

Curriculum Vitæ

Alejandro DÍAZ-CARO

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1 Positions

Current positions (since Oct/2024)

- Inria Advanced Research Position. Mocqua at the Loria laboratory (Nancy, France)
- Part-Time Tenured Assistant Professor. Universidad Nacional de Quilmes (Argentina)

Previous permanent positions

- Nov/2020 – Sep/2024: *CONICET “Investigador Adjunto”*. Instituto de Ciencias de la Computación (Universidad de Buenos Aires).
- Jul/2016 – Nov/2020: *CONICET “Investigador Asistente”*. Instituto de Ciencias de la Computación (Universidad de Buenos Aires).
- Aug/2014 – Sep/2024: *Full-Time Tenured Assistant Professor*. Universidad Nacional de Quilmes (Argentina)

Previous non-permanent positions

- Mar/2024 – Jul/2024: *Assistant Professor*. Universidad de Buenos Aires (Argentina)
- May/2024 – Jun/2024: *Invited researcher*. Université CentraleSupélec (France)
- Jun/2023 – Jul/2023: *Invited researcher*. Inria Paris-Saclay (France)
- Apr/2023 – May/2023: *Invited researcher*. Université CentraleSupélec (France)
- Jan/2016 – Jul/2016: *Invited researcher*. Università degli Studi di Torino (Italy)
- Oct/2013 – Aug/2014: *ATER*. Université Paris-Ouest Nanterre La Défense (France)
- Oct/2012 – Sep/2014: *ATER*. Université Paris-Ouest Nanterre La Défense (France)
- Oct/2011 – Sep/2012: *Postdoctoral fellow*. Université Paris 13 (France)

Education

- **PhD in Computer Science**
Institution: Université de Grenoble
Lab of affiliation: Laboratoire d’Informatique de Grenoble, France
Starting date: 17/Oct/2008 – Defense date: 23/Sep/2011
Thesis: Du typage vectoriel (On vectorial typing)
Advisor: Pablo Arrighi – Co-advisor: Frédéric Prost
Funding:
Allocation de Recherche granted by the Ministère de l’Enseignement Supérieur et de la Recherche

- **Licenciatura en Ciencias de la Computación**
(*Computer Science, eq. Research Masters in Europe*)
Institution: Universidad Nacional de Rosario, Argentina
Date: 21/Dec/2007
Thesis: Agregando medición al cálculo de van Tonder
Advisors: Manuel Gadella and Pablo E. Martínez-López

2 Responsibilities

Management responsibilities

- Appointed as Associated Editor of the IEEE Journal on Transactions on Emerging Topics in Computing (TETC), starting 2025.
- Head of the LoReL research team (<http://lore1-team.github.io>) between 2015 and 2024. The team has 4 permanent members, 6 PhD students, and several Master students.
- Adjoint research secretary at Departamento de Computación, Universidad de Buenos Aires, between 2019 and 2024.
- Representative of Universidad Nacional de Quilmes at RedUNCI (the Network of National Universities with Informatics Degrees), between 2015 and 2024.

Supervising

PhD Theses

- Malena Ivinsky. Universidad de Buenos Aires, UBA scholarship.
Coadvisor: Octavio Malherbe (UdelaR).
- Rafael Romero. Universidad de Buenos Aires, CONICET scholarship.
Coadvisor: Octavio Malherbe (UdelaR).
- Cristian Sottile. Universidad de Buenos Aires, CONICET scholarship.
Coadvisor: Pablo E. Martínez López (UNQ).

Licenciatura's Theses¹

In progress

- Luciano Barletta (Universidad Nacional de Rosario, DCC-FCEIA).
- Nicolás Monzón (Universidad Argentina de la Empresa).
- Tomás Miguez. (Universidad de Buenos Aires, DC-FCEN).
- Álvaro Piorno (Universidad Nacional de Quilmes).
- Carlos Miguel Soto (Universidad de Buenos Aires, DC-FCEN).

Defended

- Martín Villagra. *Compilación del lambda cálculo con matrices densidad en la máquina cuántica IBM-Q*. Licenciatura's Thesis. Universidad Nacional de Rosario, December 20, 2023. Coadvisor: Pablo E. Martínez López.
- Nicolás San Martín. *Operador de medición en un cálculo lambda con control cuántico*. Licenciatura's Thesis. Universidad de Buenos Aires, August 3, 2023. Coadvisor: P. E. Martínez López.

¹Argentinean "Licenciatura" is equivalent to the Research Masters in the EU system.

- Malena Ivinsky. *Agregando punto fijo a una extensión cuántica de lambda cálculo con matrices de densidad*. Licenciatura's Thesis. Universidad de Buenos Aires, August 28, 2020. Coadvisor: H. Melgratti. Paper issued: [DCIM21a]
- Francisco Noriega. *The Vectorial lambda calculus revisited*. Licenciatura's Thesis. Universidad de Buenos Aires, May 4, 2020. Preprint produced: arXiv:2007.03648
- Rafael Romero. *Una extensión polimórfica para los λ -cálculos cuánticos λ_ρ y λ_ρ°* . Licenciatura's Thesis. Universidad de Buenos Aires, March 19, 2020. Paper issued: [RDC21].
- Cristian Sottile. *Agregando polimorfismo a una lógica que identifica proposiciones isomorfas*. Licenciatura's Thesis. Universidad Nacional de La Plata, March 10, 2020. Coadvisor: P. E. Martínez López. Paper issued: [SDCM+20]
- Agustín Borgna. *Simulación del lambda cálculo de matrices de densidad en el lambda cálculo cuántico de Selinger y Valiron*. Licenciatura's Thesis. Universidad de Buenos Aires, August 1st, 2019.
- Juan Pablo Rinaldi. *Demostrando normalización fuerte sobre una extensión cuántica del lambda cálculo*. Licenciatura's Thesis. Universidad Nacional de Rosario, June 27, 2018. Paper issued: [DCDR19]
- Guido Martínez. *Confluencia en sistemas de reescritura probabilistas*. Licenciatura's Thesis. Universidad Nacional de Rosario, March 27, 2017. Paper issued: [DCM17]
- Pablo Buiras. *Aproximando los escalares de un λ -cálculo algebraico mediante cotas inferiores*. Licenciatura's Thesis. Universidad Nacional de Rosario, December 14, 2011. Coadvisor: M. Jaske-lioff. Paper issued: [BDCJ12]

Direction of research projects

- HORIZON-MSCA-2023-SE 101182520 *QCOMICAL: Quantum Computing and Its Calculi*. South American Coordinator: Alejandro Díaz-Caro. European Coordinator: Benoît Valiron. 13 participating sites from Argentina, Uruguay, France, and Italy. 12/2024–11/2028.
- PICT-2021-I-A-00090 *Computación cuántica y sus cálculos*. Director: Alejandro Díaz-Caro. 2023-2026.
- PIP 11220200100368CO *Fundamentos de lenguajes para computación cuántica y consecuencias en sistemas clásicos*. Director: Alejandro Díaz-Caro. 2021–2023.
- 21-STIC-10 *Qapla': Quantum Aspects of Programming Languages*. International and Argentinian coordinator: Alejandro Díaz-Caro. Chilean coordinator: Federico Olmedo. Uruguayan coordinator: Octavio Malherbe. French coordinators: Pablo Arrghi, Gilles Dowek, Simon Perdrix, and Benoît Valiron. 2021–2022.
- UNQ project 1342/19 *Fundamentos de lenguajes de programación: sistemas de pruebas y computación cuántica*. Director: Alejandro Díaz-Caro. Co-Director: Pablo E. Martínez López. 05/2019–04/2022.
- ECOS-Sud project A17C03 *QuCa: Quantum Calculi*. Argentine director: Alejandro Díaz-Caro. French director: Gilles Dowek. Other permanent members: Pablo Arrighi, Jean-Yves Marion, Pablo E. Martínez López, Simon Perdrix, and Benoît Valiron. 01/2018–12/2020. Extended until 12/2021.
- PICT-2015-1208 *Fundamentos de lenguajes de programación cuántica: hacia una lógica computacional*. Director: Alejandro Díaz-Caro. 04/2017–05/2020.

- UNQ project 1370/17 (renewal of PUNQ 1425/15) *Fundamentos de lenguajes de programación y sus consecuencias en sistemas clásicos*.
Director: Alejandro Díaz-Caro. Co-Director: Pablo E. Martínez López. 05/2017–04/2019.
- 16-STIC-04 *FoQCoSS: Foundations of Quantum Computation: Syntax and Semantics*.
Argentinian coordinator: Alejandro Díaz-Caro. Brazilian coordinator: Juliana Kaizer Vizzotto.
French coordinators: Pablo Arrghi, Gilles Dowek, Simon Perdrix, and Benoît Valiron. 2016–2017.
- UNQ project 1425/15 *Fundamentos de lenguajes de programación y sus consecuencias en sistemas clásicos*.
Director: Alejandro Díaz-Caro. Co-Director: Pablo E. Martínez López. 05/2015–04/2017.

Participation in Steering/Conference/Programm Committees

- *5th International Workshop on Programming Languages for Quantum Computing (PLanQC 2025)*.
Program Committee member.
- *22th International Conference on Quantum Physics and Logic (QPL 2025)*.
Program Co-Chair.
- *21th International Conference on Quantum Physics and Logic (QPL 2024)*.
Conference and Program Chair.
- *International Conference on Formal Structures for Computation and Deduction (FSCD)*.
Steering Committee member for the period 2021–2024.
- *9th International Conference on Formal Structures for Computation and Deduction (FSCD 2024)*.
Program Committee member.
- *31th EACSL Annual Conference on Computer Science Logic (CSL 2023)*.
Program Committee member.
- *17th and 18th International Workshop on Logical and Semantics Frameworks, with Applications (LSFA 2022 and 2023)*.
Program Committee member.
- *25th to 27th Brazilian Symposium on Programming Languages (SBLP 2021 to 2023)*.
Program Committee member.
- *34a Escuela de Ciencias Informáticas (ECI 2021)*.
School Chair.
- *6th International Conference on Formal Structures for Computation and Deduction (FSCD 2021)*.
Conference chair.
- *17th to 20th International Conference on Quantum Physics and Logic (QPL 2020 to 2023)*.
Program Committee member.
- *8th to 11th International Workshop on Confluence (IWC 2019 to 2022)*.
Program Committee member.
- *V Concurso Latinoamericano de Tesis de Doctorado de CLEI 2019*.
Program Committee member.

3 Publications

Editorial work

- [DCZ24] Alejandro Díaz-Caro and Vladimir Zamdzhiev. Proceedings of the 21st International Conference on Quantum Physics and Logic. *Electronic Proceedings in Theoretical Computer Science* 406, 2024.

International referred publications

- [DCV24] Alejandro Díaz-Caro and Marcos Villagra. Classically time-controlled quantum automata. *The Computer Journal*, bxae089, 2024.
- [DCDI⁺24] Alejandro Díaz-Caro, Gilles Dowek, Malena Ivniisky, and Octavio Malherbe. A linear proof language for second-order intuitionistic linear logic. In *Logic, Language, Information and Computation*, (edited by George Metcalfe, Thomas Studer, and Ruy de Queiroz), volume 14672 of *Lecture Notes in Computer Science*, pages 18–35, Springer, Cham, 2024.
- [DCD24] Alejandro Díaz-Caro and Gilles Dowek. A linear linear lambda-calculus. *Mathematical Structures in Computer Science*, FirstView:1-35, 2024.
- [DCM23] Alejandro Díaz-Caro and Octavio Malherbe. A concrete model for a typed linear algebraic lambda calculus. *Mathematical Structures in Computer Science* (34):1–40. 2023.
- [DCD23] Alejandro Díaz-Caro and Gilles Dowek. Extensional proofs in a propositional logic modulo isomorphisms. *Theoretical Computer Science* 977:114172, 2023.
- [DCD23b] Alejandro Díaz-Caro and Gilles Dowek. A new connective in natural deduction, and its application to quantum computing. *Theoretical Computer Science* 957:113840, 2023.
- [DCM22] Alejandro Díaz-Caro and Octavio Malherbe. Quantum control in the unitary sphere: Lambda- \mathcal{S}_1 and its categorical model. *Logical Methods in Computer Science* 18(3:32), 2022.
- [DCD22] Alejandro Díaz-Caro and Gilles Dowek. Linear lambda-calculus is linear In *7th International Conference on Formal Structures for Computation and Deduction*, (edited by Amy Felty), volume 282 of *Leibniz International Proceedings in Informatics (LIPIcs)*, article 22. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2022.
- [DC21] Alejandro Díaz-Caro. A quick overview on the quantum control approach to the lambda calculus. In *Logical and Semantic Frameworks with Application*, (edited by Mauricio Ayala-Rincon and Eduardo Bonelli), volume 357 of *Electronic Proceedings in Theoretical Computer Science*, pages 1–17. Open Publishing Association, 2021.
- [RDC21] Rafael Romero and Alejandro Díaz-Caro. A note on confluence in typed probabilistic lambda calculi. In *Logical and Semantic Frameworks with Application*, (edited by Mauricio Ayala-Rincon and Eduardo Bonelli), volume 357 of *Electronic Proceedings in Theoretical Computer Science*, pages 18–24. Open Publishing Association, 2021.
- [DCD21] Alejandro Díaz-Caro and Gilles Dowek. A new connective in natural deduction, and its application to quantum computing. In *18th International Colloquium on Theoretical Aspects of Computing*, (edited by Antonio Cerone and Peter Ölveczky), volume 12819 of *Lecture Notes in Computer Science*, pages 175–193. Springer, Cham, 2021 (Best Paper Award).
- [SDCM⁺20] Cristian F. Sottile, Alejandro Díaz-Caro, and Pablo E. Martínez López. Polymorphic System I. In *IFL 2020: Proceedings of the 32nd Symposium on implementation and application of functional programming languages*, pages 127–137, *ACM Digital Library*. 2020.
- [DCM20] Alejandro Díaz-Caro and Octavio Malherbe. A categorical construction for the computational definition of vector spaces. In *Applied Categorical Structures* 28(5):807–844, Springer, 2020.
- [ADC20] Beniamino Accattoli and Alejandro Díaz-Caro. Functional Pearl: The Distributive λ -Calculus. In *15th International Symposium on Functional and Logic Programming*, (edited by Keisuke Nakano and Konstantinos Sagonas), volume 12073 of *Lecture Notes in Computer Science*, pages 33–49. Springer, Cham, 2020.
- [DCDR19] Alejandro Díaz-Caro, Gilles Dowek, and Juan Pablo Rinaldi. Two linearities for quantum computing in the lambda calculus. *BioSystems* 186:104012 (special issue on *Theory and Practice of Natural Computing*), 2019.
- [DCD19] Alejandro Díaz-Caro and Gilles Dowek. Proof Normalisation in a Logic Identifying Isomorphic Propositions. In *4th International Conference on Formal Structures for Computation*

- and Deduction*, (edited by Herman Geuvers), volume 131 of *Leibniz International Proceedings in Informatics (LIPIcs)*, article 14. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, 2019.
- [DCGM⁺19] Alejandro Díaz-Caro, Mauricio Guillermo, Alexandre Miquel, and Benoît Valiron. Realisability in the Unitary Sphere. In *34th Annual ACM/IEEE Symposium on Logic in Computer Science (LICS'19)*, pages 1–13, 2019.
- [DCV18] Alejandro Díaz-Caro and Marcos Villagra. Classically time-controlled quantum automata. In *7th International Conference on the Theory and Practice of Natural Computing*, (edited by Carlos Martín-Vide, Michael O’Neill, and Miguel A. Vega-Rodríguez), volume 11324 of *Lecture Notes in Computer Science*, pages 226–278. Springer, Cham, 2018.
- [DCM18] Alejandro Díaz-Caro and Octavio Malherbe. A concrete categorical semantics for Lambda-S. In *13th Workshop on Logical and Semantic Frameworks with Applications*, (edited by Beniamino Accattoli and Carlos Olarte), volume 344 of *Electronic Notes in Theoretical Computer Science*, pages 83–100. Elsevier, 2019.
- [DCD17] Alejandro Díaz-Caro and Gilles Dowek. Typing quantum superpositions and measurement. In *Theory and Practice of Natural Computing*, (edited by Carlos Martín-Vide, Roman Neruda, and Miguel A. Vega-Rodríguez), volume 10687 of *Lecture Notes in Computer Science*, pages 281–293. Springer, Cham, 2017.
- [DC17] Alejandro Díaz-Caro. A lambda calculus for density matrices with classical and probabilistic controls. In *Programming Languages and Systems*, (edited by Bor-Yuh E. Chang), volume 10695 of *Lecture Notes in Computer Science*, pages 448–467. Springer, Cham, 2017.
- [DCM17] Alejandro Díaz-Caro and Guido Martínez. Confluence in probabilistic rewriting. In *12th Workshop on Logical and Semantic Frameworks with Applications*, (Edited by Sandra Alves and Renata Wassermann), volume 388 of *Electronic Notes in Theoretical Computer Science*, pages 115–131. Elsevier, 2018.
- [ADCV17] Pablo Arrighi, Alejandro Díaz-Caro, and Benoît Valiron. The vectorial lambda-calculus. *Information & Computation*, 254(1):105-139, 2017.
- [CDC⁺17] Mario Coppo, Mariangiola Dezani-Ciancaglini, Alejandro Díaz-Caro, Ines Margaria, and Maddalena Zacchi. Retractions in Intersection Types. In *The 8th Workshop on Intersection Types and Related Systems*, (Edited by Naoki Kobayashi), volume 242 of *Electronic Proceedings in Theoretical Computer Science*, pages 31–47, Open Publishing Association, 2017.
- [DCY16] Alejandro Díaz-Caro and Abuzer Yakaryilmaz. Affine computation and affine automaton. In *Computer Science – Theory and Applications*, (edited by Alexander S. Kulikov and Gerhard J. Woeginger), volume 9691 of *Lecture Notes in Computer Science*, pages 146–160. Springer, Cham, 2016.
- [DCML15] Alejandro Díaz-Caro and Pablo E. Martínez López. Isomorphisms considered as equalities: Projecting functions and enhancing partial application through and implementation of λ^+ . In *ACM Proceedings of IFL'15: Symposium on the implementation and application of functional programming languages*, number 9, ACM Digital Library. 2016.
- [ADCP⁺14] Ali Assaf, Alejandro Díaz-Caro, Simon Perdrix, Christine Tasson, and Benoît Valiron. Call-by-value, call-by-name and the vectorial behaviour of the algebraic λ -calculus. *Logical Methods in Computer Science*, 10(4:8), 2014.
- [DCD14] Alejandro Díaz-Caro and Gilles Dowek. The probability of non-confluent systems. In *Developments in Computational Models*, (edited by Mauricio Ayala-Rincón, Eduardo Bonelli and Ian Mackie), volume 144 of *Electronic Proceedings in Theoretical Computer Science*, pages 1–15. Open Publishing Association, 2014.
- [DCMP13] Alejandro Díaz-Caro, Giulio Manzonetto, and Michele Pagani. Call-by-value non-determinism in a linear logic type discipline. In *Logical Foundations of Computer Science*, (edited by Sergei Artemov and Anil Nerode), volume 7734 of *Lecture Notes in Computer Science*, pages 164–178. Springer, Berlin, Heidelberg, 2013.

- [DCD13] Alejandro Díaz-Caro and Gilles Dowek. Non determinism through type isomorphism. In *Logical and Semantic Frameworks, with Applications*, (edited by Delia Kesner and Petrucio Viana), volume 133 of *Electronic Proceedings in Theoretical Computer Science*, pages 137–144. Open Publishing Association, 2013.
- [ADC12] Pablo Arrighi and Alejandro Díaz-Caro. A System F accounting for scalars. *Logical Methods in Computer Science*, 8(1:11), 2012.
- [DCP12] Alejandro Díaz-Caro and Barbara Petit. Linearity in the non-deterministic call-by-value setting. In *Logic, Language, Information and Computation*, (edited by Luke Ong and Ruy de Queiroz), volume 7456 of *Lecture Notes in Computer Science*, pages 216–231. Springer, Berlin, Heidelberg, 2012.
- [BDCJ12] Pablo Buiras, Alejandro Díaz-Caro, and Mauro Jaskelioff. Confluence via strong normalisation in an algebraic λ -calculus with rewriting. In *Logical and Semantic Frameworks, with Applications*, (edited by Simona Ronchi della Rocca and Elaine Pimentel), volume 81 of *Electronic Proceedings in Theoretical Computer Science*, pages 16–29. Open Publishing Association, 2012.
- [ADCV12] Pablo Arrighi, Alejandro Díaz-Caro, and Benoît Valiron. A type system for the vectorial aspects of the linear-algebraic lambda-calculus. In *Developments of Computational Methods*, (edited by Elham Kashefi, Jean Krivine, and Femke van Raamsdonk), volume 88 of *Electronic Proceedings in Theoretical Computer Science*, pages 1–15. Open Publishing Association, 2012.
- [ADC11] Pablo Arrighi and Alejandro Díaz-Caro. Scalar System F for linear-algebraic λ -calculus: Towards a quantum physical logic. In *Quantum Physics and Logic*, (edited by Bob Coecke, Prakash Panangaden, and Peter Selinger), volume 270/2 of *Electronic Notes in Theoretical Computer Science*, pages 206–215. Elsevier, 2011.
- [ADCG⁺11] Pablo Arrighi, Alejandro Díaz-Caro, Manuel Gadella, and Jonathan J. Grattage. Measurements and confluence in quantum lambda calculi with explicit qubits. In *Joint Quantum Physics and Logic and Developments in Computational Models*, (edited by Bob Coecke, Ian Mackie, Prakash Panangaden, and Peter Selinger), volume 270/1 of *Electronic Notes in Theoretical Computer Science*, pages 59–74. Elsevier, 2011.

Theses

- [DC11] Alejandro Díaz-Caro. *Du typage vectoriel*. PhD thesis, Université de Grenoble, France, September 23, 2011.
- [DC07] Alejandro Díaz-Caro. Agregando medición al cálculo de van Tonder. Master’s thesis, Universidad Nacional de Rosario, Argentina, December 21, 2007.

Referred international workshops without proceedings

- [DCDM24] Alejandro Díaz-Caro, Gilles Dowek, and Octavio Malherbe. From Linear Logic to quantum control. Extended abstract at *21st International Conference on Quantum Physics and Logic (QPL)*, Buenos Aires, Argentina, 2024.
- [DCDI⁺24] Alejandro Díaz-Caro, Gilles Dowek, Malena Ivniisky, and Octavio Malherbe. Polymorphic intuitionistic linear logic and its connection to quantum computing. Poster presentation at *21st International Conference on Quantum Physics and Logic (QPL)*, Buenos Aires, Argentina, 2024.
- [DCMR24] Alejandro Díaz-Caro, Octavio Malherbe, and Rafael Romero. A multiple-basis quantum lambda calculus. Poster presentation at *21st International Conference on Quantum Physics and Logic (QPL)*, Buenos Aires, Argentina, 2024.
- [SDC24] Carlos Miguel Soto and Alejandro Díaz-Caro. Soundness and Completeness for a Linear Logic Calculus Designed for Quantum Computing. Poster presentation at *21st International Conference on Quantum Physics and Logic (QPL)*, Buenos Aires, Argentina, 2024.

- [MDC24] Nicolás Monzón and Alejandro Díaz-Caro. An extension of Lambda-S for multiple basis. Poster presentation at *21st International Conference on Quantum Physics and Logic (QPL)*, Buenos Aires, Argentina, 2024.
- [DCHP⁺24] Alejandro Díaz-Caro, Emmanuel Hainry, Romain Péchoux, and Mário Silva. A feasible and unitary programming language with quantum control (work-in-progress). Extended abstract at *4th International Workshop on Programming Languages for Quantum Computing (PLanQC 2024)*, London, UK, 2024.
- [DCHP⁺23] Alejandro Díaz-Caro, Emmanuel Hainry, Romain Péchoux, and Mário Silva. Light types and polynomial time for quantum lambda-calculi. Poster presentation at *20th International Conference on Quantum Physics and Logic (QPL)*, Paris, France, 2023.
- [DCDI⁺23] Alejandro Díaz-Caro, Gilles Dowek, Malena Ivnisky, and Octavio Malherbe. Polymorphic \mathcal{L}^S -calculus. Poster at *6th Workshop on Women in Logic (WiL)*, Rome, Italy, 2023.
- [DCD22a] Alejandro Díaz-Caro and Gilles Dowek. Linear lambda calculus is linear. Extended abstract at *28th International Conference on Types for Proofs and Programs (TYPES)*, Nantes, France, 2022.
- [DCIM21a] Alejandro Díaz-Caro, Malena Ivnisky, Hernán Melgratti, and Benoît Valiron. A finite-dimensional model for affine, linear quantum lambda calculi with general recursion. Extended abstract at *27th International Conference on Types for Proofs and Programs (TYPES)*, Leiden, The Netherlands (virtual), 2021.
- [DCIM⁺21b] Alejandro Díaz-Caro, Malena Ivnisky, Hernán Melgratti, and Benoît Valiron. A finite-dimensional model for affine, linear quantum lambda calculi with general recursion. Extended abstract at *5th Workshop on Women in Logic (WiL)*, Rome, Italy (virtual), 2021.
- [DCD21b] Alejandro Díaz-Caro and Gilles Dowek. A new connective in natural deduction, and its application to quantum computing. Poster presentation at *18th International Conference on Quantum Physics and Logic (QPL)*, Gdańsk, Poland (virtual), 2021.
- [DCM21] Alejandro Díaz-Caro and Octavio Malherbe. Quantum control in the unitary sphere: Lambda- \mathcal{S}_1 and its categorical model. Poster presentation at *18th International Conference on Quantum Physics and Logic (QPL)*, Gdańsk, Poland (virtual), 2021.
- [ODC20] Federico Olmedo and Alejandro Díaz-Caro. Extended abstract: Runtime Analysis of Quantum Programs: A Formal Approach. Extended abstract at *1st International Workshop on Programming Languages for Quantum Computing (PLanQC 2020)*, New Orleans, Louisiana, United States, 2020.
- [ADCV11] Pablo Arrighi, Alejandro Díaz-Caro, and Benoît Valiron. Subject reduction in a curry-style polymorphic type system with a vectorial space structure. Presentation report in *9th Workshop on Quantitative Aspects of Programming Languages*, Saarbrücken, Germany, 2011.
- [DCPT⁺10] Alejandro Díaz-Caro, Simon Perdrix, Christine Tasson, and Benoît Valiron. Equivalence of algebraic λ -calculi. In *5th International Workshop on Higher-Order Rewriting*, Edinburgh, United Kingdom, 2010.

Drafts and submitted papers

- [DCM24a] Alejandro Díaz-Caro and Octavio Malherbe. Parallel and algebraic lambda-calculi in intuitionistic propositional logic. [arXiv:2408.16102](https://arxiv.org/abs/2408.16102), 2024.
- [DCHP⁺24] Alejandro Díaz-Caro, Emmanuel Hainry, Romain Péchoux, and Mário Silva. A feasible and unitary programming language with quantum control. [ha1-04266203](https://arxiv.org/abs/2404.04266), 2024.
- [DCM24b] Alejandro Díaz-Caro and Octavio Malherbe. The sup connective in IMALL: A categorical semantics [arXiv:2205.02142](https://arxiv.org/abs/2205.02142), 2024.

Science popularisation

- [DC24] Alejandro Díaz-Caro. Lógica y computación cuántica: Un camino a través de los vaivenes políticos de la Argentina. *Bits de Ciencia*, 26:20–25, 2024. ISSN 0718–8005 (print) 0717–8013 (online).
- [DC16] Alejandro Díaz-Caro ¿Qué es la computación cuántica? *Ciencia Hoy*, 150:40–44, 2016. ISSN 0327-1218 (print) 1666–5171 (online).
- [DC12] Alejandro Díaz-Caro Tras las huellas de la computación cuántica. *Ensemble*, 9, 2012. ISSN 1852-5911 (online).

4 Teaching experience

Universidad Nacional de Quilmes

- *Introducción a la Programación Cuántica*. Licenciatura en Informática. 2021.
- *Fundamentos de Informática*. Doctorado en Ciencia y Tecnología. 2020.
- *Lógica y Programación*. Licenciatura en Informática. 2020, 2023, 2024.
- *Probabilidad y Estadística aplicada a la Bioinformática*. Maestría en Bioinformática y Biología de Sistemas. 2015, 2020, 2023.
- *Lenguajes Formales y Autómatas*. Licenciatura en Informática. 2015, 2019.
- *Matemática II*. Licenciatura en Informática. 2015–2019.
- *Matemática III*. Licenciatura en Informática. 2015–2017.
- *Características de Lenguajes de Programación*. Licenciatura en Informática. 2014–2024.

Universidad de Buenos Aires

- *Paradigmas de Programación*. Licenciatura en Ciencias de la Computación. 2024.
- *Fundamentos de Lenguajes para Computación Cuántica*. Licenciatura y Doctorado en Ciencias de la Computación. 2022.

Universidad Nacional del Noroeste de la Provincia de Buenos Aires

- *Probabilidad y Estadística aplicada a la Bioinformática*. Maestría en Bioinformática y Biología de Sistemas. 2014, 2018, 2021.

Universidad Nacional de Rosario

- *Introducción a la Computación Cuántica y Fundamentos de Lenguajes de Programación*. Licenciatura and Doctorado en Ciencias de la Computación. 2016, 2018.
- *Algebra y Geometría Analítica I* (ayudante de 1a). Escuela de Formación Básica FCEIA. 2008.
- *Análisis Matemático I* (ayudante de 1a). Escuela de Formación Básica FCEIA. 2008.
- *Análisis Matemático IV* (ayudante de 2a). Licenciatura en Ciencias de la Computación. 2007.

Université Paris-Ouest Nanterre La Défense

- *Probabilités* (TD).
L2 Économie et gestion. 2013, 2014.
- *Statistiques et probabilités* (TD).
L2 Économie et droit. 2014.
- *Méthodologie de la mesure en sciences humaines* (TD).
L1 Psychologie. 2013, 2014.
- *Mathématiques 2* (TD).
L1 Économie et gestion. 2013, 2014.
- *Mathématiques 1: Calcul et fonctions* (TD).
L1 Économie et droit. 2012, 2013.
- *Mathématiques 1* (TD).
L1 Économie et gestion. 2012.

Université Joseph Fourier

- *Compléments mathématiques et introduction à la logique et la preuve formelle* (TD).
L1 Informatique. 2010.

Institut National Polytechnique de Grenoble ESISAR

- *Calculabilité et complexité* (CM+TD).
Cycle Ingénieur (5o año) Informatique et Réseau. 2010.
- *Théorie des graphes* (CM+TD).
Cycle Ingénieur (5o año) Électronique, Informatique, Systèmes. 2009.

Short courses in summer schools

- Virtual course for the Argentinian Informatics Society (SADIO). April 2021.
Course: *Introducción a la computación cuántica* – 30hs.
- Extracurricular course for Universidad Nacional de La Pampa. October/November, 2020.
Course: *Introducción a la computación cuántica* – 9hs
- Course for a local enterprise (Terragene). August/September, 2020.
Course: *Computación cuántica: Estado actual, lenguajes y perspectivas* – 8hs
- “XI Summer Workshop in Mathematics”, Universidade de Brasília, Brazil. February 18–22, 2019.
Course: *Foundations of quantum programming languages* — 3hs
- “31a. Escuela de Ciencias Informáticas”, Exactas-UBA. Buenos Aires, Argentina. July 24–29, 2017.
Course: *Fundamentos de lenguajes para computación cuántica* — 15hs
- “Escuela de Informática del Congreso Argentino de Ciencias de la Computación”, San Luis, Argentina. October 3–7, 2016.
Course: *Fundamentos de lenguajes de programación para computación cuántica* — 25hs
- “XIII Jornadas de Ciencias de la Computación”. Rosario, Santa Fe, Argentina. October 22–23, 2015.
Course: *Introducción a la Computación Cuántica* — 4hs
- “Escuela de Verano de Ciencias Informáticas”. Río Cuarto, Córdoba, Argentina. February 9–14, 2015.
Course: *Fundamentos de lenguajes de programación cuántica* — 12.5hs

5 Comprehensive list of invited talks and seminars

2025

- Invited speaker (title not yet defined). At *Special Session on Quantum Computing at Computability in Europe (CiE 2025)*. Lisbon, Portugal. June 14–18, 2025.
- Sup, Sum, and Scalars: In Linear Logic and in Non-Linear Logic. At *Formal Methods Seminar*. LORIA. Nancy, France. January 7, 2025.

2024

- Sup, Sum, and Scalars: In Linear Logic and in Non-Linear Logic. At *LIX Proofs and Algorithms Seminar*. École Polytechnique. Paris, France. December 2, 2024.
- Sup, Sum, and Scalars: In Linear Logic and in Non-Linear Logic. At *QuACS Team Seminar*. Université Paris-Saclay. Paris, France. November 28, 2024.
- Programming Languages and Logic in Quantum Computing. At *Jornadas de Computación y Criptografía Cuántica (JC²C 2024)*. FIE-UNDEF. Buenos Aires. October 18, 2024.
- From Linear Logic to Quantum Control. At *XX Simposio Latinoamericano de Lógica Matemática (SLALM 2024)*. Universidad de la República. Montevideo, Uruguay. July 1–5, 2024.
- From Linear Logic to Quantum Control. At *Jornada LoReL 2024*. Universidad de Buenos Aires. Buenos Aires, Argentina. June 26, 2024.
- Quantum Control in Programming Languages for Quantum Computing. At *Seminario del Instituto de Computación*. Universidad de la República. Montevideo, Uruguay. February 28, 2024.

2023

- A Logical Connective for Non-Determinism. At *MOQCUA Team Seminar*. Université de Lorraine. Nancy, France. December 7, 2023.
- Quantum Computer: The Ultimate Computer? At *Café de las Ciencias*, with Pablo Arrighi, moderated by Ignacio Uman. French Embassy in Argentina and Ministry of Science, Technology, and Innovation. Centro Cultural de la Ciencia. Buenos Aires, Argentina. November 7, 2023.
- The Computational Logic of Quantum Physics, the Sup Connective, and a Lambda Calculus for Them. At *XXI Jornadas de Ciencias de la Computación (JCC 2023)*. Universidad Nacional de Rosario. Rosario, Argentina. October 6, 2023.
- Sup: A New Logical Connective for Non-Determinism. At *Logic Group Seminar*. IMERL. Universidad de la República. Montevideo, Uruguay. September 6, 2023.
- Programming Languages and Logic for Quantum Computing. At *Coloquio del Departamento de Física*. Universidad de Buenos Aires. Buenos Aires, Argentina. June 8, 2023.
- From Intuitionistic Linear Logic to Quantum Computing. At *QuACS Team Seminar*. Université Paris-Saclay. Paris, France. May 24, 2023.

2022

- Quantum Computing and Applications in Cryptography. At *Security Seminar*. Universidad Nacional de Río Cuarto. Río Cuarto, Argentina. November 25, 2022.
- An Overview of Quantum Control in the Lambda Calculus. At *XX Jornadas de Ciencias de la Computación (JCC 2022)*. Universidad Nacional de Rosario. Rosario, Argentina. October 26–28, 2022.
- Foundations of Quantum Programming Languages. At *Ciencias de la Computación, Café y Chocolate (4C)*. Instituto de Ciencias de la Computación. Buenos Aires, Argentina, September 9, 2022.
- A New Logical-Computational Connective to Describe Quantum Superposition. At *Quantum and Post-Quantum Methods Days 2022*. ARSAT. Online, Argentina. June 23, 2022.

- Linear Lambda Calculus is Linear. At *28th International Conference on Types for Proofs and Programs*. Nantes, France. June 21, 2022.
- An Overview on the Quantum Control Approach to the Lambda Calculus. At *DCC Seminar*. Departamento de Computación, Universidad de Chile. Santiago, Chile. April 5, 2022.

2021

- Towards a Quantum Computational Logic. Division talk at *Division of Foundations and Quantum Informatics*, during the *106th Annual Meeting of the Argentine Physics Association (RAFA'21)*. Virtual. October 12–15, 2021.
- An Overview on the Quantum Control Approach to the Lambda Calculus. Invited speaker at *16th International Workshop on Logical and Semantic Frameworks with Applications (LSFA'21)*. Buenos Aires, Argentina. July 23–24, 2021.
- Natural Deduction and Quantum Computing. Invited speaker at *Quantum Latino*. Virtual. June 9–11, 2021.
- Proof Theory in Quantum Computing. Invited speaker at *Seminario de Cuantos 2021*. IFLP. La Plata, Argentina. April 15, 2021.
- Proof Theory in Quantum Computing. Plenary talk at *Jornada de Investigadores en Formación (JIF'21)*. Universidad Nacional de Quilmes. Quilmes, Argentina. March 25, 2021.

2020

- Programming languages with quantum control: type theory, logic, and categories. At *QuICC Seminar*. Seminar of the QuICC research group. Instituto de Ciencias de la Computación. Buenos Aires, Argentina. September 1, 2020.
- Extensional proofs in a propositional logic modulo isomorphisms. At *Lógicos em Quarentena*. Seminar of the Brazilian Logic Society and the Logic Interest Group of the Brazilian Computing Society. Brazil. July 23, 2020.
- Quantum Computing. Talk organized by the students union at Universidad Nacional del Litoral. Santa Fe, Argentina. May 12, 2020.

2019

- Lambda Calculus as a Proof System for a Logic of Quantum Computation. At *WIP Seminar*. BA-Logic. Instituto de Investigaciones Filosóficas, Sociedad Argentina de Análisis Filosófico (SADAF). Buenos Aires, Argentina. October 11, 2019.
- Programming the Computers of the Future: Languages for Quantum Computing. At *Semana de la Computación*. DC-FCEyN, Universidad de Buenos Aires. Buenos Aires, Argentina. September 12, 2019.
- A Logic Identifying Isomorphic Propositions. At *2nd Meeting on Foundations of Programming Languages (FunLeP)*. Bernal, Buenos Aires, Argentina. May 22–24, 2019.
- Quantum Computing in Lambda Calculus. At *Día del ICC*. Buenos Aires, Argentina. March 15, 2019.
- Quantum Lambda Calculus with Quantum Control. At *V International Workshop on Quantum Mechanics and Quantum Information*. Buenos Aires, Argentina. March 13, 2019.
- A Lambda Calculus for Quantum Computation. At *XI Summer Workshop in Mathematics*. Brasília, Brazil. February 18–22, 2019.
- Lambda Calculus as a Proof System for a Logic of Quantum Computation. At Departamento de Computación, Universidad de Chile. Santiago, Chile. January 22, 2019.

2018

- Algebraic Lambda Calculus as a Base for a Quantum Logic. At *VII Jornadas de Fundamentos de Cuántica*. Buenos Aires, Argentina. November 21–23, 2018.
- Foundations of Programming Languages for Quantum Computing. At *COMTEL 2018*. Lima, Peru. October 18, 2018.
- A Lambda Calculus for Density Matrices. At *Logic and Foundations of Programming Languages Day*. Buenos Aires, Argentina. May 21, 2018.
- Two Linearities for Quantum Computing in the Lambda Calculus. At *Workshop on Combining Viewpoints in Quantum Theory*. Edinburgh, United Kingdom. March 19–22, 2018.
- Foundations of Quantum Programming Languages. At *Workshop de Técnicas de Programación Científica*. Quilmes, Argentina. February 26–March 9, 2018.
- Quantum Control in Programming Languages. At *IV Jornada de Lógica, Computación e Información Cuántica*. Quilmes, Argentina. March 1, 2018.

2017

- Typing Quantum Superpositions and Measurement. With Gilles Dowek. At *Poster Session of APLAS*. Suzhou, China. November 27–29, 2017.
- Merging Paradigms in Quantum Programming Languages. At *XV Jornadas de Ciencias de la Computación*. Rosario, Argentina. October 25–27, 2017.
- Lambda Calculus and Quantum Computing. At Universidad Nacional de La Plata. IFLP. La Plata, Argentina. April 25, 2017.
- A Lambda Calculus for Density Matrices. At ENS Cachan. DEDUCTEAM (LSV). Cachan, France. April 6, 2017.

2016

- Typing Quantum Superpositions and Projective Measurements. At *First FoQCoSS Meeting*. Bernal, Argentina. December 5–6, 2016.
- Towards a Quantum λ -Calculus with Quantum Control. At *V Congreso Latinoamericano de Matemáticos*. Barranquilla, Colombia. July 11–15, 2016.
- Affine Computation and Affine Automaton. At Dipartimento di Informatica, Università degli Studi di Torino. Turin, Italy. June 7, 2016.
- Quantum Superpositions and Projective Measurement in the Lambda Calculus. At Dipartimento di Informatica, Università degli Studi di Torino. Turin, Italy. January 28, 2016.

2015

- Projective Quantum Measurement in the Lambda Calculus. At *Workshop of the Laboratorio Internacional Asociado INFINIS*. Buenos Aires, Argentina. July 17, 2015.
- On Projective Quantum Measurement. At Universidad Nacional de Rosario. FCEIA. Rosario, Argentina. June 16, 2015.
- Works in Progress in Type Theory Modulo Type Isomorphisms. At Inria. DEDUCTEAM (Paris-Rocquencourt). Paris, France. May 29, 2015.

2014

- PCF with Pairs and Partial Evaluation (Work-in-Progress). At *Second Meeting of the French-Chinese ANR-NSFC Project LOCALI*. Paris, France. November 24–26, 2014.
- Lambda Calculus Modulo Type Isomorphisms. With Gilles Dowek. At *XII Jornadas de Ciencias de la Computación*. Rosario, Argentina. October 15–17, 2014.

- Type Theory Modulo Isomorphisms. At Universidad Nacional de Quilmes. LoReL. Bernal, Argentina. October 1, 2014.
- Simply Typed Lambda-Calculus Modulo Type Isomorphisms. With Gilles Dowek. At *20th Workshop Types for Proofs and Programs*. Paris, France. May 12–16, 2014.
- Type Theory Modulo Isomorphisms. At Aix-Marseille Université. LDP (I2M). Marseille, France. April 9, 2014.
- Simply Typed Lambda-Calculus Modulo Type Isomorphisms. At Inria. DEDUCTEAM Team. Paris, France. February 7, 2014.

2013

- Identifying Isomorphic Propositions. With Gilles Dowek. At *Journées LAC*. Créteil, France. November 28–29, 2013.
- Identifying Isomorphic Propositions. With Gilles Dowek. At *First Meeting of the French-Chinese ANR-NSFC Project LOCALI*. Beijing, China. November 4–6, 2013.
- Towards a Quantum Computational Logic. At Universidad Nacional de Rosario. FCEIA. Rosario, Argentina. August 9, 2013.
- Vectorial Types, Non-Determinism, and Probabilistic Systems: Towards a Quantum Computational Logic. At Université Paris-Diderot. LIAFA. Paris, France. May 7, 2013.
- Vectorial Types, Non-Determinism, and Probabilistic Systems: Towards a Quantum Computational Logic. At Université Paris-Diderot. PPS. Paris, France. April 16, 2013.
- Vectorial Types, Non-Determinism, and Probabilistic Systems: Towards a Quantum Computational Logic. At *Quantum Computing in Nancy*. Nancy, France. March 21, 2013.
- Non-Determinism (and Probabilities) through Type Isomorphism. At École Normale Supérieure. Plume (LIP). Lyon, France. February 21, 2013.
- Quantum Computing, Non-Determinism, Probabilistic Systems... and the Logic Behind. At Université Paris-Ouest. Modal'X (SEGMI). Nanterre, France. January 31, 2013.

2012

- Poster: Logical Interpretation of Non-Determinism. With Giulio Manzonetto and Michele Pagani. At *Digiteo Annual Forum*. Palaiseau, France. November 13, 2012.
- Non-Determinism through Type Isomorphism. At Inria. DEDUCTEAM (Centre Paris-Rocquencourt). Paris, France. October 12, 2012.
- A Vectorial Type System. With Pablo Arrighi. At *IV Congreso Latinoamericano de Matemáticos*. Córdoba, Argentina. August 6–10, 2012.
- Linearity in the Non-Deterministic Call-by-Value Setting. At Université Paris 13. LCR (LIPN). Villetaneuse, France. July 2, 2012.
- An Algebraic Approach Towards a Quantum Curry-Howard. With Gilles Dowek. At *Rencontre LOGOI*. Marseille, France. June 14, 2012.
- Equivalence on Propositions and Proofs. With Gilles Dowek. At *Logic and Interactions 2012: Quantitative Approaches Week*. Marseille, France. February 20–24, 2012.

2011

- On Vectorial Typing. At *18th Workshop Types for Proofs and Programs*. Bergen, Norway. September 8–11, 2011.
- Confluence via Strong Normalisation in an Algebraic λ -Calculus with Rewriting. With Pablo Buiras and Mauro Jaskieloff. At *1ère rencontre 2011 QuAND*. Marseille, France. July 18, 2011.
- Subject Reduction in a Curry-Style Polymorphic Type System with a Vectorial Space Structure. With Pablo Arrighi and Benoit Valiron. At *9th Workshop on Quantitative Aspects of Programming Languages*. Saarbrücken, Germany. April 1–3, 2011.

- Algebraic Type Systems. At École Polytechnique. Comète (LIX). Palaiseau, France. March 9, 2011.
- Algebraic Type Systems. At Université Paris 13. LCR (LIPN). Villetaneuse, France. January 17, 2011.

2010

- A Vectorial Type System. With Pablo Arrighi. At *2ème rencontre QuAND*. Lyon, France. November 5, 2010.
- Sums in Algebraic Lambda-Calculi. With Barbara Petit. At *17th Workshop Types for Proofs and Programs*. Warsaw, Poland. October 13–16, 2010.
- A Vectorial Type System (Work-in-Progress). With Pablo Arrighi and Benoît Valiron. At *17th Workshop Types for Proofs and Programs*. Warsaw, Poland. October 13–16, 2010.
- Equivalence of Algebraic λ -Calculi. With Simon Perdrix, Christine Tasson, and Benoît Valiron. At *5th International Workshop on Higher-Order Rewriting*. Edinburgh, Scotland. July 14, 2010.
- An Additive Type System for the Linear-Algebraic λ -Calculus. With Barbara Petit. At *CONCERTO Final Meeting*. Turin, Italy. June 9–11, 2010.
- An Additive Type System for the Linear-Algebraic Lambda-Calculus. With Barbara Petit. At *1ère rencontre QuAND*. Marseille, France. June 8, 2010.
- Equivalence of Algebraic λ -Calculi. With Simon Perdrix, Christine Tasson, and Benoît Valiron. At *1ère rencontre QuAND*. Marseille, France. June 8, 2010.
- A Vectorial System F: Work-in-Progress. With Pablo Arrighi. At *Journées GEOCAL-LAC*. Nice, France. March 15–17, 2010.
- A System F Accounting for Scalars. At Université d’Aix-Marseille. LDP (IML). Marseille, France. January 7, 2010.

2009

- Vectorial System F. With Pablo Arrighi. At *4th QNET Workshop*. Oxford, United Kingdom. December 10–11, 2009.
- Vectorial System F. At Université de Savoie. LIMD (LAMA). Chambéry, France. May 18, 2009.
- From a Scalar Type System to a Vectorial Type System. At École Polytechnique. TypiCal (LIX). Palaiseau, France. May 4, 2009.
- Scalar System F: Towards a Quantum Physical Logic. At École Normale Supérieure. Plume (LIP). Lyon, France. April 22, 2009.

2005–2008 (before PhD)

- Adding Measurement to van Tonder’s Calculus. At Université Paris Sud. Algo (LRI). Orsay, France. March 17, 2008.
- Adding Measurement to van Tonder’s Calculus. At Université de Grenoble. CAPP (LIG). Grenoble, France. March 4, 2008.
- Quantum Lambda Calculus. At Universidad Nacional de Rosario. Departamento de Ciencias de la Computación. Rosario, Argentina. June 15, 2007.
- A Very Brief Introduction to Quantum Computing. With Julián Samborski-Forlese. At *4th Jornadas de Ciencias de la Computación*. Rosario, Argentina. October 26–27, 2006.
- A Very Brief Introduction to Quantum Computing. With Julián Samborski-Forlese. At *Jornadas Abiertas de Informática v2.0*. SADIO. Rosario, Argentina. December 5, 2006.
- N-Qubit Teleportation Algorithm. At Universidad de Valladolid. Departamento de Física. Valladolid, Spain. March 8, 2006.
- Quantum Teleportation. At *3rd Jornadas de Ciencias de la Computación*. Rosario, Argentina. December 6–7, 2005.