Philippe Sabella-Garnier, PhD

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PROFESSIONAL EXPERIENCE

Postdoctoral Researcher, Theoretical Physics

Leiden University

09/2016 – 08/2020 — Leiden, Netherlands

- Investigated applications of quantum information theory and statistical mechanics to string theory; presented results in five publications and at multiple international conferences.
- Developed and simulated a simplified model to examine how black holes scramble information that falls into them.
- Analyzed 100GB of data by studying fine-grained statistical correlations, using linear regression on engineered features and creating meaningful visualizations.
- Supervised two graduate students and managed a weekly seminar series.

Graduate Researcher, Theoretical Physics

University of British Columbia

09/2011 – 08/2016 — Vancouver, BC, Canada

- Researched the applications of quantum information to string theory and noncommutative geometry, leading to results presented in four publications.
- Implemented and modified statistical algorithms in Python to study spatial and temporal correlations of quantum information in different physical models.

Teaching Assistant and TA Training Coordinator

University of British Columbia

09/2011 – 05/2016 — Vancouver, BC, Canada

- Led tutorial and lab sections for large first-year general requirement classes and smaller, more advanced groups.
- As part of a four-person team, developed and implemented an 8-hour training workshop for approximately 30 new TAs per year.
- Managed a team of six mentors to support new TAs.
- Designed and analyzed surveys to assess and revise elements of the training program and justify continued funding.

RECENT PERSONAL PROJECTS

Analysis of postdoc application success in high-energy physics

- Gathered postdoctoral applicant identity and self-reported outcomes to aggregate publication statistics from online records.
- Classified applicants as doctoral students or postdocs using an XGBoost-based model, leading to 90.6 % accuracy on test set.
- Accessed 600MB of data from online sources and a custom-built AWS MySQL database, cleaned and processed it with Python (with pandas and scikit-learn).
- Created an interactive online visualization of results with plotly.

Cryptanalysis of simple substitution ciphers

- Decrypted texts as a benchmark for various machine learning algorithms and coding techniques, using Python with Keras.
- Found decryption keys with a genetic algorithm, with fitness given by either a neural network or classical statistics.
- Directly translated text using a one-dimensional CNN or an encoder-decoder model with LSTM units.

SKILLS

Python

NumPy/SciPy | Scikit-learn | Keras | Pandas | Matplotlib | Plotly

Other Programming

SQL | Git | Matlab | LaTeX

Machine Learning

Regression | SVM | Decision trees | Neural Networks (CNN, RNN) | Ensemble methods | Clustering | PCA

EDUCATION

Deep Learning Specialization

deeplearning.ai on Coursera

2020

PhD, Physics

University of British Columbia

Thesis:
"Geometry from quantum mechanics"

2011 – 2016 — Vancouver, BC, Canada

BSc, Mathematics and Physics

McGill University

First Class Honours, with Distinction

2008 – 2011 — Montréal, QC, Canada

AWARDS

NSERC Postdoctoral Fellowship

National, based on research ability as well as communication and interpersonal skills.
Total value: $90,000

2018–2020

FRQNT Doctoral Scholarship

Provincial, based on academic excellence, research potential and communication skills.
Total value: $60,000

2013–2016

UBC 3-Minute Thesis Semi-Finalist

Competition to present doctoral thesis in under three minutes to a non-specialist audience

2016