
Cecilia Cormick - Curriculum Vitae

April 2022

Contact

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Current positions

- **Adjunct Professor and CONICET Independent Researcher (tenured).**
National University of Córdoba (Argentina).
Condensed Matter Theory Group, Physics Institute Enrique Gaviola, FAMAF.
Since November 2019.
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Main current scientific interests

- Open quantum systems.
 - Systems of composite bosons.
 - Quantum information and quantum simulations with trapped ions.
 - Quantum optics.
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Personal statements

Rather than having just one topic of expertise, my research work is curiosity-driven and involves collaborations in different subfields with several groups. Apart from my research, I commit very actively to teaching, and I have taken many teacher training courses. I have also organized meetings oriented to young students, with focus on quantum physics and on gender inequities in science. Because of my engagement to build a more diverse scientific community, I contributed to the formation of the Gender Committee of the Argentinian Physical Society, of which I have been a member for about three years.

Education

- **Ph.D. in Physics** (Doctora en Ciencias Físicas).
University of Buenos Aires (Argentina). December 2005 - December 2009.
Thesis Title: "Decoherence and quantum simulations of dynamic environments".
 - **Master in Physics** (Licenciada en Ciencias Físicas).
University of Buenos Aires (Argentina). March 2000 - September 2005.
Master's Thesis: "Discrete Wigner functions and stabilizer states in quantum computation".
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Previous research positions

- **Assistant Professor and CONICET Adjunct Researcher (tenured).**
National University of Córdoba (Argentina).
Condensed Matter Theory Group, FAMAF.
April 2015 to October 2019.
- **Postdoctoral researcher (CONICET Return Fellowship).**
National University of Córdoba (Argentina).
Condensed Matter Theory Group, FAMAF.
October 2014 to March 2015.
- **Postdoctoral researcher.**
Ulm University (Germany).
Quantum Controlled Dynamics Group (head: Prof. Martin Plenio).
October 2012 to September 2014.
- **Postdoctoral researcher.**
Saarland University (Germany).
Theoretical Quantum Physics Group (head: Prof. Giovanna Morigi).
February 2010 to August 2012.
- **PhD student.**
University of Buenos Aires (Argentina).
Quantum Foundations and Information Group (head: Prof. Juan Pablo Paz).
November 2005 to January 2010.

Research papers

32. E. Cuestas and C. Cormick, *Strongly bound fermion pairs on a ring: A composite-boson approach*, **Phys. Rev. A** **105**, 013302 (2022).
31. A. Kahan, L. Ermann, and C. Cormick, *Trapped ion in an optical cavity: Numerical study of an optomechanical transition in the few-photon regime*, **Phys. Rev. A** **104**, 043705 (2021).
30. A. D. Varizi, A. P. Vieira, C. Cormick, R. C. Drumond, and G. T. Landi, *Quantum coherence and criticality in irreversible work*, **Phys. Rev. Research** **2**, 033279 (2020).
29. C. Arenz, D. I. Bondar, D. Burgarth, C. Cormick, and H. Rabitz, *Amplification of quadratic Hamiltonians*, **Quantum** **4**, 271 (2020). Special comment by W. Ge in **Quantum Views** **4**, 41 (2020).
28. H. Landa, C. Cormick and G. Morigi, *Static kinks in chains of interacting atoms*, **Cond. Matter** **5**, 35 (2020).
27. A. Ramos and C. Cormick, *Feasibility of the ion-trap simulation of a class of non-equilibrium phase transitions*, **Eur. Phys. J. D** **73**, 237 (2019).
26. P. Céspedes, E. Rufeil-Fiori, P. A. Bouvrie, A. P. Majtey, and C. Cormick, *On the description of composite bosons in discrete models*, **Phys. Rev. A** **100**, 012309 (2019).
25. L. Himbert, C. Cormick, R. Kraus, S. Sharma, and G. Morigi, *Mean-field phase diagram of the extended Bose-Hubbard model of many-body cavity quantum electrodynamics*. **Phys. Rev. A** **99**, 043633 (2019).
24. A. Lemmer, C. Cormick, D. Tamascelli, T. Schaetz, S. F. Huelga, and M. B. Plenio, *A trapped-ion simulator for spin-boson models with structured environments*. **New J. Phys.** **20**, 073002 (2018).

23. S. Wald, A. Timpanaro, C. Cormick and G. T. Landi, *Energy barriers of metastable states in first order quantum phase transitions*. **Phys. Rev. A** **97**, 023608 (2018).
22. M. Saraceno, L. Ermann and C. Cormick, *Phase-space representations of SIC-POVM fiducial states*. **Phys. Rev. A** **95**, 032102 (2017).
21. C. Cormick and C. T. Schmiegelow, *Noise-induced transport in the motion of trapped ions*, **Phys. Rev. A** **94**, 053406 (2016).
20. T. Fogarty, H. Landa, C. Cormick, and G. Morigi, *Optomechanical many-body cooling to the ground state using frustration*, **Phys. Rev. A** **94**, 023844 (2016). Editor's suggestion.
19. T. Fogarty, C. Cormick, H. Landa, V. M. Stojanović, E. Demler and G. Morigi, *Nano-friction in cavity quantum electrodynamics*, **Phys. Rev. Lett.** **115**, 233602 (2015).
18. G. Morigi, J. Eschner, C. Cormick, Y. Lin, D. Leibfried and D. J. Wineland, *Dissipative quantum control of a spin chain*, **Phys. Rev. Lett.** **115**, 200502 (2015).
17. A. Lemmer, C. Cormick, C. T. Schmiegelow, F. Schmidt-Kaler and M. B. Plenio, *Two-dimensional spectroscopy for the study of ion Coulomb crystals*, **Phys. Rev. Lett.** **114**, 073001 (2015).
16. C. Arenz, C. Cormick, D. Vitali and G. Morigi, *Generation of two-mode entangled states by quantum reservoir engineering*. **J. Phys. B** **46**, 224001 (2013).
15. C. Cormick, A. Bermudez, S. F. Huelga and M. B. Plenio. *Preparation of the ground state of a spin chain by dissipation in a structured environment*. **New J. Phys.** **15**, 073027 (2013).
14. J. D. Baltrusch, C. Cormick and G. Morigi. *Quantum quenches of ion Coulomb crystals across structural instabilities II: Thermal effects*. **Phys. Rev. A** **87**, 032116 (2013).
13. C. Cormick and G. Morigi. *Ion chains in high-finesse cavities*. **Phys. Rev. A** **87**, 013829 (2013).
12. F. Cartarius, C. Cormick and G. Morigi. *Stability and dynamics of ion rings in linear multipole traps*. **Phys. Rev. A** **87**, 013425 (2013).
11. R. Dorner, J. Goold, C. Cormick, M. Paternostro and V. Vedral. *Emergent thermodynamics in a quenched quantum many-body system*. **Phys. Rev. Lett.** **109**, 160601 (2012).
10. J. D. Baltrusch, C. Cormick and G. Morigi. *Quantum quenches of ion Coulomb crystals across structural instabilities*. **Phys. Rev. A** **86**, 032104 (2012).
9. C. Cormick and G. Morigi. *Structural transitions of ion strings in a quantum potential*. **Phys. Rev. Lett.** **109**, 053003 (2012).
8. J. D. Baltrusch, C. Cormick, G. De Chiara, T. Calarco and G. Morigi. *Quantum superpositions of crystalline structures*. **Phys. Rev. A** **84**, 063821 (2011). Featured in *Synopsis: Superposed in a Crystal*, by J. Mimih. **Physics**, APS (2011).
7. J. Li, T. Fogarty, C. Cormick, J. Goold, Th. Busch and M. Paternostro. *Tripartite nonlocality and continuous-variable entanglement in thermal states of trapped ions*. **Phys. Rev. A** **84**, 022321 (2011).
6. C. Cormick, T. Schaetz and G. Morigi. *Trapping ions with lasers*. **New J. Phys.** **13**, 043019 (2011).
5. C. Cormick and J. P. Paz. *Observing different phases for the dynamics of entanglement in an ion trap*. **Phys. Rev. A** **81**, 022306 (2010).
4. C. Cormick and J. P. Paz. *Decoherence of Bell states by local interactions with a dynamic spin environment*. **Phys. Rev. A** **78**, 012357 (2008).
3. C. Cormick and J. P. Paz. *Decoherence induced by a dynamic spin environment: the universal regime*. **Phys. Rev. A** **77**, 022317 (2008).
2. C. Cormick and J. P. Paz. *Interference in discrete Wigner functions*. **Phys. Rev. A** **74**, 062315 (2006).

1. C. Cormick, E. Galvão, D. Gottesman, J. P. Paz and A. Pittenger. *Classicality in discrete Wigner functions*. **Phys. Rev. A** **73**, 012301 (2006).

Invited talks in scientific meetings (selected)

- **Quantum Thermodynamics Conference.**
October 4-8, 2021. Online - organized by the University of Geneva (Switzerland).
Invited talk: *Ion chains as quantum simulators.*
- **Humboldt Kolleg: Frontiers in Physical Sciences.**
November 14-18, 2016. Buenos Aires (Argentina).
Invited talk: *Ion chains in optical cavities.*
- **Quantum Optics VII.**
October 27-31, 2014. Mar del Plata (Argentina).
Invited plenary talk: *Two-dimensional spectroscopy for the study of ion Coulomb crystals.*
- **New Frontiers of Quantum Information Theory.**
July 7-11, 2014. Ascoli Piceno (Italy).
Invited talk: *Vibrational structures and long-lasting coherence in photosynthetic complexes.*
- **QIon13 - Workshop on Quantum Information and Quantum Dynamics in Ion Traps.**
April 2-6, 2013. Obergurgl (Austria).
Invited talk: *Cooling of an ion chain towards an asymptotic entangled state.*

Supervision of research activities

- **National University of Córdoba (Argentina):**
 - Alan Kahan (PhD student, from November 2018). Topic: Optomechanical systems of ultracold atoms in cavities.
 - Alan Kahan (Master student, year 2017). Topic: Non-invasive monitoring of trapped ions in cavities. Best grade obtained.
 - Dr. Alba Ramos (postdoctoral researcher, years 2016-2017). Topic: Dynamical transitions in open quantum systems.
- **Ulm University (Germany):**
 - Andreas Lemmer (PhD student, years 2013-2014). Topic: Two-dimensional spectroscopy for trapped ions.
- **Saarland University (Germany):**
 - Christian Arenz (undergraduate student, year 2012). Topic: Dissipative preparation of entangled states.
 - Jens Baltrusch (PhD student, years 2011-2012). Topic: Quantum superpositions in ion chains.
 - Florian Cartarius (undergraduate student, year 2011). Topic: Ion crystals in multipolar traps.

Fellowships, grants and awards (selected)

- **PICT Grant for Recently Formed Groups - ANPCyT (Argentina).**
Amount equivalent to 17,000 USD. February 2022.
- **Sponsorship of Renewed Research Stay in Germany by the Humboldt Foundation (Germany).**
Funding for a three-week visit to Saarland University (amount: 2,464 euros).
June 23 to July 14, 2016.
- **Return Fellowship from CONICET (Argentina).**
National University of Córdoba.
October 2014 to March 2015.
- **Selected participant in the 62nd Lindau Nobel Laureate Meeting (Germany).**
Meeting dedicated to Physics; participation cost awarded by the Humboldt Foundation.
July 1-6, 2012.
- **Postdoctoral Fellowship of the Alexander von Humboldt Foundation (Germany).**
Host: Prof. Giovanna Morigi, Saarland University.
September 2010 to August 2012.

Teaching

Teaching Experience

- **Adjunct Professor. National University of Córdoba (Argentina).**
Since November 2019. 10 hours per week.
- **Visiting Professor. University of São Paulo (Brazil).**
February 2019. Total 12 hours.
- **Assistant Professor. National University of Córdoba (Argentina).**
April 2015 to October 2019. 10 hours per week.
- **Visiting Professor. University of Buenos Aires (Argentina).**
May to June 2015. Total 32 hours.
- **Teaching assistant. Ulm University (Germany).**
April to August 2013. 10 hours per week.
- **Teaching assistant. Saarland University (Germany).**
April to August 2011. 6 hours per week.
- **Teaching assistant. University of Buenos Aires (Argentina).**
April 2003 to February 2010. 10 hours per week.

Teacher Training Courses

- **Gender awareness:**
Virtual Campus UNC (Argentina). Year 2020.
Teacher training in gender awareness and gender-related violence.

- **Physics Teacher Training Courses:**
CEFIEC, University of Buenos Aires (Argentina). Years 2006-2008.
General Didactics; Psychology and Learning; Educational Issues; History of Science (each a one-semester course, 6 hours per week; best grade obtained in all of the courses).

Evaluation of scientific activities

- **Reviewer for physics journals** (only listing those with active referrals in the last three years).
 - **Physical Review Research**, since February 2022.
 - **Physical Review X Quantum**, since October 2021.
 - **Physical Review Letters**, since October 2011.
 - **Physical Review A**, since February 2010.
- **Thesis examiner**
I have been reviewer for one MSc and two PhD theses, at the University of Buenos Aires and the National University of Córdoba (Argentina).
- **Reviewer for CONICET grants (Argentina)**
Call from year 2021.
- **Reviewer for selection of new CONICET researchers (Argentina)**
Call from years 2018 and 2020.
- **Reviewer for promotion of CONICET researchers (Argentina)**
Calls from years 2015, 2017, 2019 and 2020.

Organization of scientific meetings

- **Member of the Scientific Committee of the Annual Meeting - Argentinian Physical Society.**
September 2021, Córdoba (Argentina).
- **Member of the Organizing Committee of the 1st Workshop for Argentinian Female Physicists (TAMFIS 2019).**
October 2019, Santa Fe (Argentina).
- **Member of the Program Committee of the workshop “Q-turn”.**
November 2018, Florianópolis (Brazil).
- **Member of the Organizing Committee of the 1st Argentinian Quantum Workshop - CUANTOS.**
April 25-27, 2018. Córdoba (Argentina).
- **Coordinator of the Division “Quantum Foundations and Information” of the Argentinian Physical Society.**
February 2015 - September 2017.
Selection and scheduling of division talks in the annual general meetings:
 - September 26-29, 2017. La Plata, Buenos Aires (Argentina).
 - October 4-7, 2016. San Miguel de Tucumán, Tucumán (Argentina).
 - September 22-25, 2015. Merlo, San Luis (Argentina).