

Carlos Faubel Alama**M.Sc., Ph.D.**

Postdoctoral Researcher

Contact Information

Department of Architecture, Design & Urbanism,
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Profile Summary

Carlos is a physicist with a Ph.D. in Physics gained in 2022 at the University of Valencia (UV), Spain, and he is currently a Postdoctoral Researcher at Drexel University, Department of Architecture, Design & Urbanism, Philadelphia (US). During his Ph.D. he has collaborated with different scientists from universities such as the University of Pisa and the National Institute for Nuclear Physics (INFN), Italy, and the Institute for Particle Physics Phenomenology (IPPP), Durham University, United Kingdom. He has international experience gained during his Ph.D. as a visiting scholar at the IPPP, Durham University, United Kingdom. Currently, he is actively collaborating with experts from the Department of Electrical and Computer Engineering at the University of Texas at San Antonio (UTSA), the School of Architecture and Planning, Klesse College of Engineering and Integrated Design at UTSA, the Department of Design and the California Lighting Technology Center (CLTC) at UC Davis, and the School of Biomedical Engineering, Science and Health Systems at Drexel University. His research activities focus on analyzing indoor air quality and thermal comfort, with an emphasis on health and well-being. Moreover, he investigates the implementation of Artificial Intelligence (AI) methods and predictive modeling to assess indoor air quality and enable real-time monitoring of environmental conditions in buildings, as well as in future climate scenarios. Additionally, he is interested in evaluating the actual and future performance of structures, whether they are newly built, existing, retrofitted, or historical, and in optimizing building performance with sustainable measures and innovative technologies based on AI and data-driven approaches.

At Present

May 2023 – **Postdoctoral Researcher**

Present **Department of Architecture, Design & Urbanism, Antoinette Westphal College of Media Arts & Design, Drexel University, Philadelphia, PA, USA**

Analyzing indoor environmental quality, including indoor air quality and thermal comfort, and investigating the implementation of Artificial Intelligence (AI) methods and predictive modeling to assess indoor air quality and enable real-time monitoring of environmental conditions in buildings, as well as in future climate scenarios. Additionally, evaluating the actual and future efficiency of structures and optimizing building performance with sustainable measures and innovative technologies based on AI and data-driven approaches. Furthermore, teaching architectural technology courses as an adjunct faculty member.

Education

- 2022 **Ph.D. in Physics**
University of Valencia, UV, Spain
Thesis: “*New scalars at the origin of dark matter and anomalies in magnetic moments*”, supervised by Prof. Arcadi Santamaria, Prof. Jordi Vidal, and Dr. Juan Herrero-Garcia.
Defense date: July 28, 2022. Committee members: Nuria Rius, Mikael Chala, José Wudka, Santiago Peris, José Santiago, and Verónica Sanz.
Grade: **summa cum laude**
- 2016 **M.Sc. in Advance Physics**
University of Valencia, UV, Spain
Thesis: “*Scattering from a 3-D Dirac delta function*”, supervised by Prof. Arcadi Santamaria and Prof. Jordi Vidal. Committee members: Oscar Vives and Mariam Tórtola.
Grade: **9.28/10**
- 2012 **B.Sc. in Physics**
University of Valencia, UV, Spain
Grade: **8.46/10**

Academic Experience

- Fall 2024 – **Adjunct Faculty**
Present **Department of Architecture, Design & Urbanism, Antoinette Westphal College of Media Arts & Design, Drexel University, Philadelphia, PA, USA**
Teaching lecture courses at the undergraduate level in Building Systems and Architectural Technology.
- Fall 2023 **Adjunct Faculty**
Department of Architecture, Design & Urbanism, Antoinette Westphal College of Media Arts & Design, Drexel University, Philadelphia, PA, USA
Teaching lecture courses at the undergraduate level in Building Systems and Architectural Technology.
- 2018 **Visiting Scholar**
Institute for Particle Physics Phenomenology (IPPP), Durham University, Durham, UK
Working under the supervision of Dr. Mikael Rodriguez Chala, investigating different simulation software to analyze high-energy physics collisions in the context of dark matter. Responsible for processing, analyzing, and visualizing the large datasets resulting from the simulation software.
- 2014 **Research Fellow**
Instituto de Física Corpuscular (IFIC), CSIC, UV, Valencia, Spain
Working within the ATLAS group in Valencia, led by Dr. Carmen García García, characterizing silicon detectors employed in particle detection in high-energy physics experiments, and upgrading the ALIBAVA portable readout system for scientific use.

Publications

Peer-reviewed Journal Articles

1. **Faubel, C.**; Martinez-Molina, A.; Suk J., “*Comprehensive Assessment of Indoor Air Quality in Educational Settings: Insights from CO₂ Concentration, Particulate Matter, VOCs, and Occupants’ Perception*”. (In Progress)
2. Karaiskos, P.; **Faubel, C.**; Martinez-Molina, A.; Alamaniotis, M., “*Artificial Intelligence Applications for Air Quality Prediction and Ventilation Control: Enhancing Sustainability and Energy Efficiency in Built Environments – A Review*”. (In Progress)
3. **Faubel, C.**; Martinez-Molina, A.; Alamaniotis, M., “*Implementing Smart Preservation utilizing Artificial Neural Network and Fuzzy Logic Technologies in a Mechanical Cooling System Responding to joint Historical Building and Artifacts Requirements*”. (Under Review)
4. Bay-Sahin, E.; **Faubel, C.**; Iskandar, L.; Martinez-Molina, A., “*Evaluating natural ventilation in historic buildings across US climates using CFD for future scenarios*”. (Under Review)
5. Iskandar, L.; **Faubel, C.**; Bay-Sahin, E.; Martinez-Molina, A.; Toker Beeson, S., “*Climate change impact on natural ventilation cooling effectiveness using CFD simulations in low thermal mass historic buildings*”.
International Journal of Architectural Heritage, Taylor & Francis (2025)
[10.1080/15583058.2025.2471980](https://doi.org/10.1080/15583058.2025.2471980)
6. **Faubel, C.**; Ioannis Arvanitidis, A.; Iskandar, L.; Martinez-Molina, A.; Alamaniotis, M., “*Comparative analysis of artificial intelligence models for real-time and future forecasting of environmental conditions: A wood-frame historic building case study*”.
Journal of Building Engineering, Elsevier (2024)
[10.1016/j.jobbe.2024.111474](https://doi.org/10.1016/j.jobbe.2024.111474)
7. Iskandar, L.; **Faubel, C.**; Martinez-Molina, A.; Toker Beeson, S., “*Quantification of inherent energy efficient features in historic buildings under hot and humid conditions*”.
Energy and Buildings, Elsevier (2024)
[10.1016/j.enbuild.2024.114546](https://doi.org/10.1016/j.enbuild.2024.114546)
8. **Faubel, C.**; Martinez-Molina, A.; Suk, J., “*Calculation of CO₂ Generation and Required Fresh Air Rates in a High-intensity Physical Athletic Facility*”.
Journal of Building Engineering, Elsevier (2023)
[10.1016/j.jobbe.2023.108289](https://doi.org/10.1016/j.jobbe.2023.108289)
9. Coito, L.; **Faubel, C.**; Herrero-Garcia, J.; Santamaria, A.; Titov, A., “*Sterile neutrino portals to Majorana dark matter: effective operators and UV completions*”.
Journal of High Energy Physics, Springer (2022)
[10.1007/JHEP08\(2022\)085](https://doi.org/10.1007/JHEP08(2022)085)
10. Coito, L.; **Faubel, C.**; Herrero-Garcia, J.; Santamaria, A., “*Dark matter from a complex scalar singlet: the role of dark CP and other discrete symmetries*”.
Journal of High Energy Physics, Springer (2021)
[10.1007/JHEP11\(2021\)202](https://doi.org/10.1007/JHEP11(2021)202)
11. Coito, L.; **Faubel, C.**; Santamaria, A., “*Composite Higgs bosons from neutrino condensates in an inverted seesaw scenario*”.
Physical Review D, American Physical Society (2019)
[10.1103/PhysRevD.101.075009](https://doi.org/10.1103/PhysRevD.101.075009)

Peer-reviewed Conference Proceedings

1. Iskandar, L.; **Faubel, C.**; Martinez-Molina, A.; Toker Beeson, S., “*Optimizing Energy Efficiency in Affordable Housing Prototypes*”.
Building Technology Educators’ Society (BTES) Conference 2025, Chicago, IL, USA.
(Abstract Accepted. Full Paper Submitted)
2. Miri, M.; **Faubel, C.**; Martinez-Molina, A., “*Assessment of Indoor Environmental Quality in Educational Settings: Insights in level of stress, attention and engagement*”.
Building Technology Educators’ Society (BTES) Conference 2025, Chicago, IL, USA.
(Abstract Accepted. Full Paper Submitted)
3. **Faubel, C.**; Iskandar, L.; Martinez-Molina, A., “*Using Artificial Intelligence Models for Real-time Forecasting of Indoor Microclimate in Historic Buildings*”.
2025 Architectural Research Centers Consortium (ARCC) International Conference, College Park, MD & Washington DC, USA.
(Abstract Accepted. Full Paper Submitted)
4. **Faubel, C.**; Martinez-Molina, A., “*Indoor air quality evaluation in a high-intensity physical athletic facility: CO₂ and PM analysis*”.
4th Valencia International Biennial of Research in Architecture (VIBRArch 2024), Valencia, Spain.
(In Press)
5. Ioannis Arvanitidis, A.; **Faubel, C.**; Martinez-Molina, A.; Alamaniotis M., “*Comparative Analysis of Artificial Intelligence Models for HVAC System Optimization in UNESCO Heritage Buildings*”.
15th International Conference on Information, Intelligence, Systems and Applications (IISA 2024), Grand Arsenali, Chania, Crete, Greece. IEEE (2024)
[10.1109/IISA62523.2024.10786674](https://doi.org/10.1109/IISA62523.2024.10786674)
6. Iskandar, L.; **Faubel, C.**; Martinez-Molina, A.; Toker Beeson S., “*Hygrothermal Evaluation and Occupancy Impact in Three Stone Historic Churches Across Diverse Climate Zones during the Cooling Season*”.
19th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES 2024), Rome, Italy.
[ISSN: 2706-3690](https://doi.org/10.1007/978-3-319-72066-6_270)
7. Iskandar, L.; **Faubel, C.**; Martinez-Molina, A.; Toker Beeson, S., “*Energy Performance Evaluation Of Affordable Residential Prototypes With Different Construction Types*”.
37th Passive and Low Energy Architecture International Conference (PLEA 2024), Wroclaw, Poland. Oficyna Wydawnicza Politechniki Wrocławskiej (2024)
[10.37190/PLEA_2024](https://doi.org/10.37190/PLEA_2024)
8. Coito, L.; **Faubel, C.**; Herrero-Garcia, J.; Santamaria, A., “*Dark matter from a complex scalar singlet and preservation of its stabilizing symmetry*”.
Particles and Nuclei International Conference (PANIC 2021), Lisbon, Portugal.
Proceedings of Science (2022)
[10.22323/1.380.0055](https://doi.org/10.22323/1.380.0055)
9. **Faubel, C.**; Coito, L.; Herrero-Garcia, J.; Santamaria, A., “*Dark matter from a complex scalar singlet and the role of dark CP*”.
17th International Conference on Topics in Astroparticle and Underground Physics (TAUP 2021), Valencia, Spain.
Journal of Physics: Conference Series (2021)
[10.1088/1742-6596/2156/1/012031](https://doi.org/10.1088/1742-6596/2156/1/012031)

Grants

Oct. 2016 – **VALi+D grant**

Oct. 2019 **University of Valencia, UV, Spain**

Doctoral grant. Advisor: Prof. Arcadi Santamaria and Prof. Jordi Vidal. Funded by the Valencian Government GVA, “Conselleria d’Educació, Cultura I Esport”, Spain.

Technical Skills

Proficiency in C/C++ and Python. Expertise in software for data analysis, including Mathematica, MATLAB, and Excel, as well as knowledge of mainstream frameworks in Machine Learning and Deep Learning (Scikit-learn, TensorFlow).

Expertise in different systems and environments (Linux, Windows).

Teaching Experience

Winter 2024 **Adjunct Faculty**

Department of Architecture, Design & Urbanism, Antoinette Westphal College of Media Arts & Design, Drexel University, Philadelphia, PA, USA

ARCH 378 Architectural Technology VIII (Evaluation: avg. -).

Fall 2024 **Adjunct Faculty**

Department of Architecture, Design & Urbanism, Antoinette Westphal College of Media Arts & Design, Drexel University, Philadelphia, PA, USA

ARCH 377 Architectural Technology VII (Evaluation: avg. 4.4/5.0).

Fall 2023 **Adjunct Faculty**

Department of Architecture, Design & Urbanism, Antoinette Westphal College of Media Arts & Design, Drexel University, Philadelphia, PA, USA

ARCH 394/395 Building Systems IV/V (Evaluation: avg. 4.7/5.0).

Scientific Activities

2025 **Abstract and paper Reviewer**

2025 Architectural Research Centers Consortium (ARCC) International Conference, Emerging Challenges: technological, environmental, social. College Park, MD & Washington DC, USA.

<https://www.arcc-arch.org/2025-arcc-international-conference-main/>

2025 **Member of the Scientific Advisory Board**

20th Conference on Sustainable Development of Energy, Water, and Environment Systems (SDEWES 2025), Dubrovnik, Croatia.

<https://www.dubrovnik2025.sdewes.org/scientific-advisory-board>

2025 **Member of the Scientific Advisory Board**

1st African Conference on Sustainable Development of Energy, Water, and Environment Systems (African SDEWES 2025), Oujda-Saidia, Morocco.

<https://www.morocco2025.sdewes.org/scientific-advisory-board>

Nov. 2024 Presenter of Scientific Contribution

Presenter of scientific contribution led by Dr. Miltiadis Alamaniotis, “Utilizing Matrix Profile with the DDDAS Framework for Anomaly Detection in Nuclear Security”. 5th International Conference on Dynamic Data Driven Applications Systems (DDDAS) 2024, Rutgers University's Busch Campus, New Brunswick, NJ, USA

2017 - 2022 Specialized courses completed as part of the Doctoral Program in Physics

“Black Holes in General Relativity and Beyond”

Prof. Diego Rubiera-García, Lisbon University, Portugal.

“Phase Transitions and Critical Phenomena-Superconductivity”

Prof. Carlos García Canal, Universidad de La Plata, Argentina.

“Monte Carlo Tools for LHC Physics”

Prof. Jong Soo Kim, University of the Witwatersrand, Johannesburg, South Africa.

“The Higgs as a way to discover new Physics”

Prof. Verónica Sanz, University of Sussex, Brighton, UK.

“From QFT to Holography and back”

Prof. José L. Fernández Barbón, IFT Madrid, Spain.

“Computer tools in particle physics”

Prof. Avelino Vicente, IFIC Valencia, Spain.

“Innovation in the Particle Physics sector: applications, big-data and patents”

Prof. Francisco J. Albiol, IFIC Valencia, Spain.

“Basic models of photonic and matter-wave optics”

Prof. Boris A. Malomed, University of Tel Aviv, Israel.

“Group Theory”

Prof. Maria A. Lledó, IFIC, Valencia, Spain.

“Anomalies in Quantum Field Theory”

Prof. Andrea Donini, IFIC Valencia, Spain.

“Dark Matter”

Prof. David Cerdeño, IPPP Durham, UK.

“Effective Field Theory”

Prof. Antonio Pich, IFIC Valencia, Spain.

“Constrained Hamiltonian systems”

Prof. Fernando Barbero, IEM Madrid, Spain.

“Modern methods for Scattering Amplitudes in Gauge Theories”

Prof. William J. Torres Bobadilla, IFIC Valencia, Spain.

“Machine Learning”

Prof. Verónica Sanz, IFIC Valencia, Spain.

Languages

English	Common European Framework of Reference (CEF) Level
Valencian	Native/Bilingual Proficiency; C1 Common European Framework of Reference (CEF) Level
Spanish	Native/Bilingual Proficiency

Others

Driver License	Spanish driver license (Class B)
Music	Intermediate Grade in French Horn at the “Conservatori Professional de Música de Lliria”, Valencia, Spain