José Alejandro Vidal Maxiá

Theoretical & mathematical physicist.

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Curriculum Vitae

Research objective

I am a motivated and team-working master of theoretical and mathematical physics with the aim of conducting research in the areas of quantum field theory, mathematical physics, quantum chromodynamics and dark matter. In particular, I am inclined towards topics related to finite temperature field theory, lattice QCD, phenomenology of the Standard Model and beyond, operator product expansions, and confinement of strongly coupled theories. I am notably familiar with computational aspects of high-energy physics, as well. Techniques such as Montecarlo for path integrals are nothing new to me, being particularly coding-inclined.

Education

Two master's titles in theoretical/mathematical physics, and one bachelor's degree in physics.

2024 M.Sc. in Physics: Radiations, Nanotechnology, Astrophysics & Particles.
Astrophysics and particle physics major.
University of Granada.
Final Grades: 8.92/10
Thesis title: QCD at finite temperature and chemical potential, equation of state near the deconfinement/chiral phase transition.
Thesis advisors: E. Megías Fernández and L.L Salcedo Moreno.

2023 M.Sc. in Physics & Mathematics (FisyMat).
Theoretical and mathematical physics major.
University of Granada.
Final Grades: 8.58/10
Thesis title: On the theory of ALPs and their experimental search in fixed target experiments.
Thesis advisors: A. Carmona Bermúdez and L. Molina Bueno.

2022 Bachelor's degree in Physics.
University of Granada.
Final Grades: 7.92/10
Thesis title: Magnetic monopoles in quantum field theory.
Thesis advisor: A. Carmona Bermúdez.

Awards & honors

- **2023** - Participation in the PLANCKS (Physics League Across Numerous Countries for Kick-ass Students) final in Milan, Italy. This event was organized by the IAPS (International Association of Physics Students). Me and my team 'Cromoestáticos' landed in 4^{th} place in the national phase and 17^{th} place in the final phase in Milan -out of more than 50 teams.
- **2018** - Obtention of the award for highest grades (9.57) in the university entry examination exam (PEBAU) among all students in the city of Melilla. This award was granted by the autonomous city of Melilla, Spain.
- **2014** - Participation in the final phase of the 25^{th} Spanish juvenile mathematics olympics. This event was organized by the FESPM (Federación Española de Sociedades de Profesores de Matemáticas).

Attendance at conferences

- **2026** - Attendance to the LATTICE 2026 conference in Maryland, USA between July 26^{th} and August 1^{st}.
- **2025** - Attendance at the Witten lectures: Invitation to Black Hole Thermodynamics, held at DESY (Hamburg) in January.
- **2023** - Attendance to several guest talks and poster sessions offered by the PLANCKS organizing committee in Milan.

Skills

Academic

I am most knowledgeable in the area of quantum field theory. In particular, those topics regarding the Standard Model and its phenomenology, i.e: finite temperature and chemical potential

formalisms, lattice field theory, effective field theory, beyond the Standard Model physics, quantum chromodynamics, flavor physics, and dark matter. Secondary areas of physics I am comfortable in are: cosmology, general relativity, quantum information, critical phenomena, complex systems, and analytical mechanics.

I am also familiar with complementary mathematical aspects, such as algebraic topology, differential geometry, functional analysis, topology, asymptotic analysis, and Lie groups and algebras.

Due to my academic background, I focused on problem-solving skills and I am an active team worker towards the satisfactory achievement of the different goals imposed.

Programming

My main **programming language** is `C++`, which I use for most of my projects and in which I am particularly fluent. Additionally, I also possess a strong background in `Python` and `Fortran` as part of my university education. Most of my coding is performed on **Linux** operating systems. I am also familiar with aspects of **parallelization**, which I use for intensive cluster computing.

For representation purposes and other calculations, I frequently employ `Gnuplot` and `Mathematica` and am well-versed in these as well. I can also adapt quickly to any new software or programming language of interest. Because of my scientific background, I use LaTeX extensively for text-editing purposes. I will sometimes use Emacs for basic script writing.

Language

I speak three languages:

- **Spanish** - native.
- **English** - fluent.
- **German** - basic.
- **Italian** - intermediate (self-taught).

Additional activities

I've been a frequent article writer for the student-led magazine of the Faculty of Sciences at the University of Granada '*El Péndulo*'. I've written several articles on the topics of science communication of theoretical/high-energy physics such as: dark matter candidates, the ALPHA experiment at CERN, top quark physics, etc.

References

For reference letters:

Name: Dr Eugenio Megías Fernández
Institution: University of Granada
Deptartment: Dept. of atomic, molecular & nuclear physics
E-mail: emegias@ugr.es

Name: Dr Manuel María Pérez-Victoria Moreno de Barreda
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Name: Dr Adrián Carmona Bermúdez
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