Pablo G. Morato

Senior Researcher, Technical University of Munich

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Research Interests

- Risk-based decision modeling and structural reliability for engineering systems.
- Multi-agent and hierarchical sequential decision-making for large-scale infrastructure.
- AI-driven Bayesian modeling and active learning for experiment optimization.
- Structural integrity management and safety calibration, with emphasis on wind energy systems.

Education

2017–2021 **Ph.D. in Engineering Sciences**, University of Liege, Belgium.
Thesis: *Optimal Inspection and Maintenance Planning for Deteriorating Structures via Markov Decision Processes and Deep Reinforcement Learning.*

2015–2017 **European Master in Advanced Ship Design and Offshore Structures**, University of Liege, Belgium; Ecole Centrale de Nantes, France.

2014–2015 **M.Sc. in Sustainable Engineering: Offshore Renewable Energy**, University of Strathclyde, UK.

2010–2014 **B.Eng. in Maritime Engineering**, Polytechnic University of Madrid, Spain.

Research Experience

2025–present **Senior Researcher**, Technical University of Munich, Germany.
Develop hierarchical MARL and safe-RL methods for risk-informed infrastructure management. Supervision of PhD/MSc researchers.

2023–2025 **Postdoctoral Researcher**, Delft University of Technology, Netherlands.
Implemented a city-scale building retrofit planning tool (DE-CIST, Municipality of Rotterdam; funded by Google).

2023 **Postdoctoral Researcher**, Technical University of Denmark, Denmark.
Released an open-source environment to benchmark scalability in cooperative multi-agent reinforcement learning.

2021–2023 **Postdoctoral Researcher**, University of Liege, Belgium.
Built virtual sensing for wind-farm monitoring and numerical models for structural integrity of offshore wind turbines.

2017–2021 **Research Engineer**, University of Liege, Belgium.
Developed reinforcement-learning decision-support algorithms for inspection and maintenance optimization of offshore wind farms.

2019–2020 **Visiting Scholar**, Pennsylvania State University, USA.
Formulated efficient Bayesian updating models for systems with correlated components (Advisor: K. G. Papakonstantinou).

2016 **Visiting Scholar**, University of Michigan, USA.
Validated an analytical model for ship dynamic transversal instability using computational fluid dynamics (Advisor: A. Troesch).

Grants & Funding

- **2020–2025** — Belgian Energy Transition Fund (FPS Economy): "PhairywinD" (Co-PI). Total project budget: €3.9 million.
- **2020–2025** — Belgian Energy Transition Fund (FPS Economy): "MAXWind" (Co-PI). Total project budget: €2.2 million.
- **2023** — Horizon Europe: "Tailwind" (Co-PI).
- **2017–2021** — National Fund for Scientific Research (FNRS-FRIA), Belgium. Personal grant.
- **2015–2017** — EMShip Scholarship. University of Liege, Belgium. Personal grant.
- **2014–2015** — Offshore Renewable Energy Britannia. University of Strathclyde, United Kingdom. Personal grant.
- **2010–2015** — Grant for Undergraduate Studies. Ministry of Education, Spain. Personal grant.

Awards & Honors

- **2025** — Top Cited Paper, *Structural Safety* Journal.
- **2024** — Selected Contribution, GNI Symposium & Expo on AI for the Built World (GNI 2024).
- **2021** — Paper of the Month (Infrastructure), BAM Abteilung Bauwerkssicherheit, Germany.
- **2017** — EMShip Best Master Thesis Award, University of Liege, Belgium.
- **2015** — Graduated with Distinction, University of Strathclyde, United Kingdom.
- **2014** — Highest grade in Dissertation (10/10), Polytechnic University of Madrid, Spain.

Teaching Experience

- **Co-instructor**, *Data Analysis in Engineering*, Technical University of Munich, 2025-present.
- **Co-instructor**, *AI in Architectural Design* (EDX online course), Delft University of Technology, 2024-present. Course link.
- **Co-instructor**, *AI in Architectural Design*, Delft University of Technology, 2024-2025.
- **Coding Instructor**, PhD Summer School: *Uncertainty Quantification and Reliability of Offshore Wind Turbines*, Technical University of Denmark, 2023.
- **Co-instructor**, *Integrated Project in Ship Design*, University of Liege, 2021–2023.
- **Co-instructor**, *Offshore Wind Structures*, University of Liege, 2019–2021.
- **Teaching Assistant**, *Ship and Offshore Structures*, University of Liege, 2017–2023.

Supervision & Mentoring

- **PhD**: Daniel Hettegger (TUM, 2025–present), Anna Maria Koniari (TU Delft, 2023–2025); Prateek Bhustali (TU Delft, 2023–2025); Jonathan Moran A. (ULiege, 2021–present); Jose Mishael (ULiege, 2020–present); Nandar Hlaing (ULiege, 2019–2024).
- **MSc**: Burak Yildirim (TUM, 2025), Emily Lenarduzzi (TU Delft, 2025); Xiaochen Ding (TU Delft, 2025); Bas van Berkel (TU Delft, 2024); Nefeli K. Isoua (TU Delft, 2024); Nathan Boucard (ULiege, 2021).

Skills

Programming: Python, MATLAB, LaTeX, C++; SLURM; Unix/Linux.
Languages: English (proficient); Spanish (native).

Service & Leadership

Organization

- Co-organized the Mini-Symposium "Optimization under uncertainty", *World Congress on Computational Mechanics (WCCM) & European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS)*, 2026.
- Co-organized the Mini-Symposium "Probabilistic assessment, data-driven inference, and optimization for decision-making under uncertainty", *Engineering Mechanics Institute (EMI) Conference*, 2023 - 2025.
- Co-organized the Mini-Symposium "Structural integrity assessment and life cycle management of wind farms", *Wind Energy Science Conference*, 2023.

Reviewer

- *Reliability Engineering & System Safety (RESS).*
- *Transactions on Machine Learning Research (TMLR).*
- *Conference on Neural Information Processing Systems (NeurIPS).*
- *International Conference on Learning Representations (ICLR).*
- *Journal of Risk and Uncertainty Analysis, American Society of Civil Engineers (ASCE).*

Professional Memberships

- Member, European Talent Academy (ETA), Technical University of Munich, since 2025.
- Associate Member, American Society of Civil Engineers (ASCE), since 2021.
- Member, International Association for Life-Cycle Civil Engineering (IALCCE), since 2020.
- Member, European Energy Research Alliance (EERA), since 2017.
- Associate Member, Royal Institution of Naval Architects (ARINA), since 2015.

Talks & Seminars

- **P. G. Morato**, C. Andriotis, S. Khademi, "Batch Bayesian active learning under budget constraints" *Engineering Mechanics Institute Conference (EMI)*, 2025.
- **P. G. Morato**, C. Andriotis, A. M. Koniari, S. Khademi, "Efficient active learning for high-dimensional engineering analysis via Bayesian neural networks" *International Conference on Structural Safety and Reliability (ICOSSAR)*, 2025.
- P. Bhustali, C. P. Andriotis, **P. G. Morato**, K. G. Papakonstantinou, "Understanding multi-agent cooperation in deep reinforcement learning for inspection and maintenance planning," *Engineering Mechanics Institute Conference (EMI)*, 2024.
- **P. G. Morato**, S. Khademi, A. M. Koniari, C. P. Andriotis, "Building energy efficiency prediction and uncertainty quantification via Bayesian neural networks," *GNI Symposium & Expo on Artificial Intelligence for the Built World (GNI 2024)*, 2024.
- **P. G. Morato**, J. Morán A., S. Khademi, A. M. Koniari, N. Hlaing, C. P. Andriotis, "Bayesian neural networks for active learning and uncertainty quantification with big data," *Engineering Mechanics Institute Conference and Probabilistic Mechanics & Reliability Conference (EMI/PMC)*, 2024.
- **P. G. Morato**, K. G. Papakonstantinou, C. P. Andriotis, "From partial and limited structural health data to optimal management of engineering systems," *Engineering Mechanics Institute Conference (EMI)*, 2023.

- **P. G. Morato**, C. P. Andriotis, K. G. Papakonstantinou, P. Rigo, "Data-driven condition assessment, model updating and maintenance of multi-component systems under correlated deterioration processes," *Engineering Mechanics Institute Conference (EMI)*, 2022.
- **P. G. Morato**, K. G. Papakonstantinou, C. P. Andriotis, N. Hlaing, P. Rigo, "Optimal management of offshore wind structural systems via deep reinforcement learning and Bayesian networks," *Wind Energy Science Conference*, 2021.
- **P. G. Morato**, J. S. Nielsen, L. Marquez, P. Rigo, "Computational performance of risk-based inspection methodologies for offshore wind support structures," *Wind Energy Science Conference*, 2019.