

DAVID HEURTEL-DEPEIGES

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EDUCATION

- 2023-2024 **MVA, Ecole Normale Supérieure Paris-Saclay:** France's foremost master's degree in Machine Learning and Artificial Intelligence.
Current relevant coursework includes: *AGI and AGI safety, NLP and Graph ML, Robotics, Computational Statistics, Probabilistic Graphical Modelling, Geometric Data Analysis.*
- 2020-2023 **Ecole Polytechnique, Palaiseau:** France's leading university for science and engineering. Major in applied math and computer science.
Relevant coursework includes: *Statistics, Algorithm design, Monte Carlo methods, Foundations of machine learning, Topological data analysis, Deep Learning*
GPA: 3.93
- 2018-2020 **Lycée Sainte-Geneviève, Preparatory Program:** a two-year post-secondary program in advanced math and physics with a computer science minor, leading to nationwide competitive exams to the Grandes Ecoles. Admitted to ENS Ulm and Polytechnique.
Relevant coursework includes: *General and Linear Algebra, Topology and Calculus, Probability Theory, Algorithm Design and Analysis.*
GPA: 3.99

WORK EXPERIENCE

- Apr-Aug 2023 **Research Internship, Center for Computational Mathematics, Flatiron Institute, NY,** under the supervision of Bruno Regaldo-Saint Blancard and Ruben Ohana:
 - Worked on diffusion models for interstellar dust emission maps.
 - Introduced a new kind of diffusion models under colored noise, enabling component separations in cosmology as well as general denoising of scientific and natural images.
 - Integrated tools for Bayesian inference with our generative prior.**D. Heurtel-Depeiges et al. Removing Dust from CMB Observations with Diffusion Models,** accepted as Oral at NeurIPS 2023 MLPS workshop.
Poster at Hammers and Nails 2023 (ML for Science conference).
Python Package to be published in December 2023, including tools for diffusion models in science, diffusion models under colored noise and other aspects of our work.
Preprint in the work with stronger comparison with existing generative, denoising and inference techniques.
- June 2022-August 2022 **Birdz (Veolia), Data-scientist intern for water quality:** Team under the supervision of Guillaume Perrin-Fabre
 - Developed an app to predict algae concentration in freshwater using Python, SQL, and Docker. Created the documentation.
 - Deployed and tested the app on Google Cloud Platform, optimizing its performance. Developed tests for quantifying model accuracy.
- 2021-2022 **Lycée Sainte-Geneviève, Oral examiner in physics and substitute in maths**
- 2020-2021 **French Department of Defense, Officer cadet,** collaborated on projects with NATO officers on operational issues.

SELECTED RESEARCH AND PROJECT WORK

- Oct 2023 - current **Research Project – ENS Paris Saclay:** Mechanistic interpretability in Vision Models.
- Oct 2023 - current **Research Project – ENS Paris Saclay:** Diffusion models and stochastic interpolants for fields on the sphere (applications to medical images and cosmology)
- Oct 2023 - current **Research Project – ENS Paris Saclay (prof. at INRIA):** Investigating catastrophic forgetting in Dreamer type models in RL.
- Jan-Mar 2023 **Research Project – Center for Applied Mathematics (CMAP):** techniques for speeding up diffusion models training and inference: cascaded diffusion models, transfer learning and fine tuning under the supervision of **Marc Lelarge**
- 2021- 2022 **Research Project – CMAP:** in collaboration with the University of Corsica, wildfire forecasting and uncertainty quantification (physical model emulation, uncertainty quantification, spatio-temporal model using ConvLSTM)
- Dec 2021-Mar 2022 **Experimental Project – LIX (Computer Science Laboratory):** Geometric Heuristic for a NP-hard problem on graphs.
- Sep – Dec 2022 **Experimental Project – CMAP:** Statistical Learning seminar under the supervision of **Erwan Scornet**, topics on empirical risk minimization theory and non-parametric estimation tools. Paper presentation, generalization and simplification of proofs, simulation to evaluate papers claims and bounds.
- 2017-2018 **Research Project & Competition – TFJM2:** French equivalent of the ITYM, research on 8 open problems whose formulation is adapted to high school-students. Placed 3rd in the Greater Paris Metropolitan Area

RELEVANT SKILLS

- Programming. **Python, SQL, C++**, Java, OCaml
- Specific libraries: **PyTorch**, Tensorflow, **JAX**, Pandas...
- Distributed and accelerated computing on a cluster
- Language: English (both in professional and informal settings, TOEFL iBT :110, GRE: 167 verbal, 170 quantitative), German (intermediate), French (native)

EXTRACURRICULAR ACTIVITIES

Students' union cultural representative (2018 – 2020): organizing concerts, conferences, clubs, remembrance ceremonies for the Armistice Day Centenary 2018-2020.

Project Manager at X-Armées (2021 - 2022): reaching out to units in the French military to provide technical support and R&D opportunities.

Parismaths volunteer teacher (2023): Arithmetic

Music: Currently singing in Polytechnique choir (4 to 5 productions a year) and an a cappella group (formerly at Polytechnique now at Mines Paris). 11 years of piano.

Miscellaneous: First aid certificate, Highest level of qualification in sailing nationwide.

HONORS AND ACHIEVEMENTS

- 2017 Placed 4th in the French **Math Olympiads in the Greater Paris Metropolitan Area**
- 2018 **General Academic Contest Mathematics:** *Accessit* (honorable mention)
- 2018-2019 **International Physics Olympiad.** Among the 20 shortlisted candidates for team France.