David Davalos, Ph.D.

—Mathematical Physicist (quantum physics) and Applied Mathematician (Machine Learning, Quantitative Analysis)—

Personal address
Guadalajara Metropolitan Zone, Mexico
Contact information
davidphysdavalos@gmail.com
Cel. (+52) 55 3439 6413

About me

I am a physicist with a strong background in Mathematics. I have experience working in both academy and industry. In the academy I have leaded **several projects** and have many peer reviewed publications (the recent one with applications in **quantum computation**). In the industry I have gained strong experience with **Machine Learning** models. **Currently** I am looking to **apply my technical knowledge to data science and machine learning development.** It is worth to mention that I am **handicapped** and **neurodivergent** (level 1 ASD).

Personal Information

- Date of Birth: September 21st of 1990.
- Place of Birth: Guadalajara Jal., México.
- Nationality: Mexican, US citizen.

Social and collaborative networks (clickable)

- Personal site (ddavalos.com)
- GitHub (davidphysdavalos)
- LinkedIn (david-davalos-b29b5795)

Higher Education

- **Ph. D. Physics**
  Institute of Physcis, UNAM, 2015-2020. Graduated with honors.
- **Master of Physics**
  Institute of Physics, UNAM 2013-2015. Graduated with honors.
- **Bachelor of Physics**
  Physics department, CUCEI, University of Guadalajara, 2008-2013.

Work Experience

- **Private sector**
  - **Austin AI** (March/2023-present)
    I am working as Machine Learning specialist and developer, implementing state-of-art modified transformer-based architectures for several tasks of **Natural Language Processing** (NLP).
  - **TechIsland** (May/2022-Nov/2022)
    I worked as Machine Learning Specialist and backend developer, in particular developing algorithms using **Natural Language Processing** (NLP). I used Python and AWS, with the help of GitHub for version control and other tools such as Jira and Confluence for collaboration and documentation construction. Part of my duty was to develop and document workflows for train, retrain, maintain, organize, certify and deploy backends using Machine Learning models.
- **Academy**
  - **Institute of Physics Slovak Academy of Sciences**(Aug/2021-present)
    Research fellow with "Schwarz stipend". Working in quantum information, foundations and open systems.
  - **Institute of Physics the National Autonomous University of Mexico (IF-UNAM)** (Feb/2020-Jun/2021)
    Postdoctoral researcher. Position devoted to the exploration of imperfect quantum measurements.
  - **Research Group for Quantum Information and Quantum Optics (GIOC)** (Feb/2013-Feb/2020)
    I worked in the group as a researcher, and leaded or co-leaded at least 4 projects. Some of them culminated in the publications detailed below.
  - **Faculty of Sciences UNAM** (Feb/2013-Feb/2020)
    During my Master and PhD in Physics, I was lecturer and lecturer assistant of many topics, including computational and mathematical physics. See details below.

Programming Skills

- Advanced knowledge of **Python** (including pytorch).
- Advanced knowledge of **Julia** and **Mathematica**.
- Advanced use of **Git** and **GitHub**.
- **SQL** (MySQL and Python MySQL).
- Intermediate knowledge of **C++** and **MatLab**.
- Advanced use of **LaTeX**.
- **AWS** basic.
- Experience working under **Agile** Project Management methodology and **Scrum** framework (with Jira).
- Extensive use of **GNU/Linux** as user and administrator.

Mathematical Skills

$\Longrightarrow$These are some of my mathematical skills, I have more.

- Unsupervised algorithms (PCA, t-SNE, Kernel PCA, etc.)
- Supervised algorithms (lingreg, logreg, SVM, ANNs, etc.)
- Deep learning (feed-forward NNs, conv-NNs).
- Recurrent neural networks.

- Random Forests.
- Natural Language Processing (word embeddings and transformers).
- Advanced statistics and probability.
- Advanced linear algebra.
- Advanced mathematical modeling (ODEs, PDEs, non-linear PDEs.)
- Time series (ARIMA, GARCH).
- Stochastic calculus (Black-Scholes theory, portfolio and risk theory).

Soft Skills

- Scheduling and time management skills.
- Strong analytical thinking.
- Ability to work independently.
- Lecturing abilities.
- Fiercely self-taught and quick learner person.
- Very good listener (I am stutter).

Interests

- Machine Learning and Artificial Intelligence.
- Stochastic calculus and Financial Mathematics.
- Natural Language Processing development.
- Quantitative Analysis.
- Data Science.

Languages

- Spanish (mother language).
- English (fluent).
- German (basic).

Honors

- Graduated with Honors in the Ph. D. Physics program of UNAM (2020).
- *Alfonso Caso medal* for being the most distinguished graduated in the year 2015 of the program of "Master on Physical sciences" of UNAM (2017).
- *Juan Manuel Lozano Mejía Diploma* for distinguished academic performance in the "Master on Physical sciences" program of UNAM (2016).
- Graduated with Honors in the Master's degree program of "Master on Physical sciences" of UNAM (2015).

Publications

- Quantum dynamics is not strictly bidivisible. David Davalos and Mario Ziman. Published: Phys. Rev. Lett. 130, 080801 (2023).
- Pauli component erasing quantum channels. Jose Alfredo de Leon, Alejandro Fonseca, François Leyvraz, David Davalos, and Carlos Pineda. Published: Phys. Rev. A 106, 042604 (2022).
- Fuzzy measurements and coarse graining in quantum many-body systems. Carlos Pineda, David Davalos, Carlos Viviescas, and Antonio Rosado. Published: Phys. Rev. A 104, 042218 (2021).
- Position representation of single-mode Gaussian channels beyond the Gaussian functional form. David Davalos, Camilo Moreno, Juan-Diego Urbina and Carlos Pineda. Published: J. Phys. A: Math. Theor. 53 (2020) 425304.
- Divisibility of qubit channels and dynamical maps. David Davalos, Mario Ziman and Carlos Pineda. Published: *Quantum 3, 144 (2019)*.
- Positivity and complete positivity of differentiable quantum processes. Gustavo Montes Cabrera, David Davalos and Thomas Gorin. Published: *Phys. Lett. A 383, 23 (2019)*.
- Quantum non-markovianity and localization. David Davalos and Carlos Pineda. Published: *Phys. Rev. A 96, 062127 (2017)*.
- Measuring and using non-markovianity. Carlos Pineda, Thomas Gorin, David Davalos, Diego A. Wisniacki and Ignacio Garcia-Mata. Published: *Phys. Rev. A 93, 022117 (2016)*.

Hobbies

- International history: From Romans to XX century in Europe and America.
- Philosophy of mathematics and natural sciences: Zermelo-Fraenkel+Choice set theory and model theory; heuristics and the path from metaphysics to physics.
- Linux gaming: I enjoy enhancing my experience experimenting with different drivers and WINE (and Proton) versions. I play grand strategy (eu4, ck3), simulation (x-plane 11, F1), fighting (db fighter z) and shooting games (insurgency, verdun, CoD).

Organization of scientific activities

- *Classical and Quantum Dynamics of Complex Systems and Applications*, (via zoom) March 22nd - April 1st, 2021. Click to jump to the webpage.