Rafael Ferreira da Silva, Ph.D.

AI for Science & HPC Leader / Agentic AI / Accelerated Computing at Exascale

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Technically hands-on R&D leader who builds high-trust, high-performance teams where AI for science meets accelerated computing. Lead a **45+ person organization** at Oak Ridge National Laboratory delivering agentic AI, data, and workflow systems for the world's largest GPU-accelerated supercomputers; **promoted three times in five years**. Co-PI in the DOE Genesis Mission, contributor to **$84M+** in competitive awards, and co-founder of two international research communities. Known for turning research prototypes into production services.

45+	$84M+	330+	6,000+	12
researchers and engineers led across five groups	in competitive R&D awards as PI, co-PI, or senior personnel	members across 28 countries in the community I co-founded	citations, h-index 40, across 165+ publications	honors, including the DOE Secretary's Honor Award

EXPERIENCE

Oak Ridge National Laboratory

Oak Ridge, TN · 2021 – Present

The U.S. Department of Energy's largest science and energy laboratory; home of Frontier, the first exascale supercomputer.

Section Head, Data and AI Systems · Distinguished Research Scientist (2026) — 2025 – Present

- Lead a **45+ person R&D organization of five groups** (Learning Systems, Workflow Systems, Data Engineering, Performance Engineering, Visualization), owning technical strategy, hiring, and delivery in a matrixed, multi-program lab.
- Grew the program portfolio by helping win **six new DOE awards worth $62M+** (total value) in 2025–2026, across AI foundation models, autonomous laboratories, science-aware networking, and security for agentic workflows.
- Co-PI of **ModCon**, the DOE Genesis Mission consortium of 17 national labs, industry, and academia building self-improving AI models for science; co-lead its **23-member, 11-lab core team** on scientific workflows. Member of the team awarded the **2026 DOE Secretary's Honor Award**.
- ORNL AI Lead for **OPAL**, a four-lab autonomous-laboratory program. Our agentic AI demonstration at the 2026 AI+ Expo cut detection-to-response cycles **from a week to under a minute**.
- Task lead for HPC/AI workflow benchmarks for **Discovery**, ORNL's next leadership supercomputer.

Group Leader, Workflow and Ecosystem Services · Oak Ridge Leadership Computing Facility — 2023 – 2025

- Led the group that evaluates, deploys, and supports workflow and automation services for science teams on OLCF's leadership systems, including **Frontier** (exascale) and **Summit** (NVIDIA GPU-accelerated).
- Senior author of **S3M**, the Secure Scientific Service Mesh: OLCF's API layer for compute, data streaming, and workflow automation, now serving internal users **(Best Short Paper, PEARC '25)**.
- Connected supercomputers to experiments: HPC and neutron-facility integration on a performance-portable CPU/GPU stack **(Best Paper, XLOOP '24)**, and a real-time data-streaming initiative with NERSC, now in its sixth edition.
- Co-authored ORNL's software blueprint for **hybrid quantum-classical HPC** integration (FGCS Editor's Choice 2024; covered by HPCwire and Quantum Computing Report).

Senior Research Scientist · National Center for Computational Sciences — 2021 – 2023

- Led the effort to scale and deploy scientific workflows for the launch of Frontier, standing up five officially supported workflow systems with user training.
- Co-PI of **ExaWorks** (DOE Exascale Computing Project, $3.8M): shipped a hardened workflow SDK adopted by **six exascale applications**; its technologies were used by the 2020 Gordon Bell COVID-19 Special Prize winner.
- Led the winning proposal for a DOE-funded center on sustaining workflow software and services.

University of Southern California · Information Sciences Institute

Los Angeles, CA · 2013 – 2021

Research Lead · Research Assistant Professor of Computer Science · Computer Scientist — 2013 – 2021

- Contributed to **Pegasus**, the workflow system used in LIGO's Nobel-winning gravitational-wave detection; co-authored its reference paper **(1,300+ citations)**.
- Co-PI of the **$13M DARPA MINT** program and PI or co-PI on 11 NSF awards; mentored 15+ student researchers.

EARLIER EXPERIENCE

CNRS · CREATIS Laboratory

Lyon, France · 2010 – 2013

Software Engineer 2010 – 2013

- Built self-healing workflow execution for a production science gateway on the European Grid Infrastructure.

FOUNDED AND BUILT

Workflows Community Initiative — CO-FOUNDER · 2022

International community I direct; its summits produce the roadmaps guiding workflow R&D in the U.S. and Europe.

330+ members **28** countries **38** workflow systems **7** reports

Autonomous Science Network — CO-FOUNDER · 2025

Grassroots network of national labs, universities, and industry building interoperable, agent-driven autonomous laboratories.

2 community roadmaps **18** milestones lead author of both

WfCommons — CREATOR · OPEN SOURCE

Benchmark ecosystem of real workflow traces and generators for evaluating schedulers and platforms at scale.

100+ research articles enabled **318+** workflow instances

WRENCH — CO-CREATOR · OPEN SOURCE

Simulation workbench for fast, validated what-if studies of distributed systems before deployment.

46 papers and theses **20** releases **28K** lines of C++

EXTERNAL LEADERSHIP

- **13 Birds of a Feather sessions at SC, ISC, and ECP AM** (2022 – 2026), seven as lead organizer, on AI-driven workflows, real-time data streaming, and autonomous science, with co-leaders and speakers from **NVIDIA**, Argonne, NERSC, and CSCS.
- **Research ecosystem:** active collaborations with principal investigators and computing leaders at 11+ DOE national laboratories, U.S. universities, and European HPC centers (BSC, CSCS, EPCC).
- **Governance:** Vice-Chair, IEEE Technical Community on High Performance Computing; Vice-Chair, IEEE eScience Steering Committee; Track Chair, SC24; Program Chair, IEEE eScience 2023; Special Issues Editor-in-Chief, *Future Generation Computer Systems* (2023 – 2025).
- **Speaking:** Federal AI Forum 2026 panel on agentic AI for government missions; SC26 panel on infrastructure for science agents; keynotes and invited talks at SOS-28 and Multicore World.

CORE EXPERTISE

Leadership	Building high-trust, high-performance teams; technical strategy and roadmaps; hiring and talent development; program development; technical partnerships in matrixed organizations
AI for Science	Agentic AI and multi-agent systems, LLM agents and inference on leadership-class systems, scientific foundation models, federated learning, autonomous laboratories, provenance and trustworthy AI
Accelerated Computing	GPU-accelerated exascale systems, workflow orchestration, scheduling and resource management, benchmarking, performance modeling and simulation
Systems	Cross-facility orchestration, instrument-to-HPC data streaming, hybrid quantum-classical integration, cloud-edge-HPC continuum
Software	Python, C++; open-source stewardship (WfCommons, WRENCH, ExaWorks SDK, Pegasus)

RECOGNITION

- **DOE Secretary's Honor Award**, Genesis Mission team (2026)
- **Distinguished Research Scientist**, ORNL (2026)
- **CCSD Director's Award**, American Science Cloud team (2025)
- **Five best paper awards** (2021 – 2026)
- **Senior Member**, IEEE (2022) and ACM (2023)

EDUCATION

Ph.D., Computer Science, INSA Lyon, France 2013
M.S., Computer Science, UFCG, Brazil 2010
B.S., Computer Science, UFPB, Brazil 2007

SELECTED PUBLICATIONS

- **Toward Trustworthy Autonomous Science: A Two-Year Community Roadmap.** Lead author of 28, 2026.
- **The (R)evolution of Scientific Workflows in the Agentic AI Era: Towards Autonomous Science.** SC '25 Workshops, 2025.
- **Frontiers in Scientific Workflows: Pervasive Integration with HPC.** Lead author, IEEE Computer, 2024.
- **Integrating Quantum Computing Resources into Scientific HPC Ecosystems.** FGCS, 2024 (Editor's Choice).