

# Luca Herranz-Celotti

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## REFERENCES

**Prof. Razvan Pascanu (DeepMind)** [r.pascanu@gmail.com](mailto:r.pascanu@gmail.com)  
**Prof. Marco Viviani (Milano Bicocca)** [marco.viviani@unimib.it](mailto:marco.viviani@unimib.it)  
**Prof. Jean Rouat (Université de Sherbrooke)** [jean.rouat@usherbrooke.ca](mailto:jean.rouat@usherbrooke.ca)  
**Prof. Ugo Bastolla (CSIC)** [ubastolla@cbm.uam.es](mailto:ubastolla@cbm.uam.es)

## SKILLS

**SCIENCE:** Mathematics, Deep Learning, Computational Neuroscience, Biophysics, Fluid Dynamics, Quantum Field Theory, Electromagnetism

**Mathematics:** Complex Analysis, Differential Equations, Random Matrix Theory, Analytic Combinatorics

**PROGRAMMING:** Python, MATLAB, HTML, CSS, Git, Bash, LaTeX, Slurm, App Development, Flutter

**Python:** PyTorch, JAX, TensorFlow, HuggingFace, Pandas, Matplotlib

**SOFTWARE:** Linux, Mathematica

**DEEP LEARNING:** Gradient Stability, Pre-training, PEFT, Transfer Learning, Neuromorphic, Transformers, Convolutions, State-Space Models, Reinforcement Learning

**LANGUAGES:** English, Spanish, Italian, French, German

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## EXPERIENCE

**1/9/2025 - 1/9/2026 PostDoc - Reason Lab**

**Université Paris Cité, France**

- Supervisor: Prof. Pavlos Moraitis
- Project: TwinODIS – The position focuses on research at the intersection of natural language processing (NLP) and argumentative reasoning, and more broadly, in knowledge representation and reasoning.

**1/6/2024 - 31/7/2025 PostDoc - IKR3 Lab**

**Università degli Studi di Milano-Bicocca, Italy**

- Supervisor: Prof. Marco Viviani
- Project: KURAMI – *Knowledge-based, explainable User empowerment in Releasing private data and Assessing Misinformation in online environments*
  - The KURAMi Project, funded by the Ministry of University and Research (MUR) stems from observing recent dynamics in considering the protection of users' data and privacy, and users' access to potential misinformation, through EU regulations and guidelines. A key aspect is the balance between the rights to confidentiality, autonomous decision-making, free access to information, and freedom of expression.
- Misinformation Detection
  - Misinformation detection methods predominantly rely on supervised approaches, which depend heavily on labeled datasets that are costly and time-consuming to produce. We aimed at improving Large Language Models (LLMs) ability to detect misinformation with LogicJitter, a data augmentation technique during fine-tuning that generates both correct and incorrect statements within rule-based logic games. These games are designed to counteract well-known human cognitive biases and logical fallacies.
- Privacy Assessment
  - As users increasingly input confidential information in their queries the need for effective query protection deserves further investigation in current research. We examine whether the use of generative LLMs offers a viable solution in light of various state-of-the-art techniques aimed at safeguarding queries from the user's privacy perspective.

- Information Retrieval
  - The extreme availability of health information online and its use by non-experts, signals a strong need for Health Information Retrieval models that consider not only topical relevance but also factual accuracy. This should be done also to help those non experts and decision makers that need Explainable solutions to be able to assess if the information is trustworthy.

### **1/3/2016 - 1/3/2024 Doctoral Student - NECOTIS Lab**

#### **Université de Sherbrooke, Canada**

- Supervisor: Prof. Jean Rouat
- Internship: Developed LSNN variants at Wolfgang Maass lab in IGI TU Graz
- Internship: Developed Language Models for MarketMuse
- Neuromorphic Computing
  - Optimized stability criteria to predict at initialization hyper parameters with best performance after training
  - Discovered that high firing rate at initialization with gradual sparsity encouraging term can help generalization
- Stability of deep Recurrent Networks
  - Found that deep Recurrent Networks suffer from an additive source of exponential explosion that cannot be observed in one layer RNNs
  - Improved pre-training to stability as an effective strategy to take to stability networks of any complexity
  - Discovered that a local radius of 1 is stable for feedforward networks but only a local radius of 0.5 can handle the additive explosion in deep RNNs
- Developed the U-BESD convolutional architecture to help the hearing impaired isolate the sound they attend using their brain activity recorded with EEG

### **1/3/2014 - 1/3/2015 Internship - Laboratory of cognitive computational neuroscience**

#### **Université de Genève, Switzerland**

- Supervisor: Prof. Alexandre Pouget
- Subject: Uncertainty Propagation in Population Coding
- Took lectures on 'Introduction to cognitive and affective neuroscience' and 'Biological modelling of neural networks' with Wulfram Gerstner

### **1/3/2012 - 1/3/2013 Master in Biophysics**

#### **Universidad Autónoma de Madrid, Spain**

- Supervisor: Prof. Nestor Parga
- Final grade: 2nd best among 14 students, 87.8%
- Received the grant 'Ayudas para Inicio de Estudios en Programas de Posgrado de la UAM' that paid the whole Master, a yearlong language course and a monthly wage
- Master Thesis on Neuroscience: 'Information transfer during a perceptual decision task'

### **2011/2012 Erasmus Scholarship**

#### **Imperial College of London, United Kingdom**

- Yearlong Project on Graphs: 'A dimensional analysis on directed networks for citation graphs'
- Course on 'Biophysics of neurons' taken

### **2007/2012 Undergraduate in Physics**

#### **Universidad Autónoma de Madrid, Spain**

- Final grade: 9th best among 64 students, 81.7%
- Maths (Topology, Differential Geometry, Group Theory, Graphs) and Psychology courses taken
- Volunteered two summers during my Master to help a Physics professor on his research neuron Bohmian Trajectories.

# PUBLICATIONS

- [1] **Herranz-Celotti, L.** et al. “Can Generative AI Adequately Protect Queries? Analyzing the Trade-off Between Privacy Awareness and Retrieval Effectiveness”. In: *ECIR 2025* (2025).
  - [2] **Herranz-Celotti, L.** and J. Rouat. “Gradient Stability in Recurrent Neural Networks, Spiking and Conventional (PhD Thesis)”. In: (2024).
  - [3] **Herranz-Celotti, L.** and J. Rouat. “Surrogate Gradient Design”. In: *sub. IEEE* (2023).
  - [4] **Herranz-Celotti, L.** and J. Rouat. “Stabilizing RNN Gradients through Pre-training ”. In: *sub. IEEE* (2023).
  - [5] **Herranz-Celotti, L.** and E. Rrapaj. “Less is More! A slim architecture for optimal language translation”. In: *ENLSP-III, NeurIPS Workshop* (2023).
  - [6] E. Calvet, **Herranz-Celotti, L.**, and K. Valimamode. “SmartDCA superiority”. In: *submitted* (2022).
  - [7] M. Hosseini, **Herranz-Celotti, L.**, and E. Plourde. “End-to-End Brain-Driven Speech Enhancement in Multi-Talker Conditions”. In: *IEEE/ACM Transactions on Audio, Speech, and Language Processing* (2022).
  - [8] **Herranz-Celotti, L.**, S. Brodeur, and J. Rouat. “AriEL: volume coding for sentence generation comparisons”. In: *arXiv preprint* (2021).
  - [9] M. Hosseini, **Herranz-Celotti, L.**, and E. Plourde. “Speaker-independent Brain Enhanced Speech denoising”. In: *ICASSP* (2021).
  - [10] S. Brodeur et al. “HoME: a Household Multimodal Environment”. In: *ICLR Workshop Paper* (2018).
  - [11] **Herranz-Celotti, L.**, S. Brodeur, and J. Rouat. “Language Coverage and Generalization in RNN-based Continuous Sentence Embeddings for Interacting Agents”. In: *ViGIL 2018, NeurIPS Workshop* (2018).
  - [12] S. Brodeur, **Herranz-Celotti, L.**, and J. Rouat. “Proposal of a Generative Model of Event-based Representations for Grounded Language Understanding”. In: *Proc. GLU 2017* (2017).
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# PRESENTATIONS

## ORAL

- “Proposal of a Generative Model of Event-based Representations for Grounded Language Understanding”. Stockholm, 2017
- “IGLU project structure”, Zaragoza , 2018
- “AriEL: volume coding for sentence generation comparisons”, Graz, 2019
- “Stabilizing Spiking Neuron Training”, Neuromatch, online, 2020
- “Stabilizing Spiking Neuron Training”, Intel INRC Forum, 2022

## POSTER

- IGLU CHISTERA meeting, Paris, 2018
  - Deep Learning Reinforcement Learning Summer School, Toronto, 2019
  - VigIL Workshop, NeurIPS, Vigil, 2021
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# ACADEMIC EXPERIENCE

## WORKSHOP ORGANIZATION

Lead organizer for the NeurIPS Workshop [DLDE2021](#), [DLDE2022](#), [DLDE2023](#)

## TEACHING ASSISTANT

- Bayesian Probability I, Sherbrooke, Fall 2018
  - Bayesian Probability II, Sherbrooke, Winter 2019
  - Biologically Inspired Artificial Intelligence, Sherbrooke, Fall 2019
  - M2L summer school, Milano, Fall 2024
  - Text Mining and Search, Milano, Winter 2024
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## AWARDS

- Scholarship to course master studies, 2012: “Ayudas para Inicio de Estudios en Programas de Posgrado de la UAM”
- Drone won at the entry competition of the Machine Learning Summer School against 400 students, 2015
- Seal of Excellence won for a project proposal that received a grade of 88% at the 2024 Marie Skłodowska-Curie Actions for Postdoctoral Fellowships