

# STÉPHANE D'ASCOLI

## AI4science Research Fellow, EPFL

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## EXPERIENCE

### 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.
- Supervising several master and Ph.D. students
- 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.
- Published 14 papers in top-tier conferences and scientific journals, including 11 as first author.
- 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.

### B.Sc. in Physics

#### École Normale Supérieure, Paris

Sep 2015 – Sep 2016

First class honours.

### "Classe préparatoire"

#### Lycée Thiers, Marseille

Sep 2013 – Sep 2015

Entered ENS Paris (ranked 6th out of 1000+ nationwide). Prior to this, obtained a scientific baccalaureate with first class honours (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

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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*.
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## 📄 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*.
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## 🐾 Preprints

- Jelassi, S., Stéphane d'Ascoli, Domingo-Enrich, C., Wu, Y., Li, Y., & Charton, F. (2023). Length generalization in arithmetic 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.
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## 📖 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

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## Organized events

- Co-organizer of the Data Science seminars at ENS [↗](#).
- Co-organizer of the AI4science days at EPFL [↗](#).

## Journal reviews

- Nature Communications
- Nature Machine Intelligence
- Information and Inference
- Machine Learning
- IEEE Transactions
- Journal of Statistical Mechanics
- Journal of Physics A

## Conference reviews

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

# AWARDS

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- 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)
- 2022: EPFL AI4Science fellowship: first recipient of this competitive 2-year fellowship covering independent postdoctoral research in collaboration with a board of faculty members [↗](#)
- 2022: Special award of the press ("Coup de Cœur des Médias") at the 35<sup>th</sup> edition of the Roberval Prize, rewarding the book "Voyage au Cœur de l'Atome" [↗](#)





# INVITED TALKS

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## 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

# OUTSIDE WORK

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## 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 [↗](#), ...).
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## 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.
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## Bikepacking

- From September 2022 to March 2023, I cycled through South America, 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 [↗](#).