# Adrien Bolland

Postdoctoral Researcher (Ph.D., Ir.)

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## About me

I am a postdoctoral researcher at École Polytechnique, working on deep reinforcement learning with applications to the renewable-energy transition. My research focuses, on the one hand, on the study and development of exploration techniques in reinforcement learning algorithms and, on the other hand, on their application to control problems related to energy systems.

## Academic & Research Positions

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| Sep 2026 – Present | Postdoctoral Researcher (École Polytechnique, France)<br>Research in applied reinforcement learning. *Supervisor: Paul Mangold*. |
| May 2025 – Aug 2026 | Postdoctoral Researcher (University of Liège, Belgium)<br>Research on reinforcement learning for power-system operation and voltage stability. *Supervisor: Louis Wehenkel*. Awarded an F.R.S.–FNRS Postdoctoral Researcher fellowship. |
| 2020 – Apr 2025 | Doctoral Researcher (University of Liège, Belgium)<br>Research on policy-gradient methods, reinforcement learning, and energy-system control. *Supervisor: Damien Ernst*. Awarded an F.R.S.–FNRS Research Fellow doctoral fellowship. |
| 2019 | Research Intern (Montefiore Institute, University of Liège)<br>Reinforcement-learning methods for continuous intraday electricity trading. |
| 2019 | Intern, Market Modeling & Market View (ENGIE Belgium, Brussels)<br>Forecasting electricity imbalance prices. |

## Education

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| 2024 – 2026 | Specialized Master's in Financial Risk Management (HEC Liège, University of Liège)<br>Successfully defended in October 2026. |
| 2020 – Apr 2025 | Ph.D. in Engineering Sciences (University of Liège)<br>*Supervisor: Damien Ernst*.<br>*Thesis:* Reimagining Exploration: Theoretical Insights and Practical Advancements in Policy Gradient Methods. |
| 2018 – 2020 | M.Sc. in Electrical Engineering — Signal Processing and Intelligent Robotics (University of Liège)<br>*Summa Cum Laude* – 91%. |
| 2015 – 2018 | B.Sc. in Electrical Engineering and Computer Science (University of Liège)<br>*Magna Cum Laude* – 78%. |

## Research Fellowships & Awards

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| 2025 | F.R.S.–FNRS Postdoctoral Researcher (CR – Chargé de recherches)<br>Postdoctoral research fellowship awarded by the F.R.S.–FNRS. |
| 2020 | F.R.S.–FNRS Research Fellow (ASP – Aspirant)<br>Doctoral research fellowship awarded by the F.R.S.–FNRS. |

## Industrial Collaborations

Research collaborations and interactions with *Fluxys*, *ENGIE Belgium*, *Haulogy*, *Elia*, and *RTE* on electricity markets, energy-system optimization, and power-system operations.

## Student Supervision

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| Master's theses | Gaspard Lambrechts; José-Luis Diaz Thiele<br>Advised their master's thesis research and served as an official member of the thesis juries. |

## Teaching Experience

Numerical optimization — Introductory course on conic programming and convex optimization algorithms.

Reinforcement learning — Course on dynamic programming, bandit theory, and reinforcement learning.

Energy markets — Introductory course on the organization of European energy markets.

Programming and computer structures — Student tutoring in introductory programming (C) and computer structures.

## Invited Talks

2026 — Maximum Entropy RL and Policy Gradients: Why and What to Explore?
Mini-Workshop on Reinforcement Learning, University of Mannheim, Germany.

2025 — Breaking Down the Network Operation Complexity
Academic Board of Elia, Belgium.

2025 — Breaking Down the Network Operation Complexity
Delft University of Technology, hosted by Pedro P. Vergara, the Netherlands.

2025 — New Perspective on Intrinsic Exploration
Department of Mathematics, École Polytechnique, hosted by Éric Moulines, France.

2024 — Understanding the Influence of Exploration on the Dynamics of Policy-Gradient Algorithms
Department of Mathematics, University of Mannheim, hosted by Leif Döring, Germany.

## Selected Conference Presentations

2025 — Belgium–Netherlands Workshop on Reinforcement Learning (Eindhoven, the Netherlands)
Poster presentation.

2024 — AI for Science Workshop at ICML (Vienna, Austria)
Poster presentation.

2023 — Frontiers4LCD Workshop at ICML (Honolulu, USA)
Poster presentation.

2023 — Reinforcement Learning Summer School (Universitat Pompeu Fabra, Barcelona)
Poster presentation.

2022 — European Workshop on Reinforcement Learning (Milan, Italy)
Poster presentation.

## Technical Expertise & Languages

Machine learning — Reinforcement learning, deep learning, stochastic optimization, statistical inference.

Power systems — Power-flow analysis, QSS and RMS dynamics, power-system stability and voltage control, electricity markets.

Scientific computing — Python, PyTorch, Scikit-learn, Pyomo, Gurobi, AI-assisted research software development.

Finance — Financial risk management, portfolio theory, financial derivatives.

Languages — French (native), Dutch (C2), English (C1).

## Scientific Publications

### Journal Articles (published or accepted)

SecuLEx: A Secure Limit Exchange Market for Dynamic Operating Envelopes
Maurizio Vassallo, **Adrien Bolland**, Alireza Bahmanyar, Louis Wehenkel, Laurine Duchesne, Dong Liu, Sania Khaskheli, Alexis Ha Thuc, Pedro P. Vergara, Amjad Anvari-Moghaddam, Simon Gerard, Damien Ernst
Electric Power Systems Research, 2027 *(co-first authors: M. Vassallo and A. Bolland)*

Bayesian Inference for Estimating Generation Costs in Electricity Markets
Matthias Pirlet, **Adrien Bolland**, Alexandre Huynen, Quentin Louveaux, Gilles Louppe, Damien Ernst
Electric Power Systems Research, 2027

Gym-TORAX: Open-Source Software for Integrating Reinforcement Learning with Plasma Control Simulators in Tokamak Research
Antoine Mouchamps, Arthur Malherbe, **Adrien Bolland**, Damien Ernst
Software Impacts, 2026

Policy Gradient Algorithms Implicitly Optimize by Continuation
**Adrien Bolland**, Gilles Louppe, Damien Ernst
Transactions on Machine Learning Research, 2023

Distributional Reinforcement Learning with Unconstrained Monotonic Neural Networks
Thibaut Théate, Antoine Wehenkel, **Adrien Bolland**, Gilles Louppe, Damien Ernst
Neurocomputing, 2023

Recurrent Networks, Hidden States and Beliefs in Partially Observable Environments
Gaspard Lambrechts, **Adrien Bolland**, Damien Ernst
Transactions on Machine Learning Research, 2022

Jointly Learning Environments and Control Policies with Projected Stochastic Gradient Ascent
**Adrien Bolland**, Ioannis Boukas, Mathias Berger, Damien Ernst
Journal of Artificial Intelligence Research, 2022

A Deep Reinforcement Learning Framework for Continuous Intraday Market Bidding
Ioannis Boukas, Damien Ernst, Thibaut Théate, **Adrien Bolland**, Alexandre Huynen, Martin Buchwald, Christelle Wynants, Bertrand Cornélusse
Machine Learning, 2021

### Peer-Reviewed Conference Publications

Maximum-Entropy Exploration with Future State-Action Visitation Measures
**Adrien Bolland**, Gaspard Lambrechts, Damien Ernst
RLC, 2026

Informed POMDP: Leveraging Additional Information in Model-Based RL
Gaspard Lambrechts, **Adrien Bolland**, Damien Ernst
RLC, 2024

Detection of Topological Errors in Distribution Networks Using State Estimation Residual Patterns
Martin Castin, Alireza Bahmanyar, Adrien Leerschool, Laurine Duchesne, **Adrien Bolland**, Thomas Wehenkel, Simon Gérard, Damien Ernst
CIRED Workshop, 2026

Reinforcement Learning for Joint Design and Control of Battery-PV Systems
Marine Cauz, **Adrien Bolland**, Bardhyl Miftari, Lionel Perret, Christophe Ballif, Nicolas Wyrsch
ECOS, 2023

## Workshop Papers and Contributions

Reconciling European Electricity Data with Diffusion Priors Learned from Observations Alone
Matthias Pirlet, **Adrien Bolland**, Gilles Louppe, Damien Ernst
NeurIPS Workshop on AI Foundations for Power Grids, 2026

Future-Informed Actor-Critic
Samy Mokeddem, Gaspard Lambrechts, **Adrien Bolland**, Damien Ernst
NeurIPS MLxOR Workshop, 2026

Reinformed Dreamer: An Asymmetric World Model Efficiently Trained through Latent Guidance
Gaspard Lambrechts, **Adrien Bolland**, Daniel Ebi, Damien Ernst
RLC Finding the Frame Workshop, 2026

Behind the Myth of Exploration in Policy Gradients
**Adrien Bolland**, Gaspard Lambrechts, Damien Ernst
EWRL, 2025

Off-Policy Maximum Entropy RL with Future State and Action Visitation Measures
**Adrien Bolland**, Gaspard Lambrechts, Damien Ernst
EWRL, 2025

Cost Estimation in Unit Commitment Problems Using Simulation-Based Inference
Matthias Pirlet, **Adrien Bolland**, Gilles Louppe, Damien Ernst
NeurIPS D3S3 Workshop, 2024

Reinforcement Learning for Efficient Design and Control Co-Optimisation of Energy Systems
Marine Cauz, **Adrien Bolland**, Nicolas Wyrsch, Christophe Ballif
ICML AI for Science Workshop, 2024

Belief States of POMDPs and Internal States of Recurrent RL Agents: An Empirical Analysis of Their Mutual Information
Gaspard Lambrechts, **Adrien Bolland**, Damien Ernst
EWRL, 2022

## Preprints and Other Manuscripts

Coordinating Secure and Distributed Operation of Electrical Networks Through Bilateral Agreements on Voltage and Power Envelopes
**Adrien Bolland**, Anthony Maio, Thomas Richard, Maurizio Vassallo, Alireza Bahmanyar, Raphaël Fonteneau, Julien Callec, Dorian Fourniret, Damien Ernst
Preprint, 2026

A Multidimensional Analysis of Existing Limitations for TSO-DSO Coordination
Maurizio Vassallo, **Adrien Bolland**, Alireza Bahmanyar, Raphaël Fonteneau, Anthony Maio, Julien Callec, Dorian Fourniret, Damien Ernst
Preprint, 2026

Optimal Control of Renewable Energy Communities Subject to Network Peak Fees with Model Predictive Control and Reinforcement Learning Algorithms
Samy Aittahar, **Adrien Bolland**, Guillaume Derval, Damien Ernst
Preprint, 2024

Graph-Based Optimization Modeling Language: A Tutorial
Mathias Berger, **Adrien Bolland**, Bardhyl Miftari, Hatim Djelassi, Damien Ernst
Preprint, 2021