

Manuel Fernando Prado Ceballos.

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🌐 <https://www.researchgate.net/profile/Manuel-Prado-8>

Research Profile

- 📖 I work at the intersection of control theory, inverse problems, and stochastic partial differential equations. I am a PhD candidate in Mathematics working on inverse problems and controllability for semi-discrete stochastic parabolic equations. My research focuses on the development of Carleman estimates adapted to semi-discrete stochastic operators in arbitrary dimensions, with applications to observability inequalities, null controllability, as well as inverse random source and Cauchy problems. These results lead to quantitative stability estimates for inverse random source and Cauchy problems and allow the analysis of controllability properties of semilinear stochastic parabolic systems. My work aims to bridge continuous and semi-discrete control theory, with particular attention to Carleman-based methods under discretization and stochastic perturbations.
- 📖 **Research Interests:** Inverse Problems, Controllability, Carleman Estimates, and Stochastic Partial Differential Equations (SPDEs).

Education

- 2023 – Present 📖 **Ph.D in Mathematics** in Consorcio UV-PUCV-USM, Chile.
Project title: *Carleman estimate for semi-discrete stochastic parabolic operators in arbitrary dimension and its applications.*
Advisor: Rodrigo Lecaros, Universidad Tecnico Federico Santa Maria, Chile.
Co-Advisor: Ariel Perez, Universidad del Bio-Bio, Chile.
- 2022 – 2023 📖 **M.Sc. Mathematical Sciences** in Universidad del Valle, Colombia.
Thesis title: *A unique continuation property for a linearization of the ab-Boussinesq equation with space-dependent potential.*
Advisor: José Raúl Quintero, Universidad del Valle, Colombia.
- 2015 – 2021 📖 **Bachelor's Degree in Mathematics** in Universidad del Valle, Colombia.
Thesis title: *unique continuation property for a linearization of the BBM equation with space-dependent potential.*

Research Publications

Journal Articles

- 1 R. Lecaros, A. A. Pérez, and **M. F. Prado**^{*}, "Inverse random source and cauchy problems for semi-discrete stochastic parabolic equations in arbitrary dimensions," *Inverse Problems*, vol. 42, no. 7, p. 075 001, Jul. 2026. 🌐 DOI: 10.1088/1361-6420/ae7c2c.
- 2 R. Lecaros, A. A. Pérez, and **M. F. Prado**, "Carleman estimate for semi-discrete stochastic parabolic operators in arbitrary dimension and applications to controllability," *Applied Mathematics and Optimization*, vol. 93, no. 1, p. 12, 2026. 🌐 DOI: 10.1007/s00245-025-10364-1.

Submitted Manuscripts and Preprints

- 1 R. Lecaros, A. A. Pérez, and **M. F. Prado**^{*}, *Controllability for semi-discrete semilinear stochastic parabolic operators*, Submitted to *SIAM Journal on Control and Optimization (SICON)*, 2026. arXiv: 2604.05155 [math.OC].

^{*} Corresponding author.

Conferences and Academic Events

- 2026  **Speaker**, XXXVIII Jornada de Matemática de la Zona Sur (JMZS 2026). Universidad del Bío-Bío, Concepción, Chile.
Talk: Inverse Random Source and Cauchy Problems for Semi-Discrete Stochastic Parabolic Equations in Arbitrary Dimensions.
-  **Poster Presentation**, Inverse Problems in the Physical Sciences (IPPhys2026) Summer School. Puerto Varas, Chile.
Poster: Inverse problems for the semidiscrete stochastic parabolic equations.
- 2025  **Speaker**, XCIII Encuentro Anual de la Sociedad de Matemática de Chile (SOMACHI 2025). Vicuña, Chile.
Talk: Inverse Problems for Semidiscrete Stochastic Parabolic Equations: Carleman Estimates and Stability Results.
-  **Invited Speaker**, 2nd Colombian Workshop on Nonlinear Dispersive Equations. Universidad del Valle, Cali, Colombia.
Talk: Carleman estimate for semi-discrete stochastic parabolic operators in arbitrary dimension and applications to controllability.
-  **Speaker**, CONVImaTE 2025: Seminario especial de egresados y estudiantes de Matemáticas. Universidad del Valle, Cali, Colombia.
Talk: Las estimaciones de Carleman en el contexto estocástico y semidiscreto.
-  **Invited Participant**, Summer School "Control, Inverse Problems and Spectral Theory". Graduate School MINT, Toulouse, France.

Employment History

- 2024 - Present  **Part time lecturer**, Department of Mathematics, University Tecnica Federico Santa Maria, San Joaquin campus, Chile.
- 2023 – 2024  **Teaching Assistant**. Department of Mathematics, University Tecnica Federico Santa Maria, central campus, Chile.
- 2021 – 2022  **Teaching Assistant**. Department of Mathematics, University of Valle, central campus, Colombia.