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Vladimir Williams

Curriculum Vitae

PhD Physics | Published in Physical Review Letters | Dassault Systèmes Certified MBSE
Nationality: *American, French*

Bridging the gap between statistical physics and industrial digital twins. A PhD-quant with 10+ years of R&D experience in high-performance computing (HPC), complex systems modeling, and predictive analytics. Currently applying advanced simulation and Model-Based Systems Engineering (MBSE) to decarbonize transportation (hydrogen aircraft & battery-powered trains). Proven ability to translate first-principles physics into scalable C++/Python production code and integrate it directly into engineering design lifecycles. Seeking a leadership role to design simulation pipelines and drive R&D strategy for next-generation sustainable technologies.

Core Competencies

Scientific Computing & HPC: Parallelized algorithms (C++/Python), cluster optimization, numerical PDE solvers, stochastic modeling

Systems Integration: MBSE (Dassault Systèmes 3DExperience), co-simulation (Dymola/Simulink), digital twins

Data Science: Timeseries forecasting, anomaly/fraud detection, optimization, non-equilibrium statistical physics

Domain Expertise: Thermodynamics, fluid dynamics (cryogenic H_2), battery electrochemistry, complex adaptive systems

Leadership: Full-stack project ownership (from concept to deployment), cross-functional team collaboration (R&D/Engineering), technical storytelling for executive stakeholders

Professional Experience

Founder, Chief Data and R&D Consultant, *Atelier Markov (Tours).* **2026–present**
Boutique R&D consulting bridging academic rigor with industrial AI.
- Designing custom forecasting and anomaly-detection algorithms for industrial clients, leveraging non-equilibrium statistical methods to identify early warning signs in noisy datasets
- Delivering high-stakes technical audits and building automated AI pipelines for clients lacking in-house HPC capacity

Products & Systems Engineer/Digital Engineer, *Capgemini Engineering (Paris).* **2023–2026**
Leading R&D simulation and MBSE integration for high-priority European decarbonization projects.
- **Eraole 2 (Hydrogen Aircraft):** Designed a physics-based digital twin for liquid hydrogen storage tanks. Predicted cryogenic boil-off rates under varying flight conditions–directly informing thermal insulation design choices and reducing prototype iteration costs by an estimated 20%
- **TELLi (Battery-Electric Train):** Engineered custom 3DExperience widgets and orchestrated co-simulation workflows (Simulink/Dymola). Enabled real-time integration of battery thermal models into the system architecture, solving cross-disciplinary coupling issues between electrical and mechanical teams.
- **Client Advisory:** Acted as the in-house "physics translator", converting complex simulation outputs into clear engineering requirements for non-specialist stakeholders

Invited Researcher, *Université de Tours, Institut Denis Poisson.* **2020–2022**
Focused on high-dimensional data analysis and critical phenomena in neural systems.
- Developed custom HPC simulation codes in C++/MATLAB to model quasicritical dynamics, processing terabytes of simulation and electrophysiological data
- Achieved an Editor's Suggestion in Physical Review Letters for groundbreaking work on neural criticality

Education

PhD, Physics, *Indiana University Bloomington.* **2016**
Thesis (available on personal website): Investigation of quasicritical dynamics and phase transitions in neural networks.
- Developed novel statistical frameworks for identifying phase transitions in noisy, finite-size datasets–methods now directly applicable to fault detection and system degradation forecasting

MSc, Physics, *Indiana University Bloomington.* **2010**

Technical Skills

Languages: C++, Python (NumPy/SciPy/Pandas), MATLAB, Bash

Simulation & MBSE: 3DExperience, Dymola, Simulink, Modelica

HPC & Data: Git, SQL, Scikit-learn

Certifications: Dassault Systèmes MBSE Fundamentals & Advanced MBSE

Publications

Five peer-reviewed research articles with **300+ citations**, available at ORCID: 0000-0002-7596-5101

Languages

English (fluent/professional), French (B1, progressing to B2/C1), Spanish (fluent)