Jan Esquível Marxen

HPC-AI Researcher

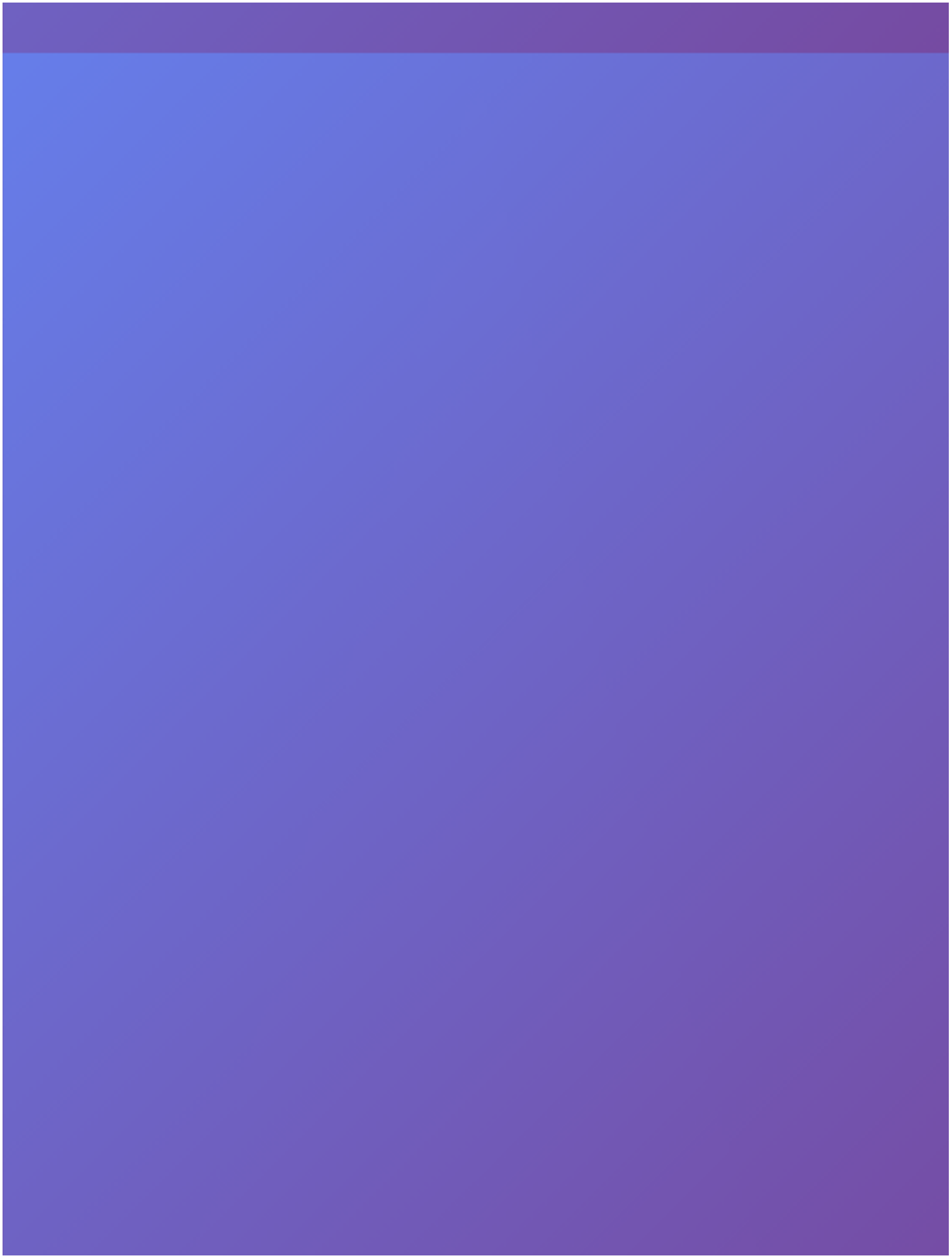
Passionate researcher with 3+ years experience in applied mathematics, machine learning, and **high-performance computing** - willing to research **neuromorphic** and **novel computing paradigms**.

📧 jan.marxen@gmail.com

🔗 linkedin.com/in/jan-esquível-marxen

💻 github.com/janmarxen

📍 Luxembourg



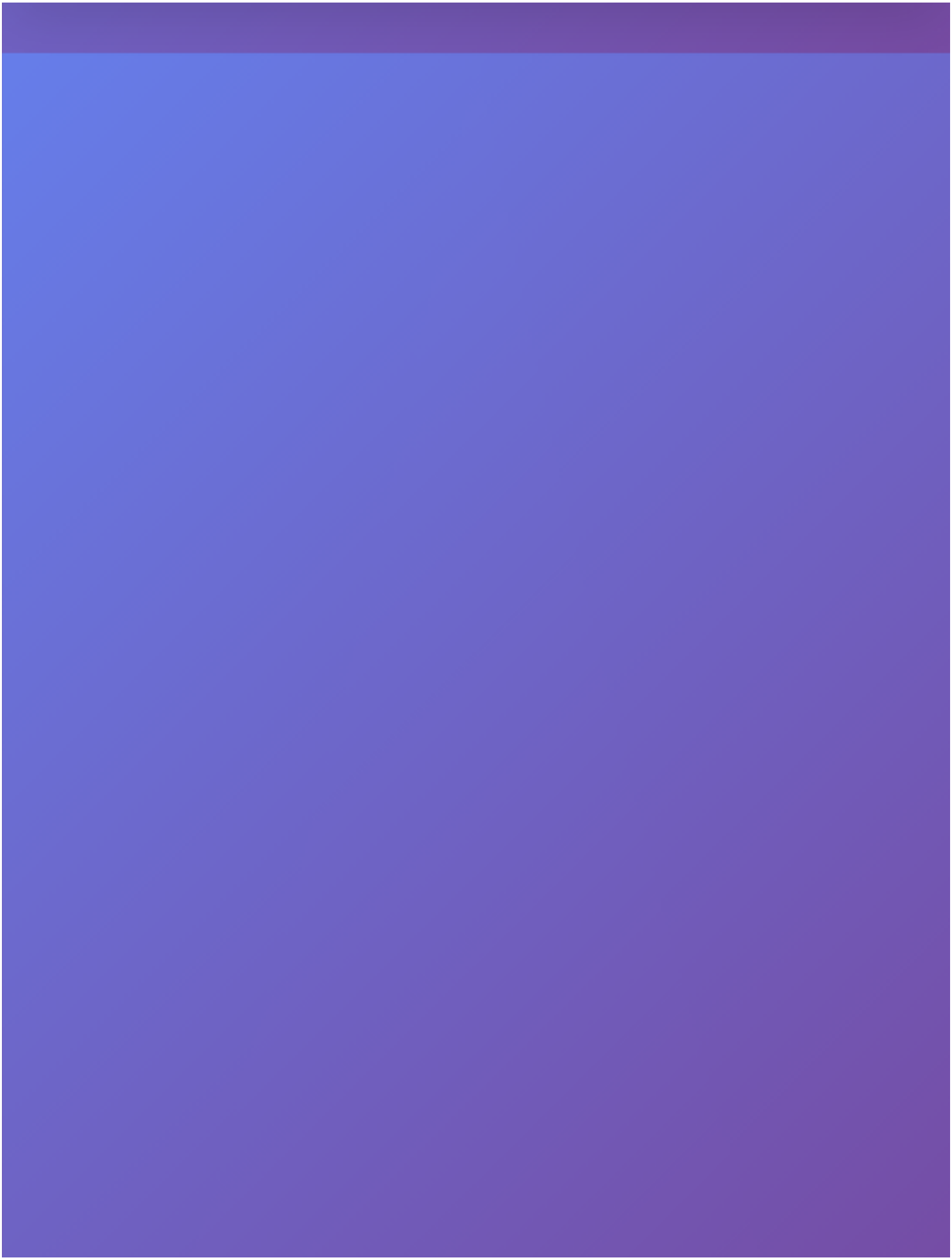
Academic Foundation & Research Journey

Bachelor in Applied Mathematics (2018-2021) - ISEL Lisbon & INSA Toulouse

- → **Francisco da Fonseca Benevides Medal** for exceptional performance in physics (19.5/20)
- → Thesis on **bio-inspired optimization algorithms** for scaffold design - bridging biology and computation
- → Gained foundation in **mathematical modeling**, numerical analysis, and computational physics
- → Specialized in **numerical methods** and hardware-aware algorithm development

Bio-Engineering Research Publications (2021)

- → Published research in **Institute of Physics** (American Journal) - peer-reviewed scientific publication
- → Presented at **international conferences** on computational biology and biomaterials
- → Developed algorithms based on **Krylov subspace methods** - advanced optimization techniques



Research & Professional Experience

European Central Bank (2022-2024) - HPC Research & Development

- → Financial Stability Analyst & Research Assistant
- → Developed **distributed HPC models** and parallel numerical solvers for large-scale simulations
- → Architected **high-performance computing infrastructure** and automated workflows
- → Collaborated with economists and PhDs in an **interdisciplinary research environment**

Bio-Engineering Researcher (2021) - Bio-Inspired Computing

- → €250,000 funded project on **bio-scaffold optimization** using nature-inspired algorithms
- → Published in **Institute of Physics** (American Journal) - peer-reviewed research
- → Developed **topology optimization algorithms** inspired by biological systems

Data Scientist - SIBS/Closer (2022) - Real-Time Machine Learning

- → Built **real-time ML pipelines** for fraud detection with microsecond latency requirements
- → Expertise in distributed computing frameworks (PySpark, Kafka, Dask) for **streaming data**
- → Developed **adaptive algorithms** for model monitoring and drift detection

Technical Expertise

Programming Languages

- → **C/C++** (systems programming, scientific simulations)
- → **Assembly** (hardware modeling/simulation, instruction sets)
- → **Python** (ML/data science, research prototyping)
- → Julia, MATLAB (scientific computing, numerical methods)

Parallel Computing

- → **CUDA** & **CuDNN** (GPU acceleration)
- → **MPI** & **OpenMP** (distributed computing)
- → **SYCL** for heterogeneous computing (GPU/FPGA)

Machine Learning

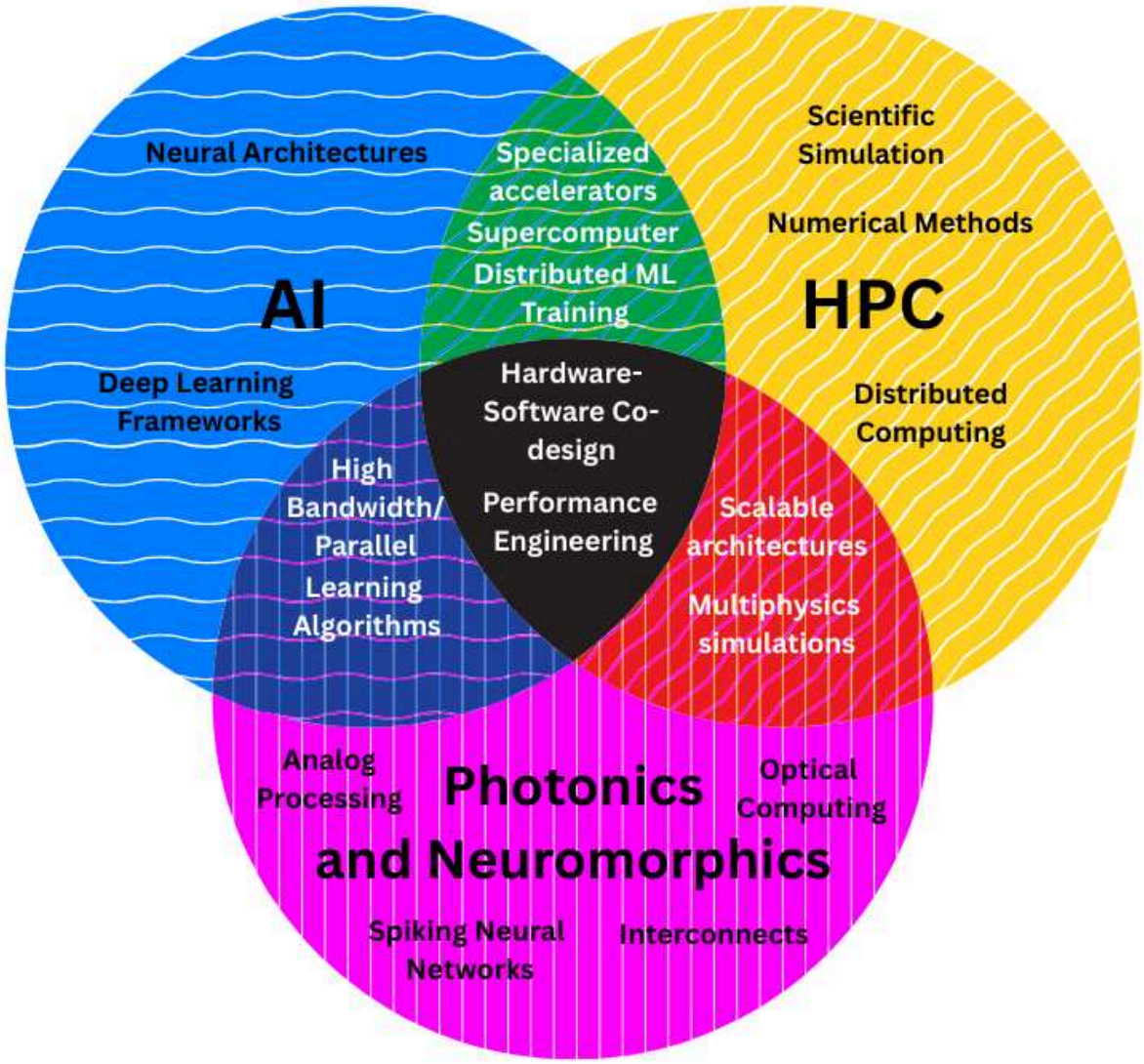
- → **PyTorch** (deep learning frameworks)
- → Distributed training optimization, **performance engineering**
- → Neural networks, transformers, **spike-based models**

Research Infrastructure

- → **HPC schedulers** (Slurm, OAR) - supercomputer environments
- → **Scientific computing clusters** & research infrastructure
- → **Collaborative research** tools and version control

Motivation

- → Pioneer **integrated computing architectures** that bridge classical and novel computing paradigms
- → Build the software stack for **neuromorphic and/or photonic computing** systems
- → Contribute to **sustainable computing** through energy-efficient architectures
- → Work hands-on with **novel hardware prototypes** and emerging computing architectures



How I Can Contribute to PGI-4

- → Deep experience with **HPC systems** and supercomputer architectures
- → Proven track record in **performance engineering** and optimization
- → Strong foundation in **mathematical modeling** and numerical methods
- → Hands-on experience with **heterogeneous computing** environments

- → Collaborative **interdisciplinary research** experience across physics, mathematics, and CS
- → Experience building **research prototypes** from concept to implementation

Why PGI-4 at Forschungszentrum Jülich

- → Working with **world-class researchers in hardware** development and design
- → Learn more about **hardware modeling** and novel computing architectures
- → **Co-design algorithms** by collaborating with hardware people

Ready to Contribute to PGI-4's Vision of Next-Generation Computing

📧 jan.marxen@gmail.com 💻 github.com/janmarxen

🔗 LinkedIn: jan-esquível-marxen