL intensive weeks - ENS, Paris
- CECAM - EPFL, Lausanne
- London ML Meetup - London
- ICML 2022 - Baltimore
- Research talk - DeepMind

Invited talks in 2023

- CMStatistics 2023 - Berlin
- Math and ML Seminar - UCLA & MPI
- Research talk - Apple
- ML College - G-Research, London
- AI4science day - EPFL, Lausanne

AWARDS

- 2015-2019: ENS scholar fellowship: 4-year fellowship covering studies at ENS
- 2019-2020: ENS Ph.D. fellowship: 4-year fellowship covering Ph.D. thesis (only used 1 year)
- 2020-2022: Facebook CIFRE Ph.D. fellowship: 3-year fellowship covering Ph.D. thesis (only used 2 years)
- 2022-: EPFL AI4Science fellowship: first recipient of this competitive 2-year fellowship covering independent post-doctoral research in collaboration with a board of faculty members
- 2022: Special award of the press ("Coup de Coeur des Médias") at the 35^{th} edition of the Roberval Prize, rewarding the book "Voyage au Cœur de l'Atome"

OUTSIDE WORK

Science outreach

- Wrote several science books, all published by First Editions. Some were adapted to audio book and translated abroad.
- Spoke on radio and TV (France Culture with Etienne Klein, France Bleu with Sidonie Bonnec, France Info with Patricia Loison, ...).

Music

- Obtained a final Conservatoire diploma in clarinet, and earned first and second prizes in international competitions.
- Performed in solo, chamber music and orchestra concerts. See my YouTube channel for some videos.
- Managed an orchestra for a year.

Long-distance cycling

- From September 2022 to March 2023, I cycled 8000km through the Andes, from Quito (Ecuador) to Punta Arenas (Chile). You may find a step-by-step narrative of the trip here.
- Along the way, I filmed the most beautiful places we encountered with my drone and created several videos.