# Curriculum Vitae

Romero-Isart, Oriol

## Personal Information


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| Place and Date of Birth: | Terrassa, Barcelona, 16 May 1981 |
| Work address: | ICFO – The Institute of Photonic Sciences<br>Mediterranean Technology Park, Av. Carl Friedrich Gauss 3,<br>08860 Castelldefels, Barcelona. |
| Telephone: | +34 935 542 354 |
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## Education

9/2004 - 9/2008 Ph. D. in Physics (Excellent *Cum Laude* and Extraordinary Prize).
Thesis: *Quantum Information with Strongly Correlated Systems: from Engineering to Detection*. Supervised by Prof. Anna Sanpera, Universitat Autònoma de Barcelona.

9/1999 - 6/2004 Llicenciat (Graduate) in Physics, Universitat Autònoma de Barcelona.

## Current Postion(s)

Since 05/2024 ICREA Research Professor and Group Leader at ICFO – The Institute of Photonic Sciences, Castelldefels, Barcelona.

## Previous Positions

10/2013 - 04/2024 University Professor in Theoretical Quantum Physics (tenure since 10/2018), University of Innsbruck, Austria.

10/2013 - 04/2024 Research Group Leader (tenure since 10/2018), Institute for Quantum Optics and Quantum Information (IQOQI) of the Austrian Academy of Sciences, Innsbruck, Austria.

10/2021 - 02/2024 Deputy Managing Director, Institute for Quantum Optics and Quantum Information (IQOQI) of the Austrian Academy of Sciences, Innsbruck, Austria.

1/2011 - 10/2013 Associate researcher at the Theory group of Prof. J. Ignacio Cirac.
Max-Planck-Institute of Quantum Optics, Garching, Germany.

1/2009 - 12/2010 Alexander von Humboldt postdoctoral fellow at the Theory group of Prof. J. Ignacio Cirac.
Max-Planck-Institute of Quantum Optics, Garching, Germany.

## Fellowships and Awards

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| 2020 | ERC Synergy Grant (corresponding PI) of the European Research Council (ERC-2020-SyG). |
| 2015 | QIPC Young Investigator Award. |
| 2013 | ERC Starting Grant of the European Research Council (ERC-2013-StG). |
| 2013 | Emmy Noether Research Program of the German Research Foundation (DFG) (declined). |
| 2012 | National prize "Investigador Novel en Física Teórica" from the Royal Physical Society of Spain and the BBVA foundation. |
| 2011 | Ph. D. extraordinary prize from the Universitat Autònoma de Barcelona. |
| 2009 | Humboldt Research Fellowship for Postdoctoral Researchers from the Alexander von Humboldt Foundation (24 months). |
| 2006 | Ph. D. fellowship from the Spanish Government (FPU Ref: AP2005-0595). |

## Scientific Output Summary

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| Publications | 76 scientific articles (2 under review): 27 Physical Review Letters, 1 Science, 4 Nature Physics, 1 Physical Review X, 1 PRX Quantum, 1 PNAS, 27 Physical Review (A, B, Applied, Research), 4 New Journal of Physics, and 8 others. 50 as first or last author. |
| Invited Talks | 50+ invited talks at international conferences, 40+ invited seminars / colloquia at universities and research institutes worldwide. |
| Lecturer | 6 times invited lecturer in international schools. |
| Visits | 70+ research visits at universities and research institutes worldwide. |
| Funding | Since 2013: +4.3 MEur total funding for my group: ERC Starting Grant (QSuperMag), ERC Synergy Grant (Q-Xtreme), 2 FET Open (MaQSenS and IQLev), 2 Marie Skłodowska-Curie Action (PWAQUTEC and DecoXtreme), 1 Feodor Lynen Research Fellowship.<br>Until 05/2024 I was part of the Board of Directors of the Cluster of Excellence from the Austrian Science Fund (FWF), funded with 35 MEur for 5 years for a basic research project on quantum science (QuantA). |

## Research Visits

70. Institut de Ciències Fotòniques, Castelldefels (Catalonia), 31 August to 1 September 2023.
69. Yale University, New Haven (USA), 7 to 9 June 2023.
68. Columbia University, NYC (USA), 5 to 6 June 2023.
67. Niels Bohr Institute, Copenhagen (Denmark) , 2 to 4 May 2023.
66. CQT, Singapore, 19 to 24 March 2023.
65. ETH, Zürich (Switzerland), 6 to 8 February 2023.
64. ETH, Zürich (Switzerland), 7 to 8 June 2022.
63. University of Vienna (Austria), 19 to 21 May 2022.

62. ETH, Zürich (Switzerland), 11 to 12 May 2022.
61. ETH, Zürich (Switzerland), 22 to 23 March 2022.
60. University of Vienna (Austria), 18 March 2022.
59. University of Vienna (Austria), 22 November 2021.
58. ETH, Zürich (Switzerland), 11 to 12 November 2021.
57. University of Vienna (Austria), 25 October 2021.
56. University of Vienna (Austria), 23 September 2021.
55. ETH, Zürich (Switzerland), 7 to 8 September 2021.
54. University of Vienna (Austria), 24 to 25 June 2021.
53. University of Vienna (Austria), 28 April 2021.
52. ETH, Zürich (Switzerland), 13 to 14 January 2020.
51. Universitat Autònoma de Barcelona (Catalonia), 26 to 28 March 2019.
50. University of Duisburg-Essen (Germany), 10 to 11 January 2019.
49. ETH, Zürich (Switzerland), 20 to 21 November 2018.
48. Institute of Science and Technology Austria, Vienna (Austria), 22 August 2018.
47. TU Wien Atominstitut, Vienna (Austria), 11 April 2018.
46. California Institute of Technology, Pasadena CA (USA), 22 to 23 February 2018.
45. TU Wien Atominstitut, Vienna (Austria), 22 January 2018.
44. Chalmers University of Technology, Göteborg (Sweeden), 23 to 24 November 2017.
43. Universidad de la Habana, La Habana (Cuba), 30 October to 3 November 2017.
42. ETH, Zürich (Switzerland), 21 to 22 September 2017.
41. TU Wien Atominstitut, Vienna (Austria), 25 to 26 April 2017.
40. Perimeter Institute for Theoretical Physics, Waterloo (Canada), 12 to 25 February 2017.
39. Universidad Autónoma de Madrid, Madrid (Spain), 2 to 3 February 2017.
38. University of Basel, Basel (Switzerland), 14 to 15 November 2016.
37. Walther-Meissner-Institute, Garching (Germany), 9 to 10 June 2016.
36. TU Delft, Delft (Netherlands), 23 to 24 November 2015.
35. Max-Planck-Institute of Quantum Optics, Garching (Germany), 15 June 2015.
34. TU Wien Atominstitut, Vienna (Austria), 1 to 3 June 2015.
33. Max-Planck-Institute of Quantum Optics, Garching (Germany), 23 March 2015.
32. Macquarie University, Sydney (Australia), 8 to 23 January 2015.
31. Max-Planck-Institute of Quantum Optics, Garching (Germany), 22 to 24 September 2014.
30. University of Vienna, Vienna (Austria), 20 August 2014.

29. Institute for Quantum Optics and Quantum Information, Vienna (Austria), 16 to 17 June 2014.
28. Max-Planck-Institute of Quantum Optics, Garching (Germany), 14 to 15 April 2014.
27. Max-Planck-Institute of Quantum Optics, Garching (Germany), 12 to 14 February 2014.
26. Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 6 to 7 February 2014.
25. Max-Planck-Institute of Quantum Optics, Garching (Germany), 16 to 20 December 2013.
24. University of Vienna, Vienna (Austria), 4 to 6 June 2013.
23. Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 15 to 26 October 2012.
22. University College of London, London (UK), 3 to 4 July 2012.
21. California Institute of Technology, Pasadena CA (USA), 16 February to 4 March 2012.
20. Stanford University, Stanford CA (USA), 2 to 16 February 2012.
19. University of Vienna, Vienna (Austria), 14 to 16 December 2011.
18. Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 18 to 19 November 2011.
17. University of Vienna, Vienna (Austria), 13 to 15 July 2011.
16. Institut de Ciències Fotòniques, Castelldefels (Catalonia), 23 to 24 May 2011.
15. Harvard University, Cambridge MA (USA) 1 to 11 February 2011.
14. Albert-Ludwigs University of Freiburg, Freiburg (Germany), 25 to 26 January 2011.
13. Institut de Ciències Fotòniques, Castelldefels (Catalonia), 19 to 21 January 2011.
12. Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 17 to 18 January 2011.
11. University of Vienna, Vienna (Austria), 23 to 25 November 2010.
10. University of Austin at Texas, Austin TX (USA), 18 to 22 October 2010.
9. University of Vienna, Vienna (Austria), 12 to 14 July 2010.
8. Institute for Quantum Optics and Quantum Information, Innbruck (Austria), 10 to 12 May 2010.
7. University of Vienna, Vienna (Austria), 8 to 10 February 2010.
6. Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 31 August to 4 September 2009.
5. Institut de Ciències Fotòniques, Castelldefels (Catalonia), 13 to 17 July 2009.
4. Harvard University, Cambridge MA (USA), 24 September to 21 December 2007.
3. Universidad Complutense de Madrid, Madrid (Spain), 23 to 27 July 2007
2. Max-Planck-Institute of Quantum Optics, Garching (Germany), 1 to 8 August 2005.
1. University of Leeds, Leeds (UK), 1 July to 15 September 2003.

## Invited talks at conferences and workshops

52. *Levitated Nanoparticles in Macroscopic Quantum Superpositions: Pushing the Boundaries of Quantum Mechanics*, XV Symposium KCIK-ICTQT on Quantum Information, Sopot, Poland, 16 to 18 May 2024.

51. *Macroscopic Quantum Superpositions via Dynamics in Nonharmonic Potentials*, WE-Heraeus-Seminar on Exploiting Levitated Particles in the Quantum Regime, Bad Honnef, Austria, 4 to 8 September 2023.

50. *Macroscopic Quantum Superpositions via Dynamics in Nonharmonic Potentials*, Workshops on Quantum Sensing and Fundamental Physics with Levitated Mechanical Systems, Aula Renzo Leonardi (ECT), Trento, Italy, 31 July to 3 August 2023.

49. *Quantum Theory of Light Interaction with a Dielectric Sphere*, Workshop on Levitating Multi Atoms, Ions and Particles, Castle Hotel Trest, Czech Republic,16 to 18 May 2023.

48. *Quantum Mechanics XXL*, Frontiers of Atomic Physics and Quantum Information, Sala de la Convalescéncia (UAB), Barcelona, Catalonia 6 to 7 October 2022.

47. *Discussion on Macroscopic Quantum Superpositions*, LeviNet Inaugural Conference, King's College London, UK 5 to 8 September 2022.

46. *Quantum Acoustomechanics with a Micromagnet*, Spin Mechanics 7, Gerolfingen, Germany 22 to 25 August 2022.

45. *Towards Macroscopic Quantum Superposition of a Nanoparticle*, Kitzbühel Humboldt conference on Clues to a Mysterious Universe, 30 June to 1 July 2022.

44. *Harnessing Unstable Levitodynamics*, Workshop on Quantum Engineering of Levitated Systems, Benasque, 24 April to 30 April 2022.

43. *Towards Quantum Delocalization of a Nanoparticle*, Workshop Testing Quantum Aspects of Gravity in a Laboratory 2022, Lorentz Center Online, 28 March to 1 April 2022.

42. *Quantum Acoustomechanics with a Micromagnet*, Optomagnonics at Cambridge, University of Cambridge (UK), 9 to 10 September 2019.

41. *Quantum Acoustomechanics with a Micromagnet*, Conference on Nanophotonics: Foundations & Applications, Monte Verità (Switzerland), 2 to 5 September 2019.

40. *Quantum Acoustomechanics with a Micromagnet*, WE-Heraeus-Seminar on Levitated Optomecahnics, Bad Honnef (Austria), 30 July to 1 August 2019.

39. *Heating in Nanophotonic Traps for Cold Atoms*, 7th International Topic Meeting on Nanophotonics and Metamaterials (NANOMETA), Seefeld (Austria), 3 to 6 January 2019.

38. *Hot or Cold Nanospheres? Maybe none of the above*, Quantum Engineering of Levitated Systems, Benasque (Spain), 16 to 22 September 2018.

37. *Levitated Nanoparticles in the Quantum Regime: Challenges and Opportunities*, Tutorial talk at the French Research Network on Quantum OptoMechanics and Nanomechanics (GdR MecaQ), Université Paris Diderot, Paris (France), 12 to 13 September 2018.

36. *Ultra-Weak Force Sensing*, Discussion leader talk on Gordon Research Conference on Mechanical Systems in the Quantum Regime, Ventura CA (USA), 26 February to 1 March 2018.

35. *Quantum spin stabilized magnetic levitation*, Frontiers on Quantum Nanophotonics, Monte Verità (Switzerland), 21 to 23 August 2017.

34. *Levitated nanomagnets in the quantum regime*, Quantum Nanophotonics, Benasque (Spain), 27 February to 3 March 2017.

33. *Towards Quantum Interference of a Superconducting Microsphere*, Quantum Engineering of Levitated Systems, Benasque (Spain), 25 to 28 September 2016.

32. *Towards quantum interference of spheres of* $10^{13}$ *AMUs in an earth-based on-chip scheme* , DICE 2016 : Spacetime - Matter - Quantum Mechanics, Castello Pasquini/Castiglioncello (Italy), 14 to 16 September 2016.

31. *Towards Quantum Interference of a Superconducting Microsphere*, FOMO - Frontiers of Matter-Wave Optics, Arcachon (France), 11 to 14 Septembre 2016.

30. *Magnetic Levitation in Quantum Nanomechanics: New Opportunities*, Quantum Interfaces with Nano-Opto electro-mechanical devices: Applications and Fundamental Physics, Ettore Majorana Foundation and Centre for Scientific Culture, Erice (Italy), 1 to 2 August 2016.

29. *All-magnetic scheme for quantum interference of a superconducting microsphere*, Workshop Quantum control of levitated optomechanics, Pontremoli (Italy), 19 to 20 May 2016.

28. *Macroscopic quantum superpositions of levitated superconducting microspheres*, OSA Incubator meeting on Levitated Optomechanics, Washington DC (USA), 3 to 4 December 2015.

27. *Levitated nanospheres in the quantum regime*, Plenary talk at QIPC Conference, University of Leeds (UK), 14 to 18 September 2015.

26. *Towards macroscopic quantum superpositions of levitated superconducting spheres*, Probing the Mystery: Theory & Experiment in Quantum Gravity, Galiano Island (Canada), 17 to 20 August 2015.

25. *Strong Single-Photon Coupling Regime in Cavity Quantum Nanomechanics*, NIM Conference on Resonator QED, Munich (Germany), 4 to 5 August 2015.

24. *Near-Field Levitated Quantum Optomechanics with Nanodiamonds*, Frontiers of Quantum and Mesoscopic Thermodynamics, Prague (Czech Republic), 29 to 30 July 2015.

23. *Near-Field Levitated Quantum Optomechanics with Nanodiamonds*, Workshop on New trends in complex quantum systems dynamics, Cartagena (Spain), 27 to 29 May 2015.

22. *Superconducting Vortex Lattice for Ultracold Atoms*, Workshop ICE-1: Información Cuántica en España, Zaragoza (Spain), 25 to 27 June 2014.

21. *Quantum Magnetomechanics with Levitating Superconducting Microspheres*, Gordon Research Seminar on Mechanical Systems in the Quantum Regime, Ventura CA (USA), 8 to 9 March 2014.

20. *Superconducting Vortex Lattice for Ultracold Atoms*, International Conference on Quantum Optics, Obergurgl (Austria), 27 to 28 February 2014.

19. *Quantum Magnetomechanics with Levitating Superconducting Microspheres*, Frontiers of Opto- and Electromechanics workshop, Fai della Paganella (Italy), 28 to 29 January 2014.

18. *Quantum Magnetomechanics with Levitating Superconducting Microspheres*, Workshop on Cavity Optomechanics - from the micro to the macro scale, Innsbruck (Austria), 4 to 6 November 2013.

17. *Superconducting Vortex Lattice for Ultracold Atoms*, 22nd SFB-FoQuS Meeting, Innsbruck (Austria), 24 to 25 October 2013.

16. *Superconducting Vortex Lattice for Ultracold Atoms*, Quantum Physics: from fundamental questions to applications, ICFO-MPQ Joint Workhsop, Fundació Catalunya La Pedrera, Barcelona (Catalonia), 22 to 24 May 2013.

15. *Tests of Fundamental Theories*, OSA's Cavity Optomechanics Incubator Meeting, Washington DC (USA), 1 to 2 October 2012.

14. *Large Quantum Superpositions of Nanospheres*, Workshop on Theory of Quantum Gases and Quantum Coherence, Lyon (France), 5 to 8 June 2012.

13. *Levitating Quantum Mechanical Oscillators: from Optomechanics to Magnetomechanics*, Workshop Optomechanics on the Hudson, New York NY (USA), 2 to 4 April 2012.

12. *Quantum superposition of massive objects and collapse models*, Workshop Optomechanics on the Hudson, New York NY (USA), 2 to 4 April 2012.

11. *Quantum superpositions with levitating mechanical resonators*, Gordon Research Conference on Mechanical Systems in the Quantum Regime, Galveston TX (USA), 4 to 9 March 2012.

10. *Testing quantum mechanics with massive objects*, CAS-MPG 2nd Exploratory Round Table Conference on Quantum Information Science, Shanghai (China), 2 to 4 November 2011.

9. *Large quantum superpositions and interference of massive nanometer-sized objects*, ESF PESC Strategic Workshop: Signatures of Quantumness in Complex Systems, Nottingham (UK), 29 June to 3 July 2011.

8. *Large quantum superpositions and interference of massive nano-objects*, Conference on Entanglement, Quantum Information and the Quantum-to-classical Transition (Accademia Nazionale dei Lincei), Rome (Italy), 5 to 7 May 2011.

7. *Optically Levitating Nanodielectrics in the Quantum Regime*, 21st edition of GLSVLS (Ecole Polytechnique Federale de Lausanne - EPFL), Lausanne (Switzerland), 2 to 4 May 2011.

6. *Optomechanical Matter-Wave Interferometer for Microspheres*, Workshop on Optomechanics and Macroscopic Cooling at ITAMP (Harvard University), Cambridge MA (USA), 7 to 9 February 2011.

5. *Optomechanics: challenging quantum mechanics at the nanoscale*, ICFO-MPQ Joint Workshop: New trends in Quantum Information and Quantum Optics, St. Benet (Catalonia), 14 to 17 December 2010.

4. *Levitating nano-dielectrics in the quantum regime: theory and protocols*, QCCC Miniworkshop on optomechanics (Max-Planck Institut für Quantenoptik), Garching (Germany), 22 July 2010.

3. *Optically Levitating Nanodielectrics in the Quantum Regime*, XXXIV International Conference of Theoretical Physics: Correlations and Coherence at Different Scales, Ustron (Poland), 3 to 5 September 2010.

2. *Quantum Optics with Nano-dielectrics*, XIII International Conference on Quantum Optics and Quantum Information, Kyiv (Ukraine), 28 May to 1 June 2010.

1. *Quantum Dynamics in Optical Lattices: from State Transfer to Quantum Ratchet*, Mini-Workshop on Disorder in Quantum Gases (European Laboratory of Non-Linear Spectroscopy LENS), Florence (Italy), 14 to 15 May 2007.

## Seminars and Colloquia

42. *Levitated Nanoparticles in Macroscopic Quantum Superpositions: Pushing the Boundaries of Quantum Mechanics*, ICFO Seminar, Institute de Ciències Fotóniques, Catalonia, 31 August 2023.

41. *Levitated Nanoparticles in Macroscopic Quantum Superpositions: Pushing the Boundaries of Quantum Mechanics*, YQI Seminar, Yale University, New Haven, USA, 9 June 2023.

40. *Levitated Nanoparticles in Macroscopic Quantum Superpositions: Pushing the Boundaries of Quantum Mechanics*, AMO-QIS Seminar, Columbia University, NYC, USA, 3 June 2023.

39. *Levitated Nanoparticles in Macroscopic Quantum Superpositions: Pushing the Boundaries of Quantum Mechanics*, QUANTOP Seminar, Niels Bohr Institute, Copenhagen, Denmark, 3 May 2023.

38. *Levitated Nanoparticles in Macroscopic Quantum Superpositions: Pushing the Boundaries of Quantum Mechanics*, CQT Colloquium, Center for Quantum Technologies, Singapore, 23 March 2023.

37. *Towards Macroscopic Quantum Physics with Levitated Nanoparticles*, Quantum Optics Seminar at Ben-Gurion University of the Negev (online), 3 November 2021.

36. *Quantum Electrodynamics with a Dielectric Sphere*, AMO ICFO Journal Club (online), 07 July 2021.

35. *Towards Macroscopic Quantum Physics with Levitated Nanoparticles*, Seminar at Atom Institute (TU Wien), 25 June 2021.

34. *Towards Macroscopic Quantum Physics with Levitated Nanoparticles*, BEC Seminar of the Center for Theoretical Physics of the Polish Academy of Sciences (online), 18 June 2021.

33. *Towards Macroscopic Quantum Physics with Levitated Nanoparticles*, Quantum Gravity in Lab Forum (online, see video), 4 May 2021.

32. *Levitated Nanoparticles in the Quantum Regime*, Quantum Science Seminar (online, see video), 26 November 2020.

31. *Levitating Nanoparticle in Vacuum: A Quantum Treasure Trove*, Physics Colloquium at the Universitat Autònoma de Barcelona (Catalonia), 27 March 2019.

30. *Towards Quantum Levitodynamics*, University of Duisburg-Essen (Germany), 11 January 2019.

29. *Levitated Nanomagnets in the Quantum Regime: Theory and Applications*, California Institute of Technology, Pasadena CA (USA), 23 February 2018.

28. *From Levitated Nanomagnets to Quantum Magnonics*, Linné Colloquium at Chalmers University of Technology, Göteborg (Sweden), 23 November 2017.

27. *Levitated Nanomagnets: Magnons, Rotons, and Phonons*, ETH Zürich (Switzerland), 22 September 2017.

26. *Magnetic Levitation in Quantum Nanomechanics: New Opportunities*, University of Basel (Switzerland), 14 November 2016.

25. *Magnetic Levitation in Quantum Nanomechanics: New Opportunities*, ICFO (Catalonia), 6 July 2016.

24. *Levitated Magnets in the Quantum Regime: New Opportunities*, Walther-Meissner-Institute (Germany), 10 June 2016.

23. *Levitated Nanospheres in the Quantum Regime*, Department of Nanoscience, TU Delft (Netherlands), 23 November 2015.

22. *Levitated Nanospheres in the Quantum Regime*, Theoriekolloquium, Universität Mainz (Germany), 23 July 2015.

21. *Superconducting Vortex Lattices for Ultracold Atoms*, Macquarie University, Sydney (Australia), 20 January 2015.

20. *Exploring the Limits of Quantum Physics with Levitating Spheres*, Antrittsvorlesung (Inaugural Lecture) at the University of Innsbruck, Innsbruck (Austria), 9 December 2014.

19. *Superconducting Vortex Lattices for Ultracold Atoms*, Institute for Quantum Optics and Quantum Information, Vienna (Austria), 16 June 2014.

18. *Superconducting Vortex Lattices for Ultracold Atoms*, TU Wien Atominstitut, Vienna (Austria), 23 January 2014.

17. *How to place a microsphere in two places at once: Exploring the limits of quantum mechanics*, Colloquium at the Institute of Theoretical Physics, University of Innsbruck, Innsbruck (Austria), 15 January 2014.

16. *How to place a microsphere in two places at once: Exploring the limits of quantum mechanics*, Colloquium at the Opening ceremony of the academic year 2013-2014 of the Master in Photonics and Master Europhotonics at the Faculty of Physics in the Universitat de Barcelona, Barcelona (Catalonia), 30 October 2013.

15. *Superconducting Vortex Lattices for Ultracold Atoms*, Colloquium at the Institute of Experimental Physics, University of Innsbruck, Innsbruck (Austria), 6 March 2013.

14. *Testing quantum mechanics with massive objects*, Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 19 October 2012.

13. *Bringing levitating microspheres into the quantum regime: from optomechanics to magnetomechanics*, Department of Physics, University College London, London (UK), 4 July 2012.

12. *Quantum Superposition of Massive Objects*, Department of Physics, Stanford University, Stanford CA (USA), 3 February 2012.

11. *Com posar un mirall en dos llocs alhora: explorant els límits de la mecànica quàntica*, Inaugural Colloquium of the 2011-2012 academic course in Physics at the Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 26 October 2011.

10. *Macroscopic Quantum Superpositions of Nanometer Sized Objects*, Max-Planck-Institute of Quantum Optics Kolloquium, Garching (Germany) 31 May 2011.

9. *Macroscopic Quantum Superpositions of Nanometer Sized Objects*, Institut de Ciències Fotòniques, Castelldefels (Catalonia), 23 May 2011.

8. *Optically levitating dielectrics in the quantum regime*, Albert-Ludwigs University of Freiburg, Institute of Physics, Freiburg (Germany), 25 January 2011.

7. *Optomechanics: challenging quantum mechanics at the mesoscale*, Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 17 January 2011.

6. *Optically levitating dielectrics in the quantum regime*, University of Austin at Texas, Center for Nonlinear Dynamics, Austin TX (USA), 18 October 2010.

5. *Optically levitating nanodielectrics in the quantum regime*, Ludwig-Maximilian Universität, Munich Atom Chip Group, Munich (Germany), 29 September 2010.

4. *Levitated Nano-dielectrics in the Quantum Regime*, Universitat Autònoma de Barcelona, Bellaterra (Catalonia), 17 June 2010.

3. *Quantum nano-dielectrics: theory and protocols*, Institute for Quantum Optics and Quantum Information, Innsbruck (Austria), 10 May 2010.

2. *Quantum Superposition of Optically Levitating Nano-Spheres*, University of Vienna, Vienna (Austria), 8 February 2010.

1. *Prediction of protein-protein interactions using distant conservation of sequence patterns and structure relationships*, Universitat Pompeu Fabra, Barcelona (Catalonia), 8 March 2004.

## Invited lecturer in international schools and special courses

6. *4 lectures, 60 min each: Quantum Optomechanics.* Winter College on Optics: Quantum Photonics and Information. ICTP Trieste (Italy), 19 February 2020.

5. *3 lectures, 90 min each: Levitated Nanospheres in the Quantum Regime.* Advanced School on Foundations and Applications of Nanomechanics. ICTP Trieste (Italy), 18 to 20 September 2017.

4. *2 lectures, 120 min each: Levitated optomechanics.* ICFO schools on the frontiers of light: Master School on Quantum Nano- and Opto-mechanics, ICFO (Catalonia), 4 to 8 July 2016.

3. *3 lectures, 90 min each: Levitated Nanospheres in the Quantum Regime.* Summer School: Quantum Optomechanics and Nanomechanics. École de Physique des Houches (France), 9 to 16 August 2015.

2. *2 lectures, 45 min each: Large Quantum Superpositions and Interference of Nanomechanical Oscillators.* WE-Heraeus Physics School on Exploring the limits of the quantum superposition principle. Physikzentrum Bad Honnef (Germany), 12 to 17 May 2013.

1. *3 lectures, 60 min each: Quantum Mechanics at the Limit.* ITAMP/B2 Winter Graduate School on Atomic, Molecular and Optical Physics: Quantum Control of Mesoscopic Systems. B2 Institute, Tucson AZ (USA), 4 to 11 January 2013.

## Accepted talks in conferences and workshops and other talks

31. *Macroscopic Quantum Mechanics with a Levitated Nanoparticle*, TIQIT (Trento Innsbruck Quantum Information Tour), Innsbruck (Austria), 1 March 2023.

30. *Introduction to non-Gaussian states*, Q-Xtreme - Kickoff meeting, Innsbruck (Austria), 4-7 October 2021.

29. *When are large position uncertainties quantum?*, Q-Xtreme - Kickoff meeting, Innsbruck (Austria), 4-7 October 2021.

28. *Quantum Superposition of Massive Objects*, TIQIT (Trento Innsbruck Quantum Information Tour), Innsbruck (Austria), April 12 2018.

27. *Levitated nanomagnets in the quantum regime*, MaQSens - 1st Year Review Meeting and Scientific Workshop, ESI, University of Vienna (Austria), 9-10 April 2018.

26. *Levitated Magnets: From Quantum Physics at Large Scales to Inertial Sensing*, OEAW Klassensitzung, Vienna (Austria), 19 January 2018.

25. *From Levitated Nanomagnets to Quantum Magnonics*, ITP Seminar, Innsbruck (Austria), 27 November 2017.

24. *Isolated Quantum Nanosystems*, 8th Joint ICFO-ETH Meeting, Feldberg-Altglashütten (Germany), 22-24 October 2017.

23. *Quantum Superposition of Massive Objects*, Tiroler Hochschultag, University of Innsbruck (Austria), 19 October 2017.

22. *Harnessing Quantum Systems with Superconductivity and Magnetism*, MIP Seminar, University of Innsbruck (Austria), 11 October 2017.

21. *Quantum Spin Stabilized Magnetic Levitation*, 7th Joint ICFO-ETH Meeting, Capellades (Catalonia), 26-28 March 2017.

20. *Cómo poner un espejo en dos sitios a la vez: explorando los límites de la física cuántica*, Popular talk organized by Benasque ConCiencia, Benasque (Spain), 26 July 2016.

19. *Levitated nanomagnets in the quantum regime*, Quantum Information in Spain ICE-3, Mallorca (Spain), 13-15 April 2016.

18. *New opportunities with magnetic levitation*, 5th Joint ICFO-ETH Meeting, Garraf (Catalonia), 11-12 April 2016.

17. *Ultrashort pulses for far-field nanoscopy*, International Conference on Quantum Optics, Obergurgl (Austria), 21-27 February 2016.

16. *Towards quantum interference of superconducting microspheres: will gravity allow it?*, Gravity in the Lab, Benasque (Spain), 7 July 2015.

15. *Towards quantum interference of superconducting microspheres: will gravity allow it?*, ITN cQOM workshop "Levitation in (quantum) physics", Vienna (Austria), 15 May 2015.

14. *Basics on Levitation*, ITN cQOM workshop "Levitation in (quantum) physics", Vienna (Austria), 14 May 2015.
13. *Quantum nanophysics, optics, and information*, SAB meeting at IQOQI, Innsbruck (Austria), 9 July 2014.
12. *Superconducting Vortex Lattices for Ultracold Atoms*, SVL meeting at the Max-Planck-Institute of Quantum Optics, Garching (Germany), 7 January 2014.
11. *Superconducting Vortex Lattices for Ultracold Atoms*, XXXIV Reunión Bienal de la Real Sociedad Española de Física, Valencia (Spain), 16 to 17 July 2013.
10. *From quantum optics to quantum magnetics*, MPQ theory group workshop at Friedrichschafen (Germany), 12 to 15 September 2012.
9. *Optically Levitating Nanodielectrics in the Quantum Regime*, International Conference on Quantum Information and Quantum Computation, Stockholm (Sweeden), 4 to 6 October 2010.
8. *Quantum Macroscopic Superposition of Levitating Nanodielectrics*, Fifth International Workshop DICE2010 :Space-Time-Matter - current issues in quantum mechanics and beyond, Castello Pasquini/Castiglioncello (Italy), 13 to 17 September 2010.
7. *Cavity Quantum Optomechanics with Optically Levitating Nanodielectrics*, Workshop on Nano-Opto-Electro-Mechanical Systems Approaching the Quantum Regime, Trieste (Italy), 6 to 10 September 2010.
6. *Quantum Optics with Nano-dielectrics*, 17th Central European Workshop on Quantum Optics, St. Andrews (Scotland), 6 to 11 June 2010.
5. *Quantum Superposition of Optically Levitating Nanospheres*, MPQ theory group workshop at Galtür (Austria), 31 January to 3 February 2010.
4. *Quantum State Transfer & Magnetic Order in Spin-1 Chains*, 1st GIQ-ICFO Winter Meeting at Lles de Cerdanya (Catalonia), 11 to 13 February 2007.
3. *Quantum State Transfer & Magnetic Order in Spin-1 Chains*, 5th Informal Quantum Information Gathering IQING5, Innsbruck (Austria), 11 to 15 April 2007.
2. *Study of Strongly Correlated Many-Body Systems with Entanglement Transport*, XXXVIII Symposium on Mathematical Physics: "Quantum Entanglement & Geometry", Torun (Poland), 4 to 7 June 2006.
1. *Purity Estimation with Separable Measurements*, Max-Planck-Institut für Physik komplexer Systeme, Desden (Germany), 29 August to 23 September 2005.

## Supervision of PhD Theses

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|---|---|
| 05/2021 - present | Supervision PhD thesis Davide Candoli.<br>University of Innsbruck and IQOQI, Innsbruck, Austria. |
| 05/2021 - present | Supervision PhD thesis Thomas Agrenius Gustafsson.<br>University of Innsbruck and IQOQI, Innsbruck, Austria. |
| 02/2019 - present | Supervision PhD thesis Sílvia Casulleras Guàrdia.<br>University of Innsbruck and IQOQI, Innsbruck, Austria. |
| 10/2017 - 05/2024 | Supervision PhD thesis Marc Rodà Llordés.<br>*Macroscopic Quantum Physics via Dynamics of a Levitated Nanoparticle in Controlled Potentials.*<br>University of Innsbruck and IQOQI, Innsbruck, Austria. |

10/2016 - 09/2022 Supervision PhD thesis Katja Kustura.
*Coherent and incoherent dynamics of multimode systems in the quantum regime: From theory to applications.*
University of Innsbruck and IQOQI, Innsbruck, Austria.

12/2015 - 11/2020 Supervision PhD thesis Patrick Maurer.
*Controlling Spatiotemporal Features of Electromagnetic Fields for Quantum Optics.*
University of Innsbruck and IQOQI, Innsbruck, Austria.

06/2015 - 09/2020 Supervision PhD thesis Daniel Hümmer.
*Phononic Excitations in Near-Field Quantum Optics and Levitodynamics.*
University of Innsbruck and IQOQI, Innsbruck, Austria.

01/2014 - 10/2018 Supervision PhD thesis Cosimo C. Rusconi.
*Levitated Nanomagnets in the Quantum regime.*
University of Innsbruck and IQOQI, Innsbruck, Austria.

11/2013 - 09/2016 Supervision PhD student Hernán Pino.
University of Innsbruck and IQOQI, Innsbruck, Austria.

09/2009 - 09/2013 Co-supervision with Prof. J. I. Cirac PhD thesis Anika C. Pflanzer.
*Optomechanics with Levitating Dielectrics: Theory and Protocols.*
Max-Planck Institute for Quantum Optics, Garching, Germany.

## Supervision of Master Theses

10/2020 - 07/2022 Supervision Master thesis Callum Carver.
University of Innsbruck and IQOQI, Innsbruck, Austria.

11/2019 - 09/2021 Supervision Master thesis Valentina Zeni.
University of Innsbruck and IQOQI, Innsbruck, Austria.

10/2019 - 04/2021 Supervision Master thesis Daniele Giannandrea.
University of Innsbruck and IQOQI, Innsbruck, Austria.

10/2018 - 11/2019 Supervision Master thesis René Lampert.
University of Innsbruck and IQOQI, Innsbruck, Austria.

10/2017 - 02/2019 Supervision Master thesis Vanessa Wachter.
University of Innsbruck and IQOQI, Innsbruck, Austria.

10/2017 - 12/2018 Supervision Master thesis Sílvia Casulleras Guàrdia.
University of Innsbruck and IQOQI, Innsbruck, Austria.

10/2016 - 01/2018 Supervision Master thesis Gerald Fux.
University of Innsbruck and IQOQI, Innsbruck, Austria.

10/2016 - 10/2017 Supervision Master thesis Andreu Riera.
University of Innsbruck and IQOQI, Innsbruck, Austria.

10/2016 - 10/2017 Supervision Master thesis Sergi Julià.
University of Innsbruck and IQOQI, Innsbruck, Austria.

09/2015 - 01/2017 Supervision Master thesis Vera Pöchhacker.
University of Innsbruck and IQOQI, Innsbruck, Austria.

09/2014 - 01/2016 Supervision Master thesis Anna Ulrichshofer.
University of Innsbruck and IQOQI, Innsbruck, Austria.

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| 10/2014 - 10/2015 | Supervision Master thesis Patrick Maurer.<br>University of Innsbruck and IQOQI, Innsbruck, Austria. |

## Other Responsibilities

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| Present | Reviewer for Science, Physical Review Letters, Physical Review (X, A, B, Applied, Research), Nature Physics, New Journal of Physics, Europhysics Letters, and others. |
| Since May 2022 | Sponsoring of an independent research group lead by Dr. Carlos Gonzalez-Ballestero. |
| Since Sept 2021 | Member of the Board of Directors of Quantum Austria (QuantA), a Cluster of Excellence funded by the Austrian Science Fund (FWF) with 35 MEur for the next five years. |
| Since Feb 2021 | Organizer of the international Quantum Science Seminar. |
| Since 2016 | Organizer of the IQOQI Colloquia. |
| Summer 2023 | Organization of a summer internship at IQOQI Innsbruck for one international undegraduate student (Evan Sheldon). |
| Summer 2022 | Organization of a summer internship at IQOQI Innsbruck for two international undegraduate student (Niklas Engelhardt Öhne and Zuzanna Jezierska). |
| 7/2022 | Co-organizer with Darrick Chang, Juan José Garcia-Ripoll, and Peter Rabl of a three weeks international Workshop on *Quantum Science: Implementations* in Benasque, Spain. |
| 2018 | Evaluation Committee of the Ramón y Cajal Programme 2017 of the Spanish Government. |
| Summer 2018 | Organization of a summer internship at IQOQI Innsbruck for one international undegraduate student (Marta Florido Linàs). |
| 7/2018 | Co-organizer with Darrick Chang, Liang Jiang, and Juan José Garcia-Ripoll of a three weeks international Workshop on *Quantum Science: Implementations* in Benasque, Spain. |
| Summer 2017 | Organization of a summer internship at IQOQI Innsbruck for two international undegraduate student (Daniel Goncalves and Víctor José Martínez Lahuerta). |
| Summer 2016 | Organization of a summer internship at IQOQI Innsbruck for an international undegraduate student (Andreu Riera-Campeny). |
| 7/2016 | Co-organizer with Darrick Chang, Liang Jiang, and Juan José Garcia-Ripoll of a three weeks international Workshop on *Quantum Science: Implementations* in Benasque, Spain. |
| Summer 2015 | Organization of a summer internship at IQOQI Innsbruck for two international undegraduate students (Sergi Julià and Marc Rodà). |
| 7/2014 | Co-organizer with Darrick Chang, Liang Jiang, and Juan José Garcia-Ripoll of a three weeks international Workshop on Quantum Science: Implementations in Benasque, Spain. |
| 5/2011 | Co-organizer with Maarten van den Nest of the 2011 MPQ-Theory group workshop at Seefeld, Austria. |

## Teaching

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| 3/2014 - Present | Teaching as University Professor at the Institute of Theoretical Physics in the University of Innsbruck, Austria. |

- Theoretische Physik 3 (Elektrodynamik) (60h / Theory / Bachelor): WS 16-17, WS 17-18, WS 20-21, WS 21-22, WS 22-23
- Quantum Physics II (60h / Theory / Master): SS 16, SS 17, WS 23-24
- Quantum Physics II (30h / Problems / Master): SS 16
- Grundkonzepte Quantenphysik (20h / Theory / Master): WS 18-19, WS 19-20, WS 20-21
- Theoretical Quantum Optics (45h / Theory / Master): SS 14, SS 15, SS 18, SS 19
- Theoretical Quantum Optics (15h / Problems / Master) SS 14, SS 15
- Advanced Quantum Physics (45h / Theory / Master): WS 18-19, WS 19-20
- Advanced Quantum Physics (15h / Problems / Master) WS 18-19
- Quantum Nano-Optics Theory (45h / Theory / Master): WS 14-15, WS 15-16
- Quantum Nano-Optics Theory (15h / Problems / Master) WS 14-15, WS 15-16
- (co-)Supervision of 12 Bachelor theses: (1) Christoph R. Kaubrügger SS 15, (2) Mathias Wolf (with J. Prat-Camps) SS16, (3) Lukas Knosp (with C. C. Rusconi) SS16, (4) Daniele Giannandrea (with B. Prasanna Venkatesh) SS17, (5) Francesco Preti (with K. Sinha) SS17, (6) Aaron Hofer (with D. Hümmer) SS18, (7) Johannes Riedel (with P. Maurer) SS19, (8) Fabian Leitner (with A. E. Rubio López) SS19, (9) Stefan Neururer SS20, (10) Judith Senn (with C. Gonzalez-Ballestero and S. Casulleras) SS21, (11) Hannah Troger (with P. T. Grochowski and D. Candoli) SS22, (12) Oliver Benz (with Thomas Agrenius) SS23.

03/2010 - 07/2010 Co-supervision with Prof. J. I. Cirac of the Bachelor thesis of Lucas Clemente. Ludwig-Maximilians-Universität München and Max-Planck Institute for Quantum Optics, Garchin, Germany.

9/2004 - 9/2008 Teaching as Ph. D. student at the Department of Physics of the Universitat Autònoma de Barcelona, Bellaterra, Catalonia.

- Course 2007-2008: Physics for Engineers (30h Problems Lectures) .
- Course 2006-2007: Experiments in Thermodynamics (39h) .
- Course 2005-2006: Quantum Physics (45h Problems Lectures), Physics for Engineers (14h Problems Lectures).
- Course 2004-2005: Quantum Physics (45h Problems Lectures), Computational methods for physics (34h Problems Lectures), Experiments in Thermodynamics (45h).

## Funding ID as a Group Leader

2021 - 2027 Q-Xtreme - Macroscopic Quantum Superpositions.
ERC Synergy Grant (ERC-2020-SyG Grant agreement ID 951234).
Corresponding PI together with M. Aspelmeyer (U Vienna), L. Novotny (ETH Zürich), and R. Quidant (ETH Zürich).
Our group was funded with 1.8M€ (Total Funding 13.1M€).

2023 - 2025 DecoXtreme - Decocherence of Levitated Microscopic Particles in Extreme Isolation.
Marie Skłodowska-Curie Actions (MSCA).
Our PostDoc Dr. Andreu Riera-Campeny was funded with 199K€.

2020 - 2023 IQLev - Inertial Sensing Based on Quantum-Enhanced Levitations Systems.
FET Open of the ERC Horizon 2020.
co-PI together with 5 collaborators.
Our group was funded with 437K€ (Total Funding 2.6M€).

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| 2019 - 2021 | Feodor Lynen Research Fellowship of the Alexander von Humboldt Foundation.<br>Our PostDoc Dr. Talitha Weiss was funded with 44K€. |
| 2018 - 2020 | PWAQUTEC - Phononic Waveguide-based Platforms for Quantum Technologies.<br>EXCELLENT SCIENCE - Marie Skłodowska-Curie Actions.<br>Our PostDoc Dr. Carlos Gonzalez-Ballestero was funded with 178K€. |
| 2016 - 2019 | MaQSenS - Magneto-mechanical Platforms for Macroscopic Quantum Experiments and Quantum Enabled Sensing Technologies.<br>FET Open of the ERC Horizon 2020 (H2020-FETOPEN-1-2016-2017 Project 736943).<br>co-PI together with 5 national and international collaborators.<br>Our group was funded with 286K€ (Total Funding 3M€). |
| 2013 - 2018 | QSuperMag - Harnessing Quantum Systems with Superconductivity and Magnetism.<br>ERC Starting Grant (ERC-2013-StG Project 335489).<br>Total Funding 1.29M€. |

## Popular Science Publications

3. Eine Diode für Magnetfelder.
   P. Maurer, O. Romero-Isart, G. Kirchmair, and J. Prat-Camps.
   Physik in unserer Zeit **50**, 114 (2019).

2. El átomo cuántico cumple 100 años.
   O. Romero-Isart.
   El País (2013).

1. Quantenmechanik am Limit: Superpositionen massiver Objekte.
   O. Romero-Isart, and A. C. Pflanzer.
   Max-Planck-Gesselschaft, Jahrbuch (2012).

## List of Publications

76. State Expansion of a Levitated Nanoparticle in a Dark Harmonic Potential.
    E. Bonvin, L. Devaud, M. Rossi, A. Militaru, L. Dania, D. S. Bykov, O. Romero-Isart, T. E. Northup, L. Novotny, and M. Frimmer.
    arXiv:2312.13111.

75. Quantum Control of Continuous Systems via Nonharmonic Potential Modulation.
    P. T. Grochowski, H. Pichler, C. A. Regal, and O. Romero-Isart.
    arXiv:2311.16819.

74. Wigner Analysis of Particle Dynamics in Wide Nonharmonic Potentials.
    A. Riera-Campeny, M. Roda-Llordes, P. T. Grochowski, and O. Romero-Isart.
    arXiv:2307.14106.

73. Numerical Simulation of Large-Scale Nonlinear Open Quantum Mechanics.
    M. Roda-Llordes, D. Candoli, P. T. Grochowski, A. Riera-Campeny, T. Agrenius, J. J. Garca-Ripoll, C. Gonzalez-Ballestero, and O. Romero-Isart.
    Physical Review Research **6**, 013262 (2024).

72. Cavity-mediated Long-range Interactions in Levitated Optomechanics.
    J. Vijayan, J. Piotrowski, C. Gonzalez-Ballestero, K. Weber, O. Romero-Isart, and L. Novotny.
    Nature Physics (2023).

71. Fast Quantum Interference of a Nanoparticle via Optical Potential Control.
L. Neumeier, M. A. Ciampini, O. Romero-Isart, M. Aspelmeyer, and N. Kiesel.
Proceedings of the National Academy of Sciences of the United States of America **121**, e2306953121 (2024)

70. Macroscopic Quantum Superpositions via Dynamics in a Wide Double-Well Potential.
M. Roda-Llordes, A. Riera-Campeny, D. Candoli, P. T. Grochowski, and O. Romero-Isart.
Physical Review Letters **132**, 023601 (2024).

69. Quantum Theory of Light Interaction with a Lorenz-Mie Particle: Optical Detection and Three-Dimensional Ground-State Cooling.
P. Maurer, C. Gonzalez-Ballestero, and O. Romero-Isart.
Physical Review A **108**, 033714 (2024).

68. Quantum Electrodynamics with a Nonmoving Dielectric Sphere: Quantizing Lorenz-Mie Scattering.
P. Maurer, C. Gonzalez-Ballestero, and O. Romero-Isart.
Journal of the Optical Society of America B **40**, 3137 (2023).

67. Suppressing Recoil Heating in Levitated Optomechanics using Squeezed Light.
C. Gonzalez-Ballestero, J. A. Zielińska, M. Rossi, A. Militaru, M. Frimmer, L. Novotny, P. Maurer, and O. Romero-Isart.
PRX Quantum **4**, 030331 (2023).

66. Generation of Spin-Wave Pulses by Inverse Design.
S. Casulleras, S. Knauer, Q. Wang, O. Romero-Isart, A. V. Chumak, and C. Gonzalez-Ballestero.
Physical Review Applied **19**, 064085 (2023).

65. Levitated Optomechanics with Meta-Atoms.
S. Lepeshov, N. Meyer, P. Maurer, O. Romero-Isart, and R. Quidant.
Physical Review Letters **130**, 233601 (2023).

64. Simultaneous Ground-State Cooling of Two Mechanical Modes of a Levitated Nanoparticle.
J. Piotrowski, D. Windey, J. Vijayan, C. Gonzalez-Ballestero, A. de los Ríos Sommer, N. Meyer, R. Quidant, O. Romero-Isart, R. Reimann, and L. Novotny.
Nature Physics **19**, 1009 (2023).

63. Interaction Between an Optically Levitated Nanoparticle and Its Thermal Image: Internal Thermometry via Displacement Sensing.
T. Agrenius, C. Gonzalez-Ballestero, P. Maurer, and O. Romero-Isart.
Physical Review Letters **130**, 093601 (2023).

62. Time-of-flight Quantum Tomography of an Atom in an Optical Tweezer.
M. O. Brown, S. R. Muleady, W. J. Dworschack, R. J. Lewis-Swan, A. M. Rey, O. Romero-Isart, and C. A. Regal.
Nature Physics **19**, 569 (2023).

61. Optomechanical Sideband Asymmetry Explained by Stochastic Electrodynamics.
L. Novotny, M. Frimmer, A. Militaru, A. Norrman, O. Romero-Isart, and P. Maurer.
Physical Review A **106**, 043511 (2022).

60. Spin-Controlled Quantum Interference of Levitated Nano Rotors.
C. C. Rusconi, M. Perdriat, G. Hétet, O. Romero-Isart, and B. A. Stickler
Physical Review Letters **129**, 093605 (2022).

59. Ponderomotive Squeezing of Light by a Levitated Nanoparticle in Free Space.
A. Militaru, M. Rossi, F. Tebbenjohanns, O. Romero-Isart, M. Frimmer, and L. Novotny.
Physical Review Letters **129**, 053602 (2022).

58. Quantum Interfaces between Magnons and Paramagnetic Spins.
C. Gonzalez-Ballestero and O. Romero-Isart.
Contribution to Advances in Magnetics Roadmap on Spin-Wave Computing, IEEE Transactions on Magnetics **58**, 0800172 (2022).

57. Mechanical Squeezing via Unstable Dynamics in a Microcavity.
K. Kustura, C. Gonzalez-Ballestero, A. de los Ríos Sommer, N. Meyer, R. Quidant, and O. Romero-Isart.
Physical Review Letters **128**, 143601 (2022).

56. Towards a Quantum Interface between Spin Waves and Paramagnetic Spin Baths.
C. Gonzalez-Ballestero, T. van der Sar, and O. Romero-Isart.
Physical Review B **105**, 075410 (2022).

55. Levitodynamics: Levitation and Control of Microscopic Objects in Vacuum.
C. Gonzalez-Ballestero, M. Aspelmeyer, L. Novotny, R. Quidant, and O. Romero-Isart.
Science **374**, eabg3027 (2021).

54. Non-Markovian Effects of Two-Level Systems in a Niobium Coaxial Resonator with a Single-Photon Lifetime of 10 milliseconds.
P. Heidler, C. M. F. Schneider, K. Kustura, C. Gonzalez-Ballestero, O. Romero-Isart, and G. Kirchmair.
Physical Review Applied **16**, 034024 (2021).

53. Quantum Size Effects in the Magnetic Susceptibility of a Metallic Nanoparticle.
M. Roda-Llordes, C. Gonzalez-Ballestero, A. E. Rubio López, M. J. Martínez-Pérez, F. Luis, and O. Romero-Isart.
Physical Review B **104**, L100407 (2021).

52. Large Quantum Delocalization of a Levitated Nanoparticle using Optimal Control: Applications for Force Sensing and Entangling via Weak Forces.
T. Weiss, M. Roda-Llordes, E. Torrontegui, M. Aspelmeyer, and O. Romero-Isart.
Physical Review Letters **127**, 023601 (2021).

51. Effective Quantum Dynamics Induced by a Driven Two-Level System Bath.
K. Kustura, O. Romero-Isart, and C. Gonzalez-Ballestero.
Physical Review A **103**, 053709 (2021).

50. Probing Surface-Bound Atoms with Quantum Nanophotonics.
D. Hümmer, O. Romero-Isart, A. Rauschenbeutel, and P. Schneeweiss.
Physical Review Letters **126**, 163601 (2021).

49. Remote Individual Addressing of Quantum Emitters with Chirped Pulses.
S. Casulleras, C. Gonzalez-Ballestero, P. Maurer, J. J. Garcia-Ripoll, O. Romero-Isart.
Physical Review Letters **126**, 103602 (2021).

48. Acoustic and Optical Properties of a Fast Spinning Dielectric Nanoparticle.
D. Hümmer, R. Lampert, K. Kustura, P. Maurer, C. Gonzalez-Ballestero, O. Romero-Isart.
Physical Review B **101**, 205416 (2020).

47. Single-Spin Magnetomechanics with Levitated Micromagnets.
J. Gieseler, A. Kabcenell, E. Rosenfeld, J. D. Schaefer, A. Safira, M. J. A. Schuetz, C. Gonzalez-Ballestero, C. C. Rusconi, O. Romero-Isart, M. D. Lukin.
Physical Review Letters **124**, 163604 (2020).

46. Quantum Acoustomechnics with a Micromagnet.
C. Gonzalez-Ballestero, J. Gieseler, and O. Romero-Isart.
Physical Review Letters **124**, 093602 (2020).

45. Theory of Quantum Acoustomagnonics and Acoustomechanics with a Micromagnet.
C. Gonzalez-Ballestero, D. Hümmer, J. Gieseler, and O. Romero-Isart.
Physical Review B **101**, 125404 (2020).

44. Radiation Reaction of a Dipole in a Quantum Electromagnetic Field.
A. E. Rubio López and O. Romero-Isart.
Physical Review Letters **123**, 243603 (2019).

43. Quantum Motional State Tomography with Non-Quadratic Potentials and Neural Networks.
T. Weiss and O. Romero-Isart.
Physical Review Research **1**, 033157 (2019).

42. Heating in Nanophotonic Traps for Cold Atoms.
D. Hümmer, P. Schneeweiss, A. Rauschenbeutel, and O. Romero-Isart.
Physical Review X **9**, 041034 (2019).

41. Hybrid Architecture for Engineering Magnonic Quantum Networks.
C. C. Rusconi, M. J. A. Schuetz, J. Gieseler, M. D. Lukin, and O. Romero-Isart.
Physical Review A **100**, 022343 (2019).

40. Theory for Cavity Cooling of Levitated Nanoparticles via Coherent Scattering: Master Equation Approach.
C. Gonzalez-Ballestero, P. Maurer, D. Windey, L. Novotny, R. Reimann, and O. Romero-Isart.
Physical Review A **100**, 013805 (2019).

39. Cavity-Based 3D Cooling of a Levitated Nanoparticle via Coherent Scattering.
D. Windey, C. Gonzalez-Ballestero, P. Maurer, L. Novotny, O. Romero-Isart, and R. Reimann.
Physical Review Letters **122**, 123601 (2019).

38. Quadratic Quantum Hamiltonians: General Canonical Transformation to a Normal Form.
K. Kustura, C. C. Rusconi, and O. Romero-Isart.
Physical Review A **99**, 022130 (2019).

37. Circumventing Magnetic Reciprocity: a Diode for Magnetic Fields.
J. Prat-Camps, P. Maurer, G. Kirchmair and O. Romero-Isart.
Physical Review Letters **121**, 213903 (2018).

36. Internal Quantum Dynamics of a Nanoparticle in a Thermal Electromagnetic Field: a Minimal Model.
A. E. Rubio López, C. Gonzalez-Ballestero, and O. Romero-Isart.
Physical Review B **98**, 155405 (2018).

35. On-Chip Quantum Interference of a Superconducting Microsphere.
H. Pino, J. Prat-Camps, K. Sinha, B. P. Venkatesh, and O. Romero-Isart.
Quantum Science and Technology **3**, 25001 (2018).

34. Cooperative Effects in Closely Packed Quantum Emitters with Collective Dephasing.
B. Prasanna Venkatesh, M. L. Juan, and O. Romero-Isart.
Physical Review Letters **120**, 033602 (2018).

33. Coherent Inflation for Large Quantum Superpositions of Microspheres.
O. Romero-Isart.
New Journal of Physics **19**, 123029 (2017).

32. Quantum Spin Stabilized Magnetic Levitation.
C. C. Rusconi, V. Pöchhacker, K. Kustura, J. I. Cirac, and O. Romero-Isart.
Physical Review Letters **119**, 167202 (2017).

31. Linear Stability Analysis of a Levitated Nanomagnet in a Static Magnetic Field: Quantum Spin Stabilized Magnetic Levitation.
C. C. Rusconi, V. Pöchhacker, J. I. Cirac, and O. Romero-Isart.
Physical Review B **96**, 134419 (2017).

30. Ultrasensitive Inertial and Force Sensors with Diamagnetically Levitated Magnets.
J. Prat-Camps, C. Teo, C. C. Rusconi, W. Wieczorek, and O. Romero-Isart.
Physical Review Applied **8**, 034002 (2017).

29. Ultrafocused Electromagnetic Field Pulses with a Hollow Cylindrical Waveguide.
P. Maurer, J. Prat-Camps, J. I. Cirac, T. W. Hänsch, and O. Romero-Isart.
Physical Review Letters **119**, 043904 (2017).

28. Ultrashort Pulses for Far-Field Nanoscopy.
P. Maurer, J. I. Cirac, and O. Romero-Isart.
Physical Review Letters **117**, 103602 (2016).

27. Near-field Levitated Quantum Optomechanics with Nanodiamonds.
M. L. Juan, G. Molina-Terriza, T. Volz, and O. Romero-Isart.
Physical Review A **94**, 023841 (2016).

26. Magnetic Rigid Rotor in the Quantum Regime: Theoretical Toolbox.
C. C. Rusconi and O. Romero-Isart.
Physical Review B **93**, 54427 (2016).

25. Strong Single-Photon Coupling in Superconducting Quantum Magnetomechanics.
G. Via, G. Kirchmair, and O. Romero-Isart.
Physical Review Letters **114**, 143602 (2015).

24. Long-Distance Transfer and Routing of Static Magnetic Fields.
C. Navau, J. Prat-Camps, O. Romero-Isart, J. I. Cirac, and A. Sanchez.
Physical Review Letters **112**, 253901 (2014).

23. Superconducting Vortex Lattices for Ultracold Atoms.
O. Romero-Isart, C. Navau, A. Sanchez, P. Zoller, and J. I. Cirac.
Physical Review Letters **111**, 145304 (2013).

22. Optomechanics Assisted with a Qubit: From Dissipative State Preparation to Many-Body Physics.
A. C. Pflanzer, O. Romero-Isart, and J. I. Cirac.
Physical Review A **88**, 033804 (2013).

21. Quantum Magnetomechanics with Levitating Superconducting Microspheres.
O. Romero-Isart, L. Clemente, C. Navau, A. Sanchez, and J. I. Cirac.
Physical Review Letters **109**, 147205 (2012).

20. Master-Equation Approach to Optomechanics with Arbitrary Dielectrics.
A. C. Pflanzer, O. Romero-Isart, and J. I. Cirac.
Physical Review A **86**, 013802 (2012).

19. Macroscopic Quantum Resonators (MAQRO).
R. Kaltenbaek, G. Hechenblaikner, N. Kiesel, O. Romero-Isart, K. C. Schwab, U. Johann, and M. Aspelmeyer.
Experimental Astronomy **34**, 123 (2012).

18. Quantum Memory Assisted Probing of Dynamical Spin Correlations.
O. Romero-Isart, M. Rizzi, C. A. Muschik, E. S. Polzik, M. Lewenstein, and A. Sanpera.
Physical Review Letters **108**, 065302 (2012).

17. Quantum Superposition of Massive Objects and Collapse Models.
O. Romero-Isart.
Physical Review A **84**, 052121 (2011).

16. Large Quantum Superpositions and Interference of Massive Nanometer-Sized Objects.
O. Romero-Isart, A. C. Pflanzer, F. Blaser, R. Kaltenbaek, N. Kiesel, M. Aspelmeyer, and J. I. Cirac.
Physical Review Letters **107**, 020405 (2011).

15. Probing Magnetic Order in Ultracold Lattice Gases.
G. De Chiara, O. Romero-Isart, and A. Sanpera.
Physical Review A **83**, 021604(R) (2011).

14. Optically Levitating Dielectrics in the Quantum Regime: Theory and Protocols.
O. Romero-Isart, A. C. Pflanzer, M. L. Juan, R. Quidant, N. Kiesel, M. Aspelmeyer, and J. I. Cirac.
Physical Review A **83**, 013803 (2011).

13. Towards Quantum Superposition of Living Organisms.
O. Romero-Isart, M. L. Juan, R. Quidant, and J. I. Cirac.
New Journal of Physics **12**, 033015 (2010).
Selected as best of 2010 in New Journal of Physics.

12. Quantum Information Processing with Quantum Zeno Many-Body Dynamics.
A. Monras and O. Romero-Isart.
Quantum Information & Computation **10**, 201 (2010).

11. Quantum Polarization Spectroscopy of Correlations in Fermionic Gases.
T. Roscilde, M. Rodriguez, K. Eckert, O. Romero-Isart, M. Lewenstein, E. S. Polzik, and A. Sanpera.
New Journal of Physics **11**, 055041 (2009).

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