

# Pedro Zuidberg Dos Martires, Ph.D.

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🌐 <https://pedrozudo.github.io>

## Employment

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Jul 2022 –	<b>Örebro University</b> (Sweden) Assistant Professor funded by <b>WASP</b>
Apr 2022 – Jun 2024	<b>Örebro University</b> (Sweden) Postdoctoral Researcher in the <b>MPI Lab</b> funded by <b>WASP</b>
Dec 2020 – Feb 2022	<b>KU Leuven</b> (Belgium) Postdoctoral Fellow in the <b>DTAI Lab</b>
Apr 2016 – Nov 2020	<b>KU Leuven</b> (Belgium) Research Assistant in the <b>DTAI Lab</b>

## Education

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Apr 2016 – Nov 2020	<b>KU Leuven</b> (Belgium), Department of Computer Science PhD in Computer Science, Artificial Intelligence <i>From Atoms to Possible Worlds: Probabilistic Inference in the Discrete-Continuous Domain</i> <i>Defended on November 25, 2020</i> <i>Supervised by Prof. Luc De Raedt</i>
Aug 2013 – Aug 2015	<b>University of Amsterdam</b> (Netherlands), Faculty of Physics Master of Science in Particle Physics
Oct 2012 – Jan 2013	<b>University of Lisbon</b> (Portugal) Exchange Student
Oct 2009 – Oct 2012	<b>University of Vienna</b> (Austria), Faculty of Physics Bachelor of Science in Physics

## Research Interests

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Broadly speaking, my research interests lie with artificial intelligence and machine learning, with a specialized emphasis on neuro-symbolic methods. In essence, my work involves harmonizing formal models of the world, usually provided by domain experts or grounded in scientific theories, with powerful function approximators like neural networks. My overarching scientific objective centers on the development of systems capable of both reasoning and learning when confronted with raw sensory data. To attain this ambitious goal, I advocate for a comprehensive approach, a philosophy also in my diverse research activities. These activities span a spectrum that encompasses, inter alia, probabilistic inference with discrete-continuous data [13, 14, 17, 18], neuro-probabilistic programming [9, 10, 11, 12, 24, 2], and cognitive robotics [4, 5, 15].

## Research Visits

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Feb 2023 – Mar 2023	Research stay in the <b>SML Group</b> (Trento, Italy) <i>Working on neuro-symbolic AI with Prof. Andrea Passerini</i>
Oct 2022	Attendance of the <b>ELLIIT Focus Period</b> (Linköping, Sweden) <i>Two week workshop at the intersection of AI and control theory</i>
Jan 2022 – Feb 2022	Research stay in the <b>SML Group (Trento, Italy)</b> <i>Working on neuro-symbolic AI with with Prof. Andrea Passerini</i>
Aug 2018	Research stay at the <b>MPI Lab</b> (Örebro, Sweden) <i>Working on cognitive robotics with Prof. Amy Loutfi</i>
Jul 2015	Research stay at <b>CERN</b> (Geneva, Switzerland) <i>Data analysis for the LHCf experiment with Prof. Davide Berge</i>

Jun 2014 - Aug 2014

Summer Student at **CERN (Geneva, Switzerland)**  
*Data analysis at the Large Hadron Collider supervised by Dr. Pamela Ferrari*

## Grants & Awards

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Dec 2022	Recipient of a <b>TAILOR Connectivity Fund</b> grant for a two-month research visit in Trento, Italy
Jul 2020	Recipient of a Postdoctoral Mandate at the KU Leuven, includes personal stipend for full year of postdoctoral research
Aug 2008	Distinguished paper award at the Junior Mathematical Congress (Jena, Germany)

## Teaching

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Instructor	<b>Autonomous Robots and ROS</b> , Örebro University 2023, 2024 <i>Introductory course to the Robot Operating System (lifelong learning course)</i>
	<b>Summer School on Robotics</b> , Örebro University 2022, 2023, 2024 <i>International four week long summer school for undergraduate students to learn the Robot Operating System</i>
Teaching Assistant	<b>WASP Artificial Intelligence and Machine Learning</b> , Örebro University 2023, 2024 <i>Advanced course for on AI and machine learning for PhD students in the WASP program</i>
	<b>Databases</b> , KU Leuven 2020-2021, 2021-2022 <i>Course on databases in the Computer Science Master's program</i>
	<b>Uncertainty in Artificial Intelligence</b> , KU Leuven 2016-2017, 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022 <i>Course on probabilistic artificial intelligence in the Computer Science Master's program</i>
	<b>Information Structures and Implications</b> , KU Leuven 2016-2017, 2017-2018, 2020-2021, 2021-2022 <i>Database course for students in the Digital Humanities Master's program</i>
	<b>Introduction to Physics</b> , University of Vienna 2011-2012 <i>Introductory physics course on in the Physics Bachelor's program</i>

## Mentorship & Advisees

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PhD Students	<b>Håkan Karlsson Faronius</b> , Örebro University, 2024 – <i>Co-Supervisor: Prof. Luc De Raedt</i>
	<b>Matthias Möller</b> , Örebro University, 2023 – <i>Co-Supervisor: Prof. Luc De Raedt</i>
	<b>Rishi Hazra</b> , Örebro University, 2022– <i>Co-Supervisor: Prof. Luc De Raedt</i>
	<b>Lennert De Smet</b> , KU Leuven, 2021 – <i>Supervisor: Prof. Luc De Raedt</i>
	<b>Gabriele Venturato</b> , KU Leuven, 2020 – 2024 <i>Supervisor: Prof. Luc De Raedt</i>
	<b>Victor Verreet</b> , KU Leuven, 2019 – 2022 <i>Supervisor: Prof. Luc De Raedt</i>
Master Students	<b>Michiel Baptist</b> , KU Leuven, 2018 – 2019
	<b>Pieter-Jan Coenen</b> , KU Leuven, 2018 – 2019

	<b>Evert Heylen</b> , KU Leuven, 2018 – 2019
	<b>Rei Bardhi</b> , KU Leuven, 2018 – 2019
	<b>Olivier, Kamers</b> , KU Leuven, 2017 – 2018
	<b>Niels Wéry</b> , KU Leuven, 2016 – 2017
Bachelor Students	<b>Tibo Van den Eede</b> , KU Leuven, 2021 – 2022
	<b>Sam Vervaeck</b> , KU Leuven, 2021 – 2022
Interns	<b>Shani Vanlerberghe</b> , KU Leuven, Summer 2019
	<b>Ivan Miošić</b> , KU Leuven, Summer 2019 (Erasmus Internship)

## Skills

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### Languages

Native Speaker	Luxembourgish
Fluent	German, English, French
Good Command	Portuguese, Dutch

### Soft Skills

Funding	I have experience reporting on external funding ( <b>ReGROUND project</b> ) and successfully writing grant applications (e.g. Postdoctoral Mandate at the KU Leuven).
Networking	I am an active member of the research community and have, for instance, hosted Prof. Robert Peharz and Dr. Vissarion Fisikopoulos at the KU Leuven.
Organizing	I have been involved in organizing various scientific events and workshops, e.g. the biannual Fluffy workshop of the DTAI lab at the KU Leuven or the Summer school on Robotics at the University of Örebro.

### Technical Skills

AI/ML Software	ProbLog, PyTorch, Tensorflow, Robot Operating System
Programming languages	Python, C++, Julia, DLang

## Professional Activities & Service

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### Reviewing

I regularly review papers for the following venues:

Journals	Artificial Intelligence Journal International Journal of Approximate Reasoning Machine Learning Journal
Conferences	International Conference on Artificial Intelligence and d Statistics (AISTATS) Uncertainty in Artificial Intelligence (UAI) International Joint Conference on Artificial Intelligence (IJCAI) Conference on Artificial Intelligence (AAAI) International Joint Conference on Learning and Reasoning (IJCLR) International Conference on Probabilistic Programming (ProbProg)

	European Conference on Artificial Intelligence (ECAI)
Workshops	International Workshop on Statistical Relational AI (StarAI)
	Workshop on Tractable Probabilistic Modeling (TPM)

## Volunteering

I have participated in the [Summer School of Science](#) in Croatia as a project leader. The summer school is a ten day event during which a small group of high school students works out their own research project and present their research to peers. I have had the opportunity to supervise two such projects (2017, 2018).

## Publications

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### Doctoral Thesis

- [1] **P. Zuidberg Dos Martires**<sup>\*</sup>. “From Atoms to Possible Worlds: Probabilistic Inference in the Discrete-Continuous Domain”. PhD thesis. KU Leuven, 2020.

### Journal Publications

- [2] **P. Zuidberg Dos Martires**, L. De Raedt, and A. Kimmig. “Declarative Probabilistic Logic Programming in Discrete-Continuous Domains”. In: *Artificial Intelligence Journal* (2024).
- [3] V. Derkinderen<sup>\*</sup>, R. Manhaeve, **P. Zuidberg Dos Martires**, and L. De Raedt. “Semirings for Probabilistic and Neuro-Symbolic Logic Programming”. In: *International Journal of Approximate Reasoning* (2024).
- [4] **P. Zuidberg Dos Martires**<sup>\*</sup>, N. Kumar, A. Persson, A. Loutfi, and L. De Raedt. “Symbolic Learning and Reasoning with Noisy Data for Probabilistic Anchoring”. In: *Frontiers in Robotics and AI* (2020).
- [5] A. Persson<sup>\*</sup>, **P. Zuidberg Dos Martires**<sup>\*</sup>, L. De Raedt, and A. Loutfi. “Semantic Relational Object Tracking”. In: *IEEE Transactions on Cognitive and Developmental Systems* (2020).

### Conference Publications

- [6] **P. Zuidberg Dos Martires**<sup>\*</sup>, V. Derkinderen, L. De Raedt, and M. Krantz. “Automated Reasoning in Systems Biology: a Necessity for Precision Medicine”. In: *Proceedings of the International Conference on Knowledge Representation and Reasoning*. 2024.
- [7] R. Hazra<sup>\*</sup>, **P. Zuidberg Dos Martires**, and L. De Raedt. “SayCanPay: Heuristic Planning with Large Language Models using Learnable Domain Knowledge”. In: *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. 2024.
- [8] G. Venturato<sup>\*</sup>, V. Derkinderen, **P. Zuidberg Dos Martires**, and L. De Raedt. “Inference and Learning in Dynamic Decision Networks Using Knowledge Compilation”. In: *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. 2024.
- [9] **P. Zuidberg Dos Martires**. “Probabilistic Neural Circuits”. In: *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. 2024.
- [10] L. De Smet<sup>\*</sup>, E. Sansone, and **P. Zuidberg Dos Martires**. “Differentiable Sampling of Categorical Distributions Using the CatLog-Derivative Trick”. In: *Proceedings of the Conference on Neural Information Processing Systems (NeurIPS)*. 2023.
- [11] L. De Smet<sup>\*</sup>, **P. Zuidberg Dos Martires**, R. Manhaeve, G. Marra, A. Kimmig, and L. De Raedt. “Neural Probabilistic Logic Programming in Discrete-Continuous Domains”. In: *Proceedings of the Uncertainty in Artificial Intelligence Conference (UAI)*. 2023.
- [12] V. Verreet<sup>\*</sup>, V. Derkinderen, **P. Zuidberg Dos Martires**, and L. De Raedt. “Inference and Learning with Model Uncertainty in Probabilistic Logic Programs”. In: *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. 2022.

- [13] P. Morettin\*, **P. Zuidberg Dos Martires\***, S. Kolb\*, and A. Passerini. “Hybrid probabilistic inference with logical and algebraic constraints: a survey”. In: *Proceedings of the 30th International Joint Conference on Artificial Intelligence (IJCAI)*. 2021.
- [14] V. Derkinderen\*, E. Heylen, **P. Zuidberg Dos Martires**, S. Kolb, and L. De Raedt. “Ordering Variables for Weighted Model Integration”. In: *Proceedings of the Uncertainty in Artificial Intelligence Conference (UAI)*. 2020.
- [15] A. Persson\*, **P. Zuidberg Dos Martires**, L. De Raedt, and A. Loutfi. “ProbAnch: a Modular Probabilistic Anchoring Framework”. In: *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*. 2020.
- [16] S. Kolb\*, P. Morettin, **P. Zuidberg Dos Martires**, F. Somnavilla, A. Passerini, R. Sebastiani, and L. De Raedt. “The pywmi Framework and Toolbox for Probabilistic Inference using Weighted Model Integration”. In: *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*. 2019.
- [17] S. Kolb\*, **P. Zuidberg Dos Martires\***, and L. De Raedt. “How to Exploit Structure while Solving Weighted Model Integration Problems”. In: *Proceedings of the Uncertainty in Artificial Intelligence Conference (UAI)*. 2019.
- [18] **P. Zuidberg Dos Martires\***, A. Dries, and L. De Raedt. “Exact and Approximate Weighted Model Integration with Probability Density Functions Using Knowledge Compilation”. In: *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*. 2019.

## Tutorials

- [19] P. Morettin, **P. Zuidberg Dos Martires**, S. Kolb, and A. Passerini. *Hybrid Probabilistic Inference with Algebraic and Logical Constraints*. 2022. URL: <https://dtai.cs.kuleuven.be/tutorials/wmitutorial>.

## Workshop Publications

- [20] L. De Smet\*, E. Sansone, and **P. Zuidberg Dos Martires**. “Differentiable Sampling of Categorical Distributions Using the CatLog-Derivative Trick”. In: *Differentiable Almost Everything: Differentiable Relaxations, Algorithms, Operators, and Simulators*. 2023.
- [21] V. Derkinderen\*, **P. Zuidberg Dos Martires**, S. Kolb, and P. Morettin. “Top-Down Knowledge Compilation for Counting Modulo Theories”. In: *Workshop on Counting and Sampling*. 2023.
- [22] L. De Smet\*, R. Manhaeve, G. Marra, and **P. Zuidberg Dos Martires**. “Tensorised Probabilistic Inference for Neural Probabilistic Logic Programming”. In: *The 5th Workshop on Tractable Probabilistic Modeling*. 2022.
- [23] G. Venturato\*, V. Derkinderen, **P. Zuidberg Dos Martires**, and L. De Raedt. “Towards Tractable Dynamic Decision Making With Circuits”. In: *5th Workshop on Tractable Probabilistic Modeling*. 2022.
- [24] **P. Zuidberg Dos Martires\***. “Neural Semirings”. In: *15th International Workshop on Neural-Symbolic Learning and Reasoning (NeSy)*. 2021.
- [25] **P. Zuidberg Dos Martires\*** and S. Kolb. “Monte Carlo Anti-Differentiation for Approximate Weighted Model Integration”. In: *Ninth International Workshop on Statistical Relational AI (StarAI)*. 2020.
- [26] O. A. Can\*, **P. Zuidberg Dos Martires\***, A. Persson, J. Gaal, A. Loutfi, L. De Raedt, D. Yuret, and A. Saffiotti. “Learning from Implicit Information in Natural Language Instructions for Robotic Manipulations”. In: *Combined Workshop on Spatial Language Understanding and Grounded Communication for Robotics (SpLU-RoboNLP)*. 2019.
- [27] **P. Zuidberg Dos Martires\***, A. Dries, and L. De Raedt. “Knowledge Compilation with Continuous Random Variables and its Application in Hybrid Probabilistic Logic Programming”. In: *Eighth International Workshop on Statistical Relational AI (StarAI)*. 2018.
- [28] L. Antanas, O. A. Can, J. Davis, L. De Raedt, A. Loutfi, A. Persson, A. Saffiotti, E. Unal, D. Yuret, and **P. Zuidberg Dos Martires**. “Relational Symbol Grounding through Affordance Learning: an Overview of the ReGround Project”. In: *International Workshop on Grounding Language Understanding (GLU)*. 2017.

## Extended Abstracts

- [29] V. Verreet\*, V. Derkinderen, **P. Zuidberg Dos Martires**, and L. De Raedt. “Inference and Learning with Model Uncertainty in Probabilistic Logic Programs”. In: *Proceedings of the International Conference on Logic Programming (ICLP)*. 2022.
- [30] **P. Zuidberg Dos Martires**\*, V. Derkinderen, R. Manhaeve, W. Meert, A. Kimmig, and L. De Raedt. “Transforming Probabilistic Programs into Algebraic Circuits for Inference and Learning”. In: *Program Transformations for Machine Learning*. 2019.
- [31] **P. Zuidberg Dos Martires**\*. “Differentiation and Weighted Model Integration”. In: *Workshop on Deep Continuous-Discrete Machine Learning (DecodeML)*. 2019.
- [32] **P. Zuidberg Dos Martires**\* and S. Dumancic. “Reactive Probabilistic Programming”. In: *International Conference on Probabilistic Programming (ProbProg)*. 2018.

## Preprints

- [33] I. Miosic\* and **P. Zuidberg Dos Martires**. “Measure Theoretic Weighted Model Integration”. In: *arXiv preprint arXiv:2103.13901* (2021).