Dr. Abelardo Carlos **Martínez Lorenzo**

Lead AI Scientist | AI Systems Architecture | Technical Leadership

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AI technical lead at the World Bank with six direct reports and a PhD in NLP. Own backend implementation, AI architecture, GCP budgets and CI/CD; translate user needs into Python services and coordinate delivery with research and product teams.

Experience

Lead AI Scientist
Washington, DC / Rome

World Bank (Extended-Term Consultant) — *Sep 2024 - Present*

- Lead an AI science team of **six direct reports**; own **architecture, core backend implementation** and code review for a conversational **evidence-synthesis platform** supporting meta-analysis and development policy.
- Build **Python/FastAPI REST APIs** for PDF parsing, information extraction, **RAG**, entity linking, SQL analysis and summarization; integrate streaming, failure recovery and automated tests.
- Own **GCP infrastructure**, resource planning and cloud budgets; establish deployment standards and automate GitHub-to-GCP **CI/CD** with Docker, Cloud Build and Cloud Run.
- Translate **user needs** into **LLM integration plans**; coordinate **research roadmaps**, grant proposals, dependencies and resources.
- Design **human-in-the-loop evaluation**, LLM judges and **retrieval benchmarks**; improve prompts and models through annotator feedback, **user sessions** and error analysis.
- Optimize **inference cost and latency** through domain-specific **fine-tuning**, encoder models, batching and caching; build Vertex AI training pipelines and synthetic-data workflows.
- Develop LLM-based **taxonomy generation and refinement** with human validation to structure and retrieve research evidence.
- Guide and co-author research on **causal effect prediction from natural-language queries**, using a **72,000+ synthetic-query benchmark** and structured LLM-to-encoder pipeline; evaluate cross-domain generalization.
- Build **terabyte-scale news pipelines** for **food-crisis research** with Pandas, PyArrow and Parquet; guide model evaluation and code improvements for **societal AI research**.

Senior AI Scientist
Washington, DC / Rome

World Bank (Short-Term Consultant) — *Jan 2024 - Sep 2024*

- Designed and implemented a **two-stage entity-linking system** using an **e5 retriever** followed by a **fine-tuned DeBERTa encoder** to map research text to an impact-evaluation taxonomy.
- Built **FastAPI/Docker NLP services**; managed **GCP resources**, container orchestration, API deployment and latency optimization.
- Built and evaluated **LLM prompting pipelines** for information extraction and semantic parsing using GPT-4o, LLaMA and Gemini.

NLP Researcher
Rome, Italy

Sapienza NLP, Sapienza University of Rome — *2023 - 2024*

- **Led research with PhD students** on multilingual language understanding and LLM-based **parsing, alignment and tagging** workflows.
- Designed **compact graph representations and encoder-decoder parsers** in PyTorch Lightning, cutting **training time by 82% and inference time by 78%** versus SPRING (BART-large, AMR 3.0) while preserving parsing quality.
- Developed **multilingual semantic-parsing datasets** through structured annotation and **GPT-3.5 fine-tuning**; evaluated on 1,100 human-annotated sentences across 11 languages.
- Served as a **teaching assistant** for MSc NLP courses and **mentored students** in research methods and implementation.

NLP Researcher
Rome, Italy

Babelscape — *2020 - 2023*

- Designed **cross-lingual meaning representations** and **BART/T5** parsing and generation models; delivered Dockerized inference demos.
- Built alignment-aware training with **cross-attention supervision**; co-developed **graph-informed adapters and self-distillation** for encoder-decoder models.
- Developed **autoregressive ensembling and graph validation**, reducing invalid outputs from **13.7% to 0.3%** versus Graphene-SMATCH at equal Smatch on AMR 3.0.
- Co-developed a **multilingual annotated corpus** with hundreds of millions of silver annotations across **four language-understanding tasks and five languages**.

Research Assistant
Berlin, Germany

Technische Universität Berlin — *Sep 2019 - Jun 2020*

- **Designed and led implementation** of a **neuro-symbolic framework for knowledge-graph completion** with faculty collaborators, combining embedding models and ontology-based reasoning.
- Built **interchangeable model/OWL2 reasoner interfaces**; evaluated TransE, ComplEx and DistMult on DBpedia and LUBM, improving DistMult MRR from **0.28 to 0.35** on LUBM.

Software Engineer
Málaga, Spain

Freelance — *2017 - 2018*

- Built a **real-time, multiplatform emergency coordination** app with chat, peer-to-peer **WebRTC** voice, maps, incidents and team assignment.
- Developed the backend with **Node.js and LoopBack**, using **MongoDB** for persistence, and implemented the frontend with **AngularJS**.

Education

PhD in Deep Learning and Natural Language Processing — *Rome, Italy*

Sapienza University of Rome

- **Marie Skłodowska-Curie fellowship**, Horizon 2020 KnowGraphs. Advisor: Roberto Navigli.
- Thesis: Enhancing Semantic Parsing in the Age of Pre-trained Language Models.

MSc in Big Data Management and Analytics — *Berlin, Barcelona, Brussels*

Erasmus Mundus joint programme: TU Berlin, UPC Barcelona and ULB Brussels

- Final grade: **9.0/10**. Focus: large-scale analytics, big data and business intelligence.

BSc in Software Engineering — *Málaga, Spain*

University of Málaga

- Final grade: **9.0/10**. Erasmus exchange: Charles University, Prague.

Publications & Preprint

2026	Giuliano Martinelli, Piriyakorn Piriyatamwong, Abelardo Carlos Martinez Lorenzo, Jasmin Baier, Riccardo Orlando, Satvik Garg, Sharif Kazemi, Linxi Wang, Arianna Legovini, Samuel P. Fraiberger. **Predicting Causal Effects from Natural Language Queries using Structured Representations**.	*arXiv preprint*
2025	Abelardo Carlos Martinez Lorenzo, Alexander Perfilyev, Volker Markl, Martha Clokie, Thomas Sicheritz-Ponten, Zoi Kaoudi. **Modular Neuro-Symbolic Knowledge Graph Completion**.	*VLDB Workshop: LS-NSL*
2024	Abelardo Carlos Martinez Lorenzo, Pere-Lluís Huguet Cabot, Karim Ghonim, Lu Xu, Hee-Soo Choi, Alberte Fernández-Castro, Roberto Navigli. **Mitigating Data Scarcity in Semantic Parsing across Languages with the Multilingual Semantic Layer and its Dataset**.	*Findings of ACL*
2024	Abelardo Carlos Martinez Lorenzo, Roberto Navigli. **Efficient AMR Parsing with CLAP: Compact Linearization with an Adaptable Parser**.	*LREC-COLING*
2024	Simone Conia, Edoardo Barba, Abelardo Carlos Martinez Lorenzo, Pere-Lluís Huguet Cabot, Riccardo Orlando, Luigi Procopio, Roberto Navigli. **MOSAICo: a Multilingual Open-text Semantically Annotated Interlinked Corpus**.	*NAACL*
2023	Abelardo Carlos Martínez Lorenzo, Pere Lluís Huguet Cabot, Roberto Navigli. **Cross-lingual AMR Aligner: Paying Attention to Cross-Attention**.	*Findings of ACL*
2023	Abelardo Carlos Martínez Lorenzo, Pere Lluís Huguet Cabot, Roberto Navigli. **AMRs Assemble! Learning to Ensemble with Autoregressive Models for AMR Parsing**.	*ACL*
2023	Pavlo Vasylenko, Pere Lluís Huguet Cabot, Abelardo Carlos Martínez Lorenzo, Roberto Navigli. **Incorporating Graph Information in Transformer-based AMR Parsing**.	*Findings of ACL*
2022	Abelardo Carlos Martínez Lorenzo, Marco Maru, Roberto Navigli. **Fully-Semantic Parsing and Generation: the BabelNet Meaning Representation**.	*ACL*
2022	Roberto Navigli, Rexhina Blloshmi, Abelardo Carlos Martínez Lorenzo. **BabelNet Meaning Representation: A Fully Semantic Formalism to Overcome Language Barriers**.	*AAAI Blue Sky*

Skills

Programming & Data	Python, SQL, Java, Bash, Pandas, NumPy, PyArrow, Parquet, MySQL, PostgreSQL / pgvector
ML & NLP	PyTorch / Lightning, Hugging Face Transformers, scikit-learn, fine-tuning, self-distillation, entity linking
LLMs & Evaluation	RAG, embeddings, Qdrant, prompting, OpenAI / Gemini APIs, vLLM, human evaluation, retrieval metrics
Backend & Cloud	FastAPI, Pydantic, REST APIs, Docker, GCP, Vertex AI, Cloud Run / Build / SQL / Storage, GitHub Actions, AWS Lambda
Research & Tools	Git, Linux, Jupyter, Weights & Biases, Hydra, Poetry, automated testing
Technical Leadership	Research planning, code review, team coordination, cloud budgets, technical proposals, mentoring
Spoken Languages	English (fluent), Spanish (native), Italian (fluent), Portuguese (intermediate)

Honors & Academic Service

2023 **2× ISCRA Type C compute allocations**. CINECA HPC Center

2023 **Best Reviewer Award**. ACL

2020 **Marie Skłodowska-Curie PhD Fellowship**. Horizon 2020 KnowGraphs

Reviewer. ACL, EMNLP and EACL (2023); LREC (2022); EMNLP (2021); ACL Rolling Review (October and December 2023; February and June 2024).