

# Curriculum Vitae

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## Scientific IDs

**Google Scholar profile:** [wYdaSlQAAAAJ](https://scholar.google.com/citations?user=wYdaSlQAAAAJ)  
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**Scopus Author ID:** 57202658871  
**zbMATH ID:** [gomez.sergio-alejandro](https://zbmath.org/authors/?q=sergio-alejandro-gomez)

## Education

10/2020 – 2023      Università di Pavia – Università della Svizzera Italiana. **PhD in Computational Mathematics and Decision Sciences.**  
• **Thesis:** [Nonconforming space–time methods for evolution PDEs.](#)  
• **Advisor:** Prof. [Andrea Moiola](#).  
• **Examiners:** Prof. [Jay Gopalakrishnan](#), Prof. [Karsten Urban](#).

01/2017 – 12/2018      University of Puerto Rico at Mayagüez (UPRM). **MSc. Applied Mathematics.**  
• **Thesis:** [Application of the Local Discontinuous Galerkin method to equations with fractional derivatives.](#)  
• **Advisor:** Prof. [Paul Castillo](#).

01/2012 – 05/2016      National Autonomous University of Honduras (UNAH). **Bachelor in Mathematics with emphasis in Mathematical Engineering.**

## Publications in international journals

1. **S. Gómez and A. Moiola (2024)**. A space-time DG method for the Schrödinger equation with variable potential. [Advances in Computational Mathematics](#), 50(2), 15.
2. **S. Gómez, L. Mascotto, and I. Perugia (2024)**. Design and performance of a space-time virtual element method for the heat equation on prismatic meshes. [Computer Methods in Applied Mechanics and Engineering](#), 418(A), 116491.
3. **S. Gómez, L. Mascotto, A. Moiola, and I. Perugia (2024)**. Space-time virtual elements for the heat equation. Accepted for publication in [SIAM Journal of Numerical Analysis](#), 62(1), 199-228.

4. **S. Gómez, A. Moiola, I. Perugia, and P. Stocker (2023)**. On polynomial Trefftz spaces for the linear time-dependent Schrödinger equation. [Applied Mathematics Letters](#), 146(C), 108824.
5. **S. Gómez (2022)**. High-order interpolatory serendipity virtual element method for semilinear parabolic problems. [Calcolo](#), 59(3), 25.
6. **S. Gómez and A. Moiola (2022)**. A space–time Trefftz Discontinuous Galerkin method for the linear Schrödinger equation. [SIAM Journal of Numerical Analysis](#), 60(2), 688–714.
7. **P. Castillo and S. Gómez (2021)**. A unified framework of high order structure-preserving B-splines Galerkin methods for coupled nonlinear Schrödinger systems. [Computers & Mathematics with Applications](#), 102(C), 45–53.
8. **P. Castillo and S. Gómez (2021)**. Conservative local discontinuous Galerkin methods for a generalized system of strongly coupled nonlinear Schrödinger equations. [Communications in Nonlinear Science and Numerical Simulation](#), 99(C), 105836.
9. **A. Aguilera, P. Castillo, and S. Gómez (2021)**. Structure preserving - field directional splitting difference methods for nonlinear Schrödinger systems. [Applied Mathematics Letters](#), 119(C), 107211.
10. **P. Castillo and S. Gómez (2021)**. An interpolatory directional splitting-Local Discontinuous Galerkin method with application to pattern formation in 2D/3D. [Applied Mathematics and Computation](#), 397(C), 125984.
11. **P. Castillo and S. Gómez (2020)**. On the Convergence of the Local Discontinuous Galerkin Method Applied to a Stationary One Dimensional Fractional Diffusion Problem. [Journal of Scientific Computing](#), 85(2), 32.
12. **P. Castillo and S. Gómez (2020)**. Interpolatory super-convergent discontinuous Galerkin methods for nonlinear reaction diffusion equations on three dimensional domains. [Communications in Nonlinear Science and Numerical Simulation](#), 90(C), 105388.
13. **P. Castillo and S. Gómez (2020)**. Conservative super-convergent and hybrid discontinuous Galerkin methods applied to nonlinear Schrödinger equations. [Applied Mathematics and Computation](#), 371(C), 124950.
14. **P. Castillo and S. Gómez (2020)**. Conservative Local Discontinuous Galerkin method for the fractional Klein-Gordon-Schrödinger system with generalized Yukawa interaction. [Numerical Algorithms](#), 84(1), 407-425.
15. **P. Castillo and S. Gómez (2019)**. Optimal stabilization and time step constraints for the forward Euler-Local Discontinuous Galerkin method applied to fractional diffusion equations. [Journal of Computational Physics](#), 394(C), 503–521.
16. **P. Castillo, S. Gómez, and S. Manzanarez (2018)**. Improving the accuracy of LDG approximations on coarse grids. [Mathematics and Computers in Simulation](#), 156, 310–326.
17. **P. Castillo and S. Gómez (2018)**. On the conservation of fractional nonlinear Schrödinger equation’s invariants by the LDG method. [Journal of Scientific Computing](#), 77(3), 1444–1467.

## Publications in Latin-American journals

1. **A. Aguilera, P. Castillo, and S. Gómez (2022)**. High order conservative Finite Difference method for a class of nonlinear Schrödinger systems. **Revista Mexicana de Física E**, 19(1), 1–14.
2. **P. Castillo and S. Gómez (2019)**. Von Neumann analysis for the Local Discontinuous Galerkin method in 1D. **Revista Integración, Temas de Matemáticas**, 37(2), 199–217.
3. **P. Castillo and S. Gómez (2018)**. Conservación de invariantes de la ecuación de Schrödinger no lineal por el método LDG. **Revista Mexicana de Física E**, 64(1), 52–60.
4. **P. Castillo and S. Gómez (2017)**. Efficiency of the LDG method to approximate the solution of the Bratu and Troesch problems. **Revista de la escuela de Física, UNAH**, 5(2), 39–46.

## Invited seminars and talks

- **(Forthcoming)** Asymptotic-preserving HDG method for the Westervelt quasilinear wave equation, 10 - 14 June 2024, **CMAM-10**, Bonn, Germany.
- **(Forthcoming)** Space-time ultra-weak discontinuous Galerkin method for the Schrödinger equation, 12 - 17 May 2024, **Contemporary Challenges in Trefftz Methods, from Theory to Applications (2024)**, CMO Oaxaca, Mexico (hybrid).
- Space-time ultra-weak discontinuous Galerkin method for the Schrödinger equation, 26 - 27 March 2024, **APOWA Kick-off meeting (2024)**, Lille, France.
- Structure-preserving Local Discontinuous Galerkin method for nonlinear cross-diffusion system, 15 - 19 January 2024, **WONAPDE (2024)**, Concepción, Chile.
- Space-time ultra-weak discontinuous Galerkin method for the Schrödinger equation, 28 August - 01 September 2023, **SIMAI (2023)**, Matera, Italy.
- Space-time ultra-weak discontinuous Galerkin method for the Schrödinger equation, 14 - 18 August 2023, **ICOSAHOM (2023)**, Seoul, South Korea.
- Space-time ultra-weak discontinuous Galerkin method for the Schrödinger equation, 26 - 28 July 2023, **PoWER (2023)**, Turin, Italy.
- High-order interpolatory / quasi-interpolatory serendipity virtual element method for semilinear parabolic problems, 12 - 14 December 2022, **POEMS (2022)**, Milan, Italy (Lightning talk).
- A space-time Trefftz discontinuous Galerkin method for the linear Schrödinger equation, 12 October 2022, **PDE afternoon (2022)**, University of Vienna, Austria.
- Space-time virtual element method for the heat equation, 29 - 30 September 2022, **GIMC-SIMAI (2022)**, Pavia, Italy.
- Space-time virtual element method for the heat equation, 29 August - 02 September 2022, **CMAM (2022)**, Vienna, Austria.

## Contributed talks

- Space-time virtual elements for the heat equation, 27 - 28 April 2023, [NAD \(2023\)](#), Vienna, Austria.
- Improving the efficiency of Galerkin discretizations for nonlinear problems using interpolation techniques, 18 - 22 September 2022, [YAMC \(2022\)](#), Arenzano, Italy.
- A space-time Trefftz discontinuous Galerkin method for the linear Schrödinger equation, 25 - 29 July 2022, [WAVES \(2022\)](#), Palaiseau, France.
- High-order interpolatory/quasi-interpolatory serendipity virtual element method for semilinear parabolic problems, 04 - 06 July 2022, [PICNDEA \(2022\)](#), Évora, Portugal.
- A space-time Trefftz discontinuous Galerkin method for the linear Schrödinger equation, 16 - 17 March 2022, [CompMat \(2022\)](#), Pavia, Italy.
- Unified framework for conservative discontinuous Galerkin methods for nonlinear Schrödinger equations, 12 - 16 July 2021, [ICOSAHOM \(2021\)](#) online.
- Unified framework for conservative discontinuous Galerkin methods for nonlinear Schrödinger equations, 21 - 23 June 2021, [MexSIAM Annual Meeting \(2021\)](#) online.
- Invariant's conservation for the fractional nonlinear Schrödinger and Klein-Gordon-Schrödinger equations by the Local Discontinuous Galerkin method, [Semana de la carrera de Matemáticas \(2019\)](#), UNAH, Honduras.
- Application of the Finite Element method in 2D, a computational simulation of the heat transfer in the human eye, [X Congreso de Investigación Científica UNAH \(2016\)](#), UNAH, Honduras.
- Computational simulation of biological processes with reaction-diffusion, an application of the finite element method in 2D, [Semana de la carrera de Matemáticas \(2015\)](#), UNAH, Honduras.

## Organization activities

- Organizer of the minisymposium "**Variational methods for evolutionary partial differential equations**" in [CMAM-10](#), 10-14 June 2024, Bonn, Germany, in collaboration with [Gregor Gantner](#) and [Johannes Storn](#).
- Organizer of the minisymposium "**Recent advances in polytopal methods for coupled problems**" in [SIMAI 2023](#), 28 August - 01 September 2023, Matera, Italy, in collaboration with [Michele Botti](#).

## Refereeing activity

- [Applied Mathematics and Computation](#) (Elsevier)
- [Applied Numerical Mathematics](#) (Elsevier)
- [Communications in Nonlinear Science and Numerical Simulation](#) (Elsevier)
- [Computational & Applied Mathematics](#) (Springer)

- [Computers & Mathematics with Applications](#) (Elsevier)
- [Journal of Computational and Applied Mathematics](#) (Elsevier)
- [Journal of King Saud University - Science](#) (Elsevier)
- [Journal of Scientific Computing](#) (Springer)
- [Mathematics and Computers in Simulation](#) (Elsevier)
- [Wave Motions](#) (Elsevier)

### Teaching activity

<b>A.Y. 2023-2024</b> (Fall semester)	<b>Introduction to Numerical Analysis (Exercise course 40 hours).</b> Department of Mathematics and Applications, UNIMIB.
<b>A.Y. 2020</b> (2 <sup>nd</sup> term)	<b>MM-650 Numerical Optimization, master course (60 hours).</b> Department of Applied Mathematics, UNAH.
	<b>MM-420 Discrete Mathematics, bachelor course (50 hours).</b> Department of Applied Mathematics, UNAH.
<b>A.Y. 2020</b> (1 <sup>st</sup> term)	<b>MM-610 Numerical Linear Algebra, master course (60 hours).</b> Department of Applied Mathematics, UNAH.
	<b>MM-420 Discrete Mathematics, bachelor course (50 hours).</b> Department of Applied Mathematics, UNAH.
	<b>MM-100 Introduction to Social Statistics, bachelor course (50 hours).</b> Department of Statistics, UNAH.
	<b>MM-423 Numerical Linear Algebra, bachelor course (50 hours)</b> Department of Applied Mathematics, UNAH
<b>A.Y. 2019</b> (3 <sup>rd</sup> term)	<b>MM-420 Discrete Mathematics, bachelor course (50 hours).</b> Department of Pure Mathematics, UNAH.
<b>A.Y. 2019</b> (2 <sup>nd</sup> term)	<b>MM-420 Discrete Mathematics, bachelor course (50 hours).</b> Department of Applied Mathematics, UNAH.
	<b>HH806 Introduction to Computing, bachelor course (45 hours).</b> Department of Applied Mathematics, UNAH.
	<b>MM-428 Mathematical Analysis, bachelor course (50 hours).</b> Department of Applied Mathematics, UNAH.
<b>A.Y. 2019</b> (1 <sup>st</sup> term)	<b>MM-690 Numerical Methods for Partial Differential Equations, master course (60 hours).</b> Department of Applied Mathematics, UNAH.
	<b>MM-420 Discrete Mathematics, bachelor course (50 hours).</b> Department of Applied Mathematics, UNAH.
	<b>MM-515 Numerical Differential Equations, bachelor course (50 hours).</b> Department of Applied Mathematics, UNAH.

**MM-423 Numerical Linear Algebra, bachelor course (50 hours).** Department of Applied Mathematics, UNAH.

**A.Y. 2018-2019**  
(1<sup>nd</sup> semester)

**Teaching assistant, MATE3172 Precalculus II (3 sections, 45 hours).** Department of Mathematical Sciences, UPRM.

**Teaching assistant, COMP3057 Computer Basics (2 sections, 30 hours).** Department of Mathematical Sciences, UPRM.

**A.Y. 2017-2018**  
(2<sup>nd</sup> semester)

**Teaching assistant, MATE3171 Precalculus I (2 sections, 30 hours).** Department of Mathematical Sciences, UPRM.

**Teaching assistant, COMP3057 Computer Basics (2 sections, 30 hours).** Department of Mathematical Sciences, UPRM.

**A.Y. 2017-2018**  
(1<sup>st</sup> semester)

**Teaching assistant, MATE3171 Precalculus I (6 sections, 90 hours).** Department of Mathematical Sciences, UPRM.

**A.Y. 2016-2017**  
(2<sup>nd</sup> semester)

**Teaching assistant, MATE3171 Precalculus I (2 sections, 30 hours).** Department of Mathematical Sciences, UPRM.

**Teaching assistant, MATE3172 Precalculus II (2 sections, 30 hours).** Department of Mathematical Sciences, UPRM.

## Grants

**27 Oct. – 01 Nov. 2024**

**Research in Residence** at the Centre International de Rencontres Mathematiques (CIRM), Luminy, Marseille, France.

**Project:** [Unconditionally stable conforming space-time methods for the Schrödinger equation.](#)

**Collaborator:** [Matteo Ferrari.](#)

**Jan. – Dec. 2024**

**GNCS project 2024**, “Risoluzione efficiente di PDE basata su tecniche avanzate di algebra lineare numerica”, 1100€, member (PI [Massimo Frittelli](#)).

**Mar. – Sept. 2023**

**Junior Research Fellowship** at the Erwin Schrödinger International Institute for Mathematics and Physics (ESI), Vienna, Austria.

**Project:** [Structure-preserving methods for nonlinear PDEs.](#)

**Mentor:** Prof. [Ilaria Perugia.](#)

## Scientific visits and periods abroad

**03 – 09 Mar. 2024**

Invited to the [University of Vienna](#) by Prof. [Ilaria Perugia.](#)

**Mar. – Sept. 2023**

**Junior Research Fellowship** at the Erwin Schrödinger International Institute for Mathematics and Physics (ESI).

**03 – 14 Oct. 2022**

Invited to the [University of Vienna](#) by Prof. [Ilaria Perugia.](#)

**Feb. – Jul. 2022**

Erasmus Traineeship, [Università della Svizzera italiana \(USI\)](#) under the supervision of Prof. [Kai Hormann.](#)

## Other conferences and schools attended

[Conference on Advanced NUMerical analysis in TORino - 2023 \(CANUTO23\)](#), 02 - 04 November 2023, Turin, Italy.

[2nd SFB International Workshop 2023 "Taming Complexity in Partial Differential Systems"](#), 19 - 21 April 2023, Vienna, Austria.

[Workshop on Generalized Barycentric Coordinates in Computer Graphics and Computational Mechanics](#), 01 - 04 June 2022, Monte Verità, Ascona, Switzerland.

[Workshop on Dynamics, Control and Numerics for Fractional PDE's](#), 05 - 07 December 2018, Isla Verde, Carolina, Puerto Rico.

**EMALCA 2015**, 07 - 16 December 2015, National Autonomous University of Nicaragua. **Courses attended:** nonlinear programming, discrete dynamic systems, celestial mechanics.

## Professional affiliations

- [SIMAI](#), Società Italiana di Matematica Applicata e Industriale, since 2023.
- [GNCS](#), Gruppo Nazionale di Calcolo Scientifico - Istituto Nazionale di Alta Matematica (INdAM), since 2021.
- [SIAM](#), Society for Industrial and Applied Mathematics, since 2020.

## Computational skills

- **Programming languages:** MATLAB, C/C++, Java.
- **Software:** LaTeX, Microsoft Office.