CURRÍCULUM VÍTAE NORMALIZADO

# Alejandro Bermúdez Carballo

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GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

FECYT INNOVACIÓN

## Summary of CV

This section describes briefly a summary of your career in science, academic and research; the main scientific and technological achievements and goals in your line of research in the medium -and long- term. It also includes other important aspects or peculiarities.

1. More than **18** years of research experience focused on quantum technologies for theoretical physics: Strong expertise on quantum information and computation, atomic physics and quantum optics, and their application for quantum many-body systems connecting to relativistic lattice field theories.
2. Relevant contributions in quantum information processing and quantum simulations: From a total of **71** peer-reviewed publications in prestigious journals for the quantum information community.
3. Highly motivated researcher with a proven capacity of achieving planned research goals: first author in **29** papers with an average of **4** additional coauthors per paper.
4. Experience in leading research projects: Supervision of **7** PhD students and **4** master thesis. Last author of **29** papers, designing the research project and supervising it.
5. Collaboration with experimentalists of 8 groups on different quantum technologies(trapped ions, Nitrogen-Vacancy centers, and ultracold neutral atoms).-experimental implementation of several theoretical proposals in world-leadingtrapped-ion groups (Prof. D. Wineland, NIST, Boulder, Prof. R. Blatt, U. Innsbruck).

6. Internationally recognized research:
-citations: Google Scholar **4969**
-press coverage: Phys.Org: 1 cover story, Nature: 1 research highlight, APS: 1 Editor's suggestion PRL with accompanying viewpoint & 1 Editor's suggestion PRA, IOP: 3 highlights of the best papers of the year in New Journal of Physics, and 1 Editor's selection, FP7 projects AQUTE and QESSENCE: 2 research highlights.
-invited Speaker: 17 conferences and workshops, and 30 seminars in international groups and universities.
-IOP: Publishing Reviewer Award 2016 for New Journal of Physics.

7. Wide research network in quantum technologies:-collaborations with more than 50 different researchers of world-leading groups.

I have coauthored **75** papers ( **71** peer-reviewed): **1** Nature Communications, **4** Physical Review X, **15** Physical Review Letters, 4 Physical Review X Quantum , 4 Quantum, **1** Philosophical Transactions of the Royal Society A, **13** New Journal of Physics, **1** AVS Quantum Technologies, **3** Rapid Communications in Physical Review A, **3** Physical Review A, **6** Physical Review B, **1** Physical Review D, **2** Annals of Physics, **1** Journal of Physics A, **1** European Journal of Physics, and **4** Arxiv preprints

I have been part of 12 national and international research projects (see below a selection of the 5/12 most recent ones).

1. MILLENION-SGA1" EU Project,101114305, Modular industrial large-scale quantum computing with trapped ions, phase 1, (", Quantum Technologies Flagship EU). PI:Thomas Monz; PI Spain node:Alejandro Bermudez (CSIC-UAM). 01/03/2023 - 30/08/2026, 589.090 €
2. W911NF-23-S-0004: Modular Logical Qubits (MODULARIS, IARPA, USA). PI: Thomas Monz; PI IFT node :Alejandro Bermudez (CSIC-UAM). 01/11/2023 - 31/10/2027. 624.854,36 €
3. W911NF-20-S-0004, Verification and Certification of Quantum Fault-Tolerance (VEQTOR, DARPA, USA). Consortium PI: Thomas Monz (University of Innsbruck), PI UCM node: Alejandro Bermúdez Carballo. (Universidad Complutense de Madrid). 16/09/2020 - 15/09/2024. 523,476.33 $.
4. PGC2018-099169-B-100, Tecnologías Cuánticas Topológicas (ToQTech, Ministerio de Educación y Ciencia, Spain). PI1: Miguel Ángel Martín-Delgado, PI2: Alejandro Bermúdez Carballo (Universidad Complutense de Madrid). 01/01/2019 - 30/12/2021. 96.000 €.
5. H2020-FETFLAG-2018-03, Advanced Quantum Computing with trapped ions (Aqtion, 820495, Quantum Technologies Flagship EU). Consortium P.I.Thomas Monz (University of Innsrbuck), UCM node P.I. Alejandro Bermúdez Carballo (since 01/04/2020), (Universidad Complutense de Madrid). 01/01/2017 - 30/12/2021. 169.375€.

## General quality indicators of scientific research

This section describes briefly the main quality indicators of scientific production (periods of research activity, experience in supervising doctoral theses, total citations, articles in journals of the first quartile, H index...). It also includes other important aspects or peculiarities.

Quality indicators of scientific research according to Google Scholar

Total number of articles considered: 78
Total number of citations: 4969
H-index: 40
i10-index:55

# Alejandro Bermúdez Carballo


| | |
|---|---|
| Surname(s): | **Bermúdez Carballo** |
| Name: | **Alejandro** |
| DNI: | **53386452W** |
| ORCID: | **0000-0002-7331-1139** |
| ResearcherID: | **A-1175-2009** |
| Date of birth: | **30/01/1982** |
| Gender: | **Male** |
| Nationality: | **Spain** |
| Country of birth: | **Spain** |
| Aut. region/reg. of birth: | **Community of Madrid** |
| Contact province: | **Madrid** |
| City of birth: | **Madrid** |
| Contact address: | **Avda. Bravo Murillo 29, 3º izq.** |
| Postcode: | **28015** |
| Contact country: | **Spain** |
| Contact aut. region/reg.: | **Community of Madrid** |
| Contact city: | **Madrid** |
| Land line phone: | **(0034) 916377735** |
| Email: | **bermudez.carballo@gmail.com** |
| Mobile phone: | **(0034) 661148285** |
| Personal web page: | **https://bermudezphysics.wordpress.com** |


## Current professional situation

**Employing entity:** Consejo Superior de Investigaciones Científicas

**Type of entity:** State agency

**Department:** Instituto de Física Teórica

**Professional category:** Investigador Científico

**Start date:** 03/12/2021

**Type of contract:** Civil servant

**Dedication regime:** Full time

**Primary (UNESCO code):** 220000 - Physics

## Previous positions and activities

| | Employing entity | Professional category | Start date |
|---|---|---|---|
| 1 | Universidad Complutense de Madrid | Investigador Ramón y Cajal | 01/03/2018 |
| 2 | University of Swansea | Senior Research Assistant | 10/05/2016 |
| 3 | Consejo Superior de Investigaciones Científicas | Juan de la Cierva research fellow | 01/01/2014 |
| 4 | Consejo Superior de Investigaciones Científicas | Post-doctoral researcher | 01/05/2013 |
| 5 | Universität Ulm | Post-doctoral researcher | 08/03/2011 |
| 6 | Universidad Complutense de Madrid | Post-doctoral Researcher | 21/12/2010 |
| 7 | Universidad Complutense de Madrid | Doctoral researcher | 01/07/2007 |

**1** **Employing entity:** Universidad Complutense de Madrid **Type of entity:** University
**Department:** Departamento de Física Teórica I (UCM), Facultad de Ciencias Físicas
**City employing entity:** Madrid, Community of Madrid, Spain
**Professional category:** Investigador Ramón y Cajal **Leadership and management (Y/N):** Yes
**Start-End date:** 01/03/2018 - 02/12/2021 **Duration:** 3 years - 8 months - 1 day
**Type of contract:** Temporary employment contract
**Area of leadership and/or management activity:** University

**2** **Employing entity:** University of Swansea
**Professional category:** Senior Research Assistant
**Start-End date:** 10/05/2016 - 01/03/2018 **Duration:** 1 year - 9 months - 20 days

**3** **Employing entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Department:** INSTITUTO DE FISICA FUNDAMENTAL
**Professional category:** Juan de la Cierva research fellow **Leadership and management (Y/N):** No
**Start-End date:** 01/01/2014 - 30/04/2016 **Duration:** 3 years - 4 months
**Type of contract:** Temporary employment contract
**Dedication regime:** Full time
**Area of leadership and/or management activity:** Public Research Body

**4** **Employing entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Department:** Departamento de Física Teórica I (UCM), Facultad de Ciencias Físicas
**City employing entity:** Madrid, Community of Madrid, Spain
**Professional category:** Post-doctoral researcher **Leadership and management (Y/N):** No
**Start-End date:** 01/05/2013 - 31/12/2013 **Duration:** 8 months
**Type of contract:** Temporary employment contract
**Dedication regime:** Full time
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Identify key words:** Quantum optic; Interaction light-matter; Quantum information and associated physical effects; Quantum computation

**5** **Employing entity:** Universität Ulm
**Department:** Institute of Theoretical Physics, Universität Ulm
**City employing entity:** Ulm, Germany
**Professional category:** Post-doctoral researcher **Leadership and management (Y/N):** No
**Start-End date:** 08/03/2011 - 15/04/2013 **Duration:** 2 years - 1 month - 7 days
**Type of contract:** Temporary
**Dedication regime:** Full time
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Identify key words:** Quantum optic; Interaction light-matter; Quantum information and associated physical effects; Quantum computation

**6** **Employing entity:** Universidad Complutense de Madrid **Type of entity:** University
**Department:** Departamento de Física Teórica I (UCM), Facultad de Ciencias Físicas
**City employing entity:** Madrid, Community of Madrid, Spain
**Professional category:** Post-doctoral Researcher
**Start-End date:** 21/12/2010 - 28/02/2011 **Duration:** 2 months - 10 days
**Type of contract:** Grant-assisted student (pre or post-doctoral, others)
**Dedication regime:** Full time
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory

**7** **Employing entity:** Universidad Complutense de Madrid **Type of entity:** University
**Department:** Departamento de Física Teórica I (UCM), Facultad de Ciencias Físicas
**City employing entity:** Madrid, Community of Madrid, Spain
**Professional category:** Doctoral researcher **Leadership and management (Y/N):** Yes
**Start-End date:** 01/07/2007 - 28/02/2011 **Duration:** 3 years - 8 months
**Type of contract:** Grant-assisted student (pre or post-doctoral, others)
**Dedication regime:** Full time
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Identify key words:** Quantum optic; Interaction light-matter; Quantum information and associated physical effects; Quantum computation

# Education

## University education

### 1st and 2nd cycle studies and pre-Bologna degrees

**1** **University degree:** Máster
**Name of qualification:** M.Sc. degree in Fundamental Physics
**City degree awarding entity:** Madrid, Community of Madrid, Spain
**Degree awarding entity:** Universidad Complutense de Madrid **Type of entity:** University
**Date of qualification:** 30/11/2007
**Average mark:** Outstanding

**2** **University degree:** Higher degree
**Name of qualification:** B.Sc. Degree in Physics (Fundamental Physics)
**City degree awarding entity:** Madrid, Community of Madrid, Spain
**Degree awarding entity:** Universidad Complutense de Madrid **Type of entity:** University
**Date of qualification:** 27/06/2006
**Average mark:** Outstanding
**Prize:** Special award for degree

### Doctorates

**Doctorate programme:** PhD degree in Physics
**Degree awarding entity:** Universidad Complutense de Madrid **Type of entity:** University
**City degree awarding entity:** Madrid, Community of Madrid, Spain
**Date of degree:** 20/12/2010
**European doctorate:** No
**Thesis title:** Quantum Simulations of Condensed-Matter and High-Energy Systems with Trapped Ions and Optical Lattices
**Thesis director:** Miguel Ángel Martín-Delgado Alcántara
**Obtained qualification:** Sobresaliente Cum Laude
**Recognition of quality:** Yes
**Special doctorate award:** Yes **Date of award:** 2010

## Language skills

| Language | Listening skills | Reading skills | Spoken interaction | Speaking skills | Writing skills |
|---|---|---|---|---|---|
| German | | B1 | B1 | B1 | B1 |
| English | | C1 | C1 | C1 | C1 |

# Teaching experience

## General teaching experience

**1** **Type of teaching:** Official teaching
**Name of the course:** Mecanica Clasica
**Professional category:** Profesor Oficial
**Type of programme:** Bachelor's degree **Type of teaching:** In person theory
**Type of subject:** Obligatory
**University degree:** PCEO Grado en Física / Grado en Matemáticas
**Course given:** Mecánica Clásica
**Start date:** 05/09/2020 **End date:** 17/12/2021
**Type of hours/ ECTS credits:** Credits
**Hours/ECTS credits:** 6,15
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**2** **Type of teaching:** Official teaching
**Name of the course:** Simulaciones Cuánticas
**Type of programme:** Master's degree **Type of teaching:** In person theory
**Type of subject:** Optional
**University degree:** Master degree in Theoretical Physics
**Course given:** Simulaciones Cuánticas
**Start date:** 17/02/2020 **End date:** 06/06/2020
**Type of hours/ ECTS credits:** Credits
**Hours/ECTS credits:** 1,25
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**3** **Type of teaching:** Official teaching
**Name of the course:** Mecanica Clasica
**Professional category:** Profesor Oficial
**Type of programme:** Bachelor's degree **Type of teaching:** In person theory
**Type of subject:** Obligatory

**University degree:** PCEO Grado en Física / Grado en Matemáticas
**Course given:** Mecánica Clásica
**Start date:** 05/09/2019 **End date:** 17/12/2019
**Type of hours/ ECTS credits:** Credits
**Hours/ECTS credits:** 6,15
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**4** **Type of teaching:** Official teaching
**Name of the course:** Simulaciones Cuánticas
**Type of programme:** Master's degree **Type of teaching:** In person theory
**Type of subject:** Optional
**University degree:** Master degree in Theoretical Physics
**Course given:** Simulaciones Cuánticas
**Start date:** 17/02/2019 **End date:** 06/06/2019
**Type of hours/ ECTS credits:** Credits
**Hours/ECTS credits:** 1,25
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**5** **Type of teaching:** Official teaching
**Name of the course:** Fisica II
**Professional category:** Profesor Oficial
**Type of programme:** Bachelor's degree **Type of teaching:** In person theory
**Type of subject:** Obligatory
**University degree:** Grado en Ingeniería de comunicaciones
**Course given:** Fisica II
**Start date:** 30/01/2019 **End date:** 20/05/2019
**Type of hours/ ECTS credits:** Credits
**Hours/ECTS credits:** 6,5
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**6** **Type of teaching:** Official teaching
**Name of the course:** Simulaciones Cuánticas
**Type of programme:** Master's degree **Type of teaching:** In person theory
**Type of subject:** Optional
**University degree:** Master degree in Theoretical Physics
**Course given:** Simulaciones Cuánticas
**Start date:** 17/02/2017 **End date:** 06/06/2018
**Type of hours/ ECTS credits:** Credits
**Hours/ECTS credits:** 1,5

**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**7** **Type of teaching:** Official teaching
**Name of the course:** Simulaciones Cuánticas
**Type of programme:** Master's degree **Type of teaching:** In person theory
**Type of subject:** Optional
**University degree:** Master degree in Theoretical Physics
**Course given:** Simulaciones Cuánticas
**Start date:** 17/02/2017 **End date:** 06/06/2017
**Type of hours/ ECTS credits:** Credits
**Hours/ECTS credits:** 1,5
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**8** **Type of teaching:** Official teaching
**Name of the course:** Simulaciones Cuánticas
**Type of programme:** Master's degree **Type of teaching:** In person theory
**Type of subject:** Optional
**University degree:** Master degree in Theoretical Physics
**Course given:** Simulaciones Cuánticas
**Start date:** 17/02/2016 **End date:** 06/06/2016
**Type of hours/ ECTS credits:** Hours
**Hours/ECTS credits:** 9
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**9** **Type of teaching:** Unofficial teaching
**Name of the course:** Simulaciones Cuánticas
**Type of programme:** Master's degree **Type of teaching:** In person theory
**Type of subject:** Optional
**University degree:** Master degree in Theoretical Physics
**Course given:** Simulaciones Cuánticas
**Start date:** 17/02/2015 **End date:** 06/06/2015
**Type of hours/ ECTS credits:** Hours
**Hours/ECTS credits:** 9
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**10** **Type of teaching:** Unofficial teaching
**Name of the course:** Simulaciones Cuánticas
**Type of programme:** Master's degree **Type of teaching:** In person theory
**Type of subject:** Optional
**University degree:** Master degree in Theoretical Physics
**Course given:** Simulaciones Cuánticas
**Start date:** 17/02/2014 **End date:** 06/06/2014
**Type of hours/ ECTS credits:** Hours
**Hours/ECTS credits:** 9
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** madrid, Community of Madrid, Spain
**Subject language:** Spanish

**11** **Type of teaching:** International teaching
**Name of the course:** Open Quantum Systems
**Type of programme:** Master's degree **Type of teaching:** Practical work (classroom-problems)
**Type of subject:** Optional
**University degree:** Master degree in Physics
**Course given:** Open Quantum Systems
**Start date:** 01/04/2012 **End date:** 30/07/2012
**Type of hours/ ECTS credits:** Hours
**Hours/ECTS credits:** 10
**Entity:** Ulm University **Type of entity:** University
**Faculty, institute or centre:** Institute of Theoretical Physics
**Department:** Institute of Theoretical Physics
**City of entity:** Ulm, Germany
**Subject language:** English

**12** **Type of teaching:** Official teaching
**Name of the course:** Quantum Mechanics
**Type of programme:** Bachelor's degree **Type of teaching:** Practical work (classroom-problems)
**Type of subject:** Core
**University degree:** MSc degree in Physics
**Course given:** Mecánica Cuántica
**Start date:** 01/09/2009 **End date:** 30/01/2010
**Type of hours/ ECTS credits:** Hours
**Hours/ECTS credits:** 10
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** Madrid, Community of Madrid, Spain
**Subject language:** Spanish

**13** **Type of teaching:** Unofficial teaching
**Name of the course:** Quantum Physics
**Type of programme:** Bachelor's degree **Type of teaching:** Practical work (classroom-problems)
**Type of subject:** Core
**University degree:** MSc degree in Physics
**Course given:** Mecánica Cuántica **Frequency of the activity:** 2

**Start date:** 01/09/2007 **End date:** 30/01/2009
**Type of hours/ ECTS credits:** Hours
**Hours/ECTS credits:** 4
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Faculty, institute or centre:** Facultad de Ciencias Físicas
**Department:** Fisica Teórica I
**City of entity:** Madrid, Community of Madrid, Spain
**Subject language:** Spanish

## Experience supervising doctoral thesis and/or final year projects

1 **Project title:** PhD Thesis: Tensor networks for theoretical physics (official supervisor)
**Co-director of thesis:** Alejandro Bermúdez Carballo; Esperanza López Manzanares
**Entity:** Universidad Autónoma de Madrid **Type of entity:** University
**Student:** Sergio Cerezo Roquebrún
**Date of reading:** 01/08/2028

2 **Project title:** PhD Thesis: Noise analysis in the next generation of quantum processors (official supervisor)
**Co-director of thesis:** Alejandro Bermúdez Carballo; Esperanza López Manzanares
**Entity:** Universidad Autónoma de Madrid **Type of entity:** University
**Student:** César Benito Lamata
**Date of reading:** 01/08/2027

3 **Project title:** PhD Thesis: Quantum Simulation of Gravitational Phenomena (official supervisor)
**Entity:** Universidad Autónoma de Madrid **Type of entity:** University
**Student:** Carlos Fulgado Claudio
**Date of reading:** 01/12/2026

4 **Project title:** PhD Thesis: Quantum Computation and Information (official supervisor)
**Entity:** Universidad Autónoma de Madrid **Type of entity:** University
**Student:** Pablo Viñas Martínez
**Date of reading:** 01/09/2026

5 **Project title:** Master Thesis: Fermionic Gaussian States applied to Quantum Field Theories in an Analogue Expanding Universe (official supervisor)
**Entity:** Universidad Autónoma de Madrid **Type of entity:** University
**Student:** Manuel Morante
**Obtained qualification:** Outstanding (Sobresaliente 8.9/10)
**Date of reading:** 16/07/2023

6 **Project title:** Master Thesis: Topological quantum error correction: thresholds for surface and Floquet codes (co-supervisor)
**Entity:** Universidad Autónoma de Madrid
**Student:** César Benito Lamata
**Obtained qualification:** Outstanding (Sobresaliente 9.6/10)
**Date of reading:** 30/06/2023

7 **Project title:** PhD Thesis: Towards Fault-Tolerant Quantum Information Processing with Trapped Ions (official supervisor)
**Entity:** Universidad Complutense de Madrid **Type of entity:** University

**Student:** Andrea Roríguez Blanco
**Obtained qualification:** Outstanding (Sobresaliente)
**Date of reading:** 05/06/2023

**8** **Project title:** Master Thesis: Self-consistent estimation of long-range Ising interactions mediated by \lambda \phi^{4} fields (official supervisor)
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Student:** Pablo Viñas martínez
**Obtained qualification:** Outstanding (Sobresaliente 9.8/10)
**Date of reading:** 01/09/2022

**9** **Project title:** Master Thesis: Topological Phases in Curved Spacetimes: Particle Creation in the Boundary of an Expanding Universe (official supervisor)
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Student:** Carlos Fulgado Claudio
**Obtained qualification:** Outstanding (Sobresaliente 9.8/10)
**Date of reading:** 17/06/2022

**10** **Project title:** Bsc project (TFG): Trapped-ion quantum computers
**Type of project:** End of course project
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** Madrid, Community of Madrid, Spain
**Student:** Pablo Viñas
**Obtained qualification:** 9,4
**Date of reading:** 29/06/2021

**11** **Project title:** Bsc project (TFG): Trapped-ion quantum computers
**Type of project:** End of course project
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** Madrid, Community of Madrid, Spain
**Student:** Miriam Izquierdo
**Obtained qualification:** 9,7
**Date of reading:** 29/06/2020

**12** **Project title:** Master Thesis: Aharonov-Bohm interference in warm and noisy trapped-ion crystals (official supervisor)
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Student:** Gabriel Martínez Carracedo
**Obtained qualification:** Outstanding (Sobresaliente 9/10)
**Date of reading:** 24/07/2019

**13** **Project title:** Master Thesis: Numerical methods to study 2 qubits in a transmission line: 1D Quantum Optics (I collaborated in the scientific guidance with one of the official co-supervisors Prof. J.J. García-Ripoll)
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Student:** Guillermo Díaz Camacho
**Obtained qualification:** Outstanding (Sobresaliente)
**Date of reading:** 22/09/2014

**14** **Project title:** Master Thesis: Non-Equilibrium Quantum Dynamics with Trapped Ions (I collaborated in the scientific guidance with one of the official co-supervisors Prof. J.J. García-Ripoll)
**Co-director of thesis:** Jens Eisert

**Entity:** Freie Universität Berlin **Type of entity:** University
**City of entity:** Madrid, Community of Madrid, Spain
**Student:** Johannes Jünemann
**Obtained qualification:** Outsatnding
**Date of reading:** 01/07/2013
**Quality recognition:** Yes **Date of award:** 07/06/2014

**15** **Project title:** Master Thesis: Quantum Simulations with Trapped Ions
**Type of project:** End of course project
**Co-director of thesis:** M. B. Plenio
**Entity:** University of Ulm **Type of entity:** University
**City of entity:** Ulm, Germany
**Student:** Andreas Lemmer
**Obtained qualification:** Outstanding
**Identify key words:** Physics - Quantum physics
**Date of reading:** 01/07/2013

## Materials and other teaching or educational publications.

**1** A. Bermudez. Hojas de problemas y soluciones para Mecanica CLasica.
**Name of the materials:** Hojas de problemas y soluciones para Mecanica Clasica
**Date of drafting:** 05/09/2019
**Format:** Notes
**Description Narrative:** I wrote 5 problem sets with a total of 34 problems, and posted them together with the solutions, for the course "Mecanica Clasica".

**2** A. Bermudez. Hojas de problemas y soluciones para Fisica II.
**Name of the materials:** Hojas de problemas y soluciones para Fisica II
**Date of drafting:** 30/01/2019
**Format:** Notes
**Description Narrative:** I wrote 4 problem sets with a total of 38 problems, and posted them together with the solutions, for the course "Fisica II".

**3** **Name of the materials:** Lecture Notes for the master degree course "Simulaciones Cuánticas"
**Date of drafting:** 03/02/2014
**Format:** Notes
**Description Narrative:** I developed the lecture notes for the 3rd topic of the course, "Átomos Ultrafríos en Redes Ópticas", which was being taught for the first time. These lecture notes will be used in subsequent courses by members of Instituto de Física Fundamental CSIC, or of Departamento de Física Teórica I, UCM.

# Scientific and technological experience

## Research and development groups/teams

**1** **Name of the group:** Quantum information Instituto de Física Teórica (QIFT)
**Aims of the group:** Research in Quantum Information Science
**Name of principal investigator:** Germán Sierra Rodero
**Type of collaboration:** Co-authorship of publications
**City of group:** madrid, Community of Madrid, Spain
**Affiliation entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Start date:** 10/12/2021

**2** **Name of the group:** Grupo de Información y Computación Cuánticas (GICC)
**Aims of the group:** Research in Quantum Information Science
**Name of principal investigator:** Miguel Ángel Martín-Delgado Alcántara **Number of members in the group:** 14
**Type of collaboration:** Co-authorship of publications
**City of group:** madrid, Community of Madrid, Spain
**Affiliation entity:** FUNDACION GENERAL DE LA UNIVERSIDAD COMPLUTENSE DE MADRID
**Number of directed thesis:** 3 **Number of directed postdoc:** 2
**Start date:** 01/03/2018

**3** **Name of the group:** Red de Información Cuántica en España RICE (Red Temática de Excelencia)
**Aims of the group:** Develop connections and establish new collaborations between different quantum information research groups in spain
**Name of principal investigator:** Juan José León García **Number of members in the group:** 10
**Type of collaboration:** Co-authorship of projects and their development
**City of group:** Spain
**Start date:** 20/11/2014

**4** **Name of the group:** Quantum Information and Foundations Group (QUINFOG)
**Aims of the group:** Fundamental Research in Quantum Information Science
**Name of principal investigator:** Juan José León García **Number of members in the group:** 10
**Type of collaboration:** Co-authorship of publications
**City of group:** Madrid, Community of Madrid, Spain
**Affiliation entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Number of directed thesis:** 6 **Number of directed postdoc:** 3
**Start date:** 01/05/2013

## Scientific or technological activities

### R&D projects funded through competitive calls of public or private entities

**1** **Name of the project:** Modular Logical Qubits (W911NF-23-S-0004, MODULARIS, IARPA, USA).
**Entity where project took place:** Universidad Autónoma de Madrid **Type of entity:** University
**City of entity:** Innsbruck, Austria
**Name principal investigator (PI, Co-PI....):** Thomas Monz; Alejandro Bermudez
**Funding entity or bodies:**
IARPA, USA

**Start-End date:** 01/11/2023 - 31/10/2027
**Total amount:** 624.854,36 €

**2** **Name of the project:** Modular industrial large-scale quantum computing with trapped ions, phase 1, ("MILLENION-SGA1" EU Project,101114305, Quantum Technologies Flagship EU).
**Entity where project took place:** Universidad Autónoma de Madrid **Type of entity:** University
**City of entity:** Innsbruck, Austria
**Name principal investigator (PI, Co-PI....):** Thomas Monz; Alejandro Bermudez
**Funding entity or bodies:**
European research council **Type of entity:** Business

**Start-End date:** 01/03/2023 - 30/08/2026
**Total amount:** 589.090 €

**3** **Name of the project:** Quantum Spain (QUANTUM ENIA RTRP-Next Generation EU, EU)
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Universidad Autónoma de Madrid **Type of entity:** University
**City of entity:** Madrid, Community of Madrid, Spain
**Name principal investigator (PI, Co-PI....):** Germán Sierra Rodero
**Nº of researchers:** 5
**Funding entity or bodies:**
QUANTUM ENIA project call-QUANTUM SPAIN project, and by the EU through the RTRP-Next Generation EU within the framework of the Digital Spain 2025 Agenda.

**Type of participation:** Team member
**Name of the programme:** QUANTUM ENIA project call-QUANTUM SPAIN project, and by the EU through the RTRP-Next Generation EU within the framework of the Digital Spain 2025 Agenda
**Start-End date:** 04/08/2022 - 31/12/2025 **Duration:** 3 years
**Total amount:** 143.850 €
**Dedication regime:** Part time

**4** **Name of the project:** Many-Body Quantum technologies (Maqute, PID2021- 127726NB-I00,MCIU/AEI/FEDER, UE)
**Identify key words:** Quantum information and associated physical effects

**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Universidad Autónoma de Madrid
**City of entity:** Madrid, Community of Madrid, Spain
**Name principal investigator (PI, Co-PI....):** Germán Sierra Rodero; Esperanza López
**Nº of researchers:** 5
**Funding entity or bodies:**
Ministerio de Ciencia, Innovación y Universidades

**Type of participation:** Team member
**Name of the programme:** Generación de conocimiento
**Code according to the funding entity:** PID2021- 127726NB- I00
**Start-End date:** 01/09/2022 - 31/08/2025 **Duration:** 3 years
**Total amount:** 125.000 €
**Dedication regime:** Part time

5 **Name of the project:** Verification and Certification of Quantum Fault-Tolerance (VEQTOR, W911NF-20-S-0004, LPS-ARO, USA).
**Entity where project took place:** Universidad Autónoma de Madrid **Type of entity:** University
**City of entity:** Innsbruck, Austria
**Name principal investigator (PI, Co-PI....):** Thomas Monz; Alejandro Bermudez
**Funding entity or bodies:**
LPS-ARO, USA **Type of entity:** defense
**City funding entity:** washington dc, United States of America

**Start-End date:** 01/11/2021 - 31/10/2024
**Total amount:** 523.476,55 €

6 **Name of the project:** Quantum simulators of gauge theories based on trapped ions (PRX22/00423, Universidad Oxford, Estancias de profesores e investigadores sénior en centros extranjeros, Salvador Madariaga)
**Entity where project took place:** Oxford university **Type of entity:** University
**City of entity:** Oxford, United Kingdom
**Name principal investigator (PI, Co-PI....):** David Lucas; Alejandro Bermudez
**Nº of researchers:** 1
**Funding entity or bodies:**
Ministerio de ciencia, innovación y universidades
**City funding entity:** Spain

**Start-End date:** 01/09/2023 - 29/02/2024
**Total amount:** 19.430 €

7 **Name of the project:** Advanced Quantum Computing with trapped ions (Aqtion, 820495, Quantum Technologies Flagship EU).
**Entity where project took place:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** Innsbruck, Austria
**Name principal investigator (PI, Co-PI....):** Thomas Monz; Alejandro Bermudez
**Funding entity or bodies:**
European research council **Type of entity:** Business

**Start-End date:** 01/04/2020 - 30/12/2021

**Total amount:** 169.375 €

**8** **Name of the project:** Topological Quantum technologies (TopTech, PGC2018- 099169-B-I00 (MCIU/AEI/FEDER, UE)
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** Madrid, Community of Madrid, Spain
**Name principal investigator (PI, Co-PI....):** Miguel Ángel martín Delgado; Alejandro Bermúdez Carballo
**Nº of researchers:** 5
**Funding entity or bodies:**
Ministerio de Ciencia, Innovación y Universidades

**Type of participation:** Principal investigator
**Name of the programme:** Generación de conocimiento
**Code according to the funding entity:** PGC2018- 099169-B-I00
**Start-End date:** 01/01/2019 - 30/12/2021 **Duration:** 3 years
**Total amount:** 96.000 €
**Dedication regime:** Part time

**9** **Name of the project:** Tecnologías Cuánticas con qubits y campos
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**City of entity:** Madrid, Community of Madrid, Spain
**Name principal investigator (PI, Co-PI....):** Juan José García Ripoll
**Funding entity or bodies:**
Ministerio de Ciencia e Innovación **Type of entity:** público
**City funding entity:** Madrid, Community of Madrid, Spain

**Type of participation:** Team member
**Code according to the funding entity:** FIS2015-70856-P
**Start-End date:** 01/01/2016 - 30/12/2018 **Duration:** 3 years
**Participating entity/entities:** Consejo Superior de Investigaciones Científicas
**Total amount:** 84.000 €
**Dedication regime:** Part time
**Applicant's contribution:** I contribute to the research deliverables of this project in connection to topological phases of matter, and quantum simulations of quantum field theories.

**10** **Name of the project:** Quantum Technologies in Madrid + (QUITEMAD+)
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**City of entity:** Madrid, Community of Madrid, Spain

**Name principal investigator (PI, Co-PI....):** Miguel Ángel Martín-Delgado Alcántara; Vicente Martín Ayuso; David Pérez García; Alberto Ibort Latre; Juan José León García; Fernando Limón Martínez
**Funding entity or bodies:**
Comunidad Autónoma de Madrid **Type of entity:** Public Research Body
**City funding entity:** Madrid, Community of Madrid, Spain

**Type of participation:** Others
**Name of the programme:** CAM PRICIT
**Code according to the funding entity:** S2013/ICE-2801
**Start-End date:** 24/07/2014 - 23/07/2018 **Duration:** 4 years
**Participating entity/entities:** Consejo Superior de Investigaciones Científicas; Universidad Carlos III de Madrid; Universidad Complutense de Madrid; Universidad Politécnica de Madrid
**Total amount:** 700.060 €
**Dedication regime:** Part time
**Applicant's contribution:** I am a research member of the partner at CSIC, and contribute to the research of work-packages 2, 3 and 5 on quantum computation, quantum simulations, and Quantum Sensing.

**11** **Name of the project:** Simulators and Interfaces with Quantum Systems- SIQS under FET Proactive Initiative "Quantum Information Communication and Technologies"
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** European Union
**Degree of contribution:** Researcher
**Entity where project took place:** Universität Ulm
**City of entity:** Ulm, Schwaben, Germany
**Name principal investigator (PI, Co-PI....):** Giovanna Morigi
**Nº of researchers:** 41
**Funding entity or bodies:**
The European Community's 7th Framework Program **Type of entity:** Public Research Body
**City funding entity:** Brussels, Belgium

**Type of participation:** Others
**Name of the programme:** The European Community's 7th Framework Program
**Code according to the funding entity:** 249958
**Start-End date:** 01/05/2013 - 30/04/2016 **Duration:** 3 years
**Participating entity/entities:** Imperial College of London; Saarland University; Universidad Complutense de Madrid; University of Aarhus; University of Freiburg; University of Siegen; University of Tel Aviv; University of Ulm
**Dedication regime:** Part time
**Applicant's contribution:** As a post-doctoral fellow at Ulm University, I participated in writing the Ulm-node scientific content related to 'Quantum Simulation with cold Coulomb crystals' in workpackage 4.1 of the proposal.

**12** **Name of the project:** Tecnologías de la Información Cuántica con átomos, moléculas, y circuitos
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**City of entity:** Madrid, Community of Madrid, Spain
**Name principal investigator (PI, Co-PI....):** Juan José García Ripoll
**Funding entity or bodies:**

Ministerio de Ciencia e Innovación **Type of entity:** público
**City funding entity:** Madrid, Community of Madrid, Spain

**Type of participation:** Others
**Code according to the funding entity:** FIS2012-33022
**Start-End date:** 01/03/2013 - 30/12/2015 **Duration:** 3 years
**Participating entity/entities:** Consejo Superior de Investigaciones Científicas
**Total amount:** 102.960 €
**Dedication regime:** Part time
**Applicant's contribution:** I contribute to the research deliverables of this project since the 1st of March 2013, when I left another national research project FIS2012-33152

**13** **Name of the project:** Quantum Technologies in Madrid (QUITEMAD)
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** Madrid, Community of Madrid, Spain
**Name principal investigator (PI, Co-PI....):** 1; Miguel Ángel Martín-Delgado Alcántara; David Pérez García; Alberto Ibort Latre; Juan José León García; Vicente Martín Ayuso; Pedro Gómez Vilda
**Funding entity or bodies:**
Comunidad Autónoma de Madrid **Type of entity:** Public Research Body
**City funding entity:** Madrid, Community of Madrid, Spain

**Type of participation:** Others
**Name of the programme:** CAM PRICIT
**Code according to the funding entity:** 2009/ESP-1594
**Start-End date:** 01/01/2010 - 30/12/2013 **Duration:** 4 years
**Participating entity/entities:** Consejo Superior de Investigaciones Científicas; Universidad Carlos III de Madrid; Universidad Complutense de Madrid; Universidad Politécnica de Madrid
**Total amount:** 1.073.000 €
**Dedication regime:** Part time
**Applicant's contribution:** I was a member of the partner Universidad Complutense de Madrid, and contributed to the research of work-packages 3 and 5 (quantum computation and quantum simulations).

**14** **Name of the project:** The physics of ion Coulomb crystals: Thermodynamics, Quantum Control, and Quantum Simulators - PICC
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** European Union
**Degree of contribution:** Researcher
**Entity where project took place:** Universität Ulm
**City of entity:** Ulm, Schwaben, Germany
**Name principal investigator (PI, Co-PI....):** Giovanna Morigi; Richard Thomson; Michael Drewsen; Benni Reznik; Martin Plenio; Tomaso Calarco; Christof Wunderlich; Miguel Ángel Martín-Delgado Alcántara; Tobias Schaetz
**Funding entity or bodies:**
The European Community's 7th Framework Program **Type of entity:** Public Research Body
**City funding entity:** Brussels, Belgium

**Type of participation:** Others
**Name of the programme:** The European Community's 7th Framework Program

**Code according to the funding entity:** 249958
**Start-End date:** 01/01/2010 - 30/12/2013 **Duration:** 4 years
**Participating entity/entities:** Imperial College of London; Saarland University; Universidad Complutense de Madrid; University of Aarhus; University of Freiburg; University of Siegen; University of Tel Aviv; University of Ulm
**Total amount:** 3.500.000 €
**Dedication regime:** Part time
**Applicant's contribution:** I was hired as a post-doctoral researcher under this project. My research related to ion traps contributes to the deliverables in one of the work-packages of this project. I have also participated in scientific review meetings.

**15** **Name of the project:** Quantum Information and Strongly Correlated Systems
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Universität Ulm
**City of entity:** Ulm, Schwaben, Germany
**Name principal investigator (PI, Co-PI....):** Miguel Ángel Martín Delgado
**Funding entity or bodies:**
Ministerio de Ciencia e Innovación **Type of entity:** público
**City funding entity:** Madrid, Community of Madrid, Spain

**Type of participation:** Others
**Code according to the funding entity:** FIS2012-33152
**Start-End date:** 01/01/2013 - 01/03/2013 **Duration:** 3 years
**Participating entity/entities:** Universidad Complutense de Madrid
**Total amount:** 133.000 €
**Dedication regime:** Part time
**Applicant's contribution:** I contributed to the research deliverables of this project, until the 1st of March 2013, when I joined another national research project FIS2012-33022.

**16** **Name of the project:** Quantum Information and Strongly Correlated Systems
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** National
**Degree of contribution:** Researcher
**Entity where project took place:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** ulm, Schwaben, Germany
**Name principal investigator (PI, Co-PI....):** Miguel Ángel Martín Delgado
**Funding entity or bodies:**
Ministerio de Ciencia e Innovación **Type of entity:** público
**City funding entity:** Madrid, Community of Madrid, Spain

**Type of participation:** Others
**Code according to the funding entity:** FIS2009-10061
**Start-End date:** 01/01/2010 - 31/12/2012 **Duration:** 3 years
**Participating entity/entities:** Universidad Complutense de Madrid
**Total amount:** 250.470,01 €
**Dedication regime:** Part time
**Applicant's contribution:** I contributed to the research deliverables of this project.

**17** **Name of the project:** Quantum Information and Quantum Computation
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** Regional
**Degree of contribution:** Researcher
**Entity where project took place:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** Madrid, Community of Madrid, Spain
**Name principal investigator (PI, Co-PI....):** Miguel Ángel Martín-Delgado Alcántara
**Nº of researchers:** 7
**Funding entity or bodies:**
Universidad Complutense de Madrid **Type of entity:** University
**City funding entity:** Madrid, Community of Madrid, Spain

BANCO SANTANDER, S.A.
**City funding entity:** Spain

**Type of participation:** Others
**Start-End date:** 01/01/2009 - 30/12/2011 **Duration:** 3 years
**Total amount:** 9.000 €
**Dedication regime:** Part time
**Applicant's contribution:** I contributed with my research results to the project deliverables.

**18** **Name of the project:** Encoded qubit alive (eQual) with trapped ions, under IARPA-BAA-15-10 program "Logical qubits"
**Identify key words:** Quantum information and associated physical effects
**Type of project:** Basic research (including archaeological digs, etc) **Geographical area:** Non EU International
**Degree of contribution:** Researcher
**Entity where project took place:** University of Swansea **Type of entity:** University
**City of entity:** Swansea, East Wales, United Kingdom
**Name principal investigator (PI, Co-PI....):** Rainer Blatt
**Funding entity or bodies:**
IARPA (Intelligence Advanced Research Projects) **Type of entity:** State agency
**City funding entity:** Washington, United States of America

**Type of participation:** Team member
**Name of the programme:** IARPA program "Logical qubits"
**Code according to the funding entity:** IARPA-BAA-15-10
**Start-End date:** 01/04/2016 - 30/03/2010 **Duration:** 5 years
**Participating entity/entities:** ETH Zurich; University of Innsbruck; University of Mainz; University of Oxford; University of Sidney; University of Swansea
**Sub-project amount:** 870.000 €
**Dedication regime:** Full time
**Applicant's contribution:** I was a named researcher in the proposal to develop a variety of research tasks. Now I am part of the Swansea node.

## R&D non-competitive contracts, agreements or projects with public or private entities

**1** **Name of the project:** FRIAS research focus grant, (Short Scientific Mission under the program “Designed quantum transport in complex materials”).
**Degree of contribution:** Researcher
**Nº of researchers:** 1
**Funding entity or bodies:**
FRIAS (Freiburg Research Institute of Advanced Studies) **Type of entity:** R&D Centre
**City funding entity:** Freiburg, Freiburg, Germany
**Start date:** 01/08/2015 **Duration:** 15 days

**2** **Name of the project:** STSM "Many-body quantum simulations based on photon-assisted tunneling" under COST Action Number MP1001
**Type of project:** Basic research (including archaeological digs, etc) **Entity where project took place:** UNiversity of Sussex
**Degree of contribution:** Researcher
**Entity where project took place:** UNiversity of Sussex **Type of entity:** University
**City of entity:** Brighton, Togo
**Name principal investigator (PI, Co-PI....):** A Bermudez Carballo
**Nº of researchers:** 2 **Nª people/year:** 2
**Funding entity or bodies:**
EU Framework Programme (COST) **Type of entity:** Foundation
**Type of project:** Cooperation
**Name of the programme:** COST Action Number MP1001 Ion Traps for Tomorrow's Applications
**Code according to the funding entity:** COST-STSM-MP1001-15206
**Start date:** 20/11/2013 **Duration:** 1 month
**Total amount:** 2.300 €

# Scientific and technological activities

## Scientific production

**H index:** 39
**Date of application:** 17/07/2024
**Source of H-Index:** GOOGLE SCHOLAR

### Publications, scientific and technical documents

**1** E. Domanti; A. Bermudez; L. Amico. Dynamical Aharonov-Bohm cages and tight meson confinement in a -loop gauge theory. arXiv (arXiv:2412.12425). 17/12/2024. Available on-line at: <https://arxiv.org/abs/2407.11539>.
**Type of production:** Scientific paper
**Corresponding author:** No

**2** S. Varona; S. Saner; O Bazavan; G Aarts; G Araneda; A. Bermudez. Towards quantum computing Feynman diagrams in hybrid qubit-oscillator devices. arXiv (arXiv:2411.05092). 07/11/2024. Available on-line at: <https://arxiv.org/abs/2407.11539>.
**Type of production:** Scientific paper
**Corresponding author:** Yes

**3** C. Fulgado; P. Sala; D. Gonzalez-Cuadra; A. Bermudez. Interacting Dirac fields in an expanding universe: dynamical condensates and particle production. arXiv (arXiv:2408.06405). 12/08/2024. Available on-line at: <https://arxiv.org/abs/2407.11539>.
**Type of production:** Scientific paper
**Corresponding author:** Yes

**4** J. Cobos; D. F. Locher; A. Bermudez; M. Müller; E. Rico. Noise-aware variational eigensolvers: a dissipative route for lattice gauge theories. PRX Quantum 5 (3), 030340. 5, pp. 030340-1 - 030340-30. American physical society, 01/08/2024.
**Type of production:** Scientific paper
**Corresponding author:** No

**5** Pablo Viñas Martínez; Esperanza López; Alejandro Bermudez. Thermal masses and trapped-ion quantum spin models: a self-consistent approach to Yukawa-type interactions in the $\lambda\!\phi^4$ model. Quantum. 8, pp. 1411 - 1411. 15/07/2024. Available on-line at: <https://quantum-journal.org/papers/q-2024-07-15-1411/>.
**Type of production:** Scientific paper
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Corresponding author:** No

**6** O. Bazavan; S. Saner; E. Tirrito; G. Araneda; R. Srinivas; A. Bermudez. Synthetic $\mathbb{Z}_2$ gauge theories based on parametric excitations of trapped ions. Communications Physics volume. 7, pp. 229 - 229. Nature publishing group, 12/07/2024. Available on-line at: <https://www.nature.com/articles/s42005-024-01691-w>.
**Type of production:** Scientific paper
**Position of signature:** 6
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 6
**Corresponding author:** Yes

**7** A. Bermudez; D. González-Cuadra; S. Hands. A higher-order topological twist on cold-atom SO(5) Dirac fields. SciPost Physics. 17 - 1, pp. 003 - 003. 04/07/2024. Available on-line at: <https://www.scipost.org/SciPostPhys.17.1.003>.
**Type of production:** Scientific paper
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes

**8** Enrico C. Domanti; Dario Zappalà; Alejandro Bermudez; Luigi Amico. A Floquet-Rydberg quantum simulator for confinement in $\mathbb{Z}_2$ gauge theories. Phys. Rev. Research. 6, pp. L022059 - L022059. 11/06/2024. Available on-line at: <https://journals.aps.org/prresearch/abstract/10.1103/PhysRevResearch.6.L022059>.
**Type of production:** Scientific paper
**Position of signature:** 3
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 4
**Corresponding author:** No

**9** S Varona; M Müller; A. Bermudez. Lindblad-like quantum tomography for non-Markovian quantum dynamical maps. arXiv (arXiv:2403.19799). 28/03/2024. Available on-line at: <https://arxiv.org/abs/2403.19799>.
**Type of production:** Scientific paper
**Corresponding author:** No

**10** P Viñas; A. Bermudez. Microscopic parametrizations for gate set tomography under coloured noise. arXiv (arXiv:2407.11539). 28/03/2024. Available on-line at: <https://arxiv.org/abs/2407.11539>.
**Type of production:** Scientific paper
**Corresponding author:** No

**11** D Dobrynin; L Cardarelli; M Müller; A. Bermudez. Compressed-sensing Lindbladian quantum tomography with trapped ions. arXiv (arXiv:2403.07462). 12/03/2024. Available on-line at: <https://arxiv.org/abs/2403.07462>.
**Type of production:** Scientific paper
**Corresponding author:** No

**12** J. M. Sanchez-Velazquez; A Steiner; R. Freund; M Guevara-Bertsch; Ch. D. Marciniak; T. Monz; A. Bermudez. Dynamical quantum maps for single-qubit gates under non-Markovian phase noise. Physical Review Research 7 (1), 013008. 7, pp. 013008-1 - 013008-32. American physical society, 22/02/2024. Available on-line at: <https://arxiv.org/abs/2402.14530>.
**Type of production:** Scientific paper
**Corresponding author:** No

**13** C Benito; E Lopez; B Peropadre; A. Bermudez. Comparative study of quantum error correction strategies for the heavy-hexagonal lattice. arXiv (arXiv:2402.02185). 03/02/2024. Available on-line at: <https://arxiv.org/abs/2402.02185>.
**Type of production:** Scientific paper
**Corresponding author:** No

**14** Andrea Rodriguez-Blanco; Farid Shahandeh; Alejandro Bermudez. Witnessing entanglement in trapped-ion quantum error correction under realistic noise. Physical Review A. 109 - 5, pp. 052417 - 052417. 2024. Available on-line at: <https://journals.aps.org/pra/abstract/10.1103/PhysRevA.109.052417>.
**Type of production:** Scientific paper
**Position of signature:** 3
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** No

**15** Carlos Fulgado-Claudio; Jose M. S{á}nchez Vel{á}zquez; Alejandro Bermudez. Fermion production at the boundary of an expanding universe: a cold-atom gravitational analogue. Quantum. 7, pp. 1042 - 1042. {Verein zur F{ö}rderung des Open Access Publizierens in den Quantenwissenschaften}, 06/2023. Available on-line at: <https://doi.org/10.22331/q-2023-06-21-1042>. ISSN 2521-327X

**Type of production:** Scientific paper **Format:** Journal

**16** Andrea Rodriguez-Blanco; K. Birgitta Whaley; Alejandro Bermudez. Suppressing amplitude damping in trapped ions: Discrete weak measurements for a nonunitary probabilistic noise filter. Phys. Rev. A. 107, pp. 052409 - 052409. American Physical Society, 05/2023. Available on-line at: <https://link.aps.org/doi/10.1103/PhysRevA.107.052409>.

**Type of production:** Scientific paper **Format:** Journal

**17** L. Ziegler; E. Tirrito; M. Lewenstein; S. Hands; A. Bermudez. Correlated Chern insulators in two-dimensional Raman lattices: A cold-atom regularization of strongly coupled four-Fermi field theories. Phys. Rev. Res.4, pp. L042012 - L042012. American Physical Society, 10/2022. Available on-line at: <https://link.aps.org/doi/10.1103/PhysRevResearch.4.L042012>.

**Type of production:** Scientific paper **Format:** Journal

**18** E. Tirrito; M. Lewenstein; A. Bermudez. Topological chiral currents in the Gross-Neveu model extension. Phys. Rev. B. 106, pp. 045147 - 045147. American Physical Society, 07/2022. Available on-line at: <https://link.aps.org/doi/10.1103/PhysRevB.106.045147>.

**Type of production:** Scientific paper **Format:** Journal

**19** G. Martín-V\'azquez; G. Aarts; M. M\"uller; A. Bermudez. Long-Range Ising Interactions Mediated by $ \ensuremath{\lambda}{\ensuremath{\phi}}^{4}$ Fields: Probing the Renormalization of Sound in Crystals of Trapped Ions. PRX Quantum. 3, pp. 020352 - 020352. American Physical Society, 06/2022. Available on-line at: <https://link.aps.org/doi/10.1103/PRXQuantum.3.020352>.

**Type of production:** Scientific paper **Format:** Journal

**20** Monika Aidelsburger; Luca Barbiero; Alejandro Bermudez; Titas Chanda; Alexandre Dauphin; Daniel González-Cuadra; Przemysław R. Grzybowski; Simon Hands; Fred Jendrzejewski; Johannes Jünemann; Gediminas Juzeliūnas; Valentin Kasper; Angelo Piga; Shi-Ju Ran; Matteo Rizzi; Germán Sierra; Luca Tagliacozzo; Emanuele Tirrito; Torsten V. Zache; Jakub Zakrzewski; Erez Zohar; Maciej Lewenstein. Cold atoms meet lattice gauge theory. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences. 380 - 2216, pp. 20210064 - 20210064. 07/02/2022. Available on-line at: <https://royalsocietypublishing.org/doi/abs/10.1098/rsta.2021.0064>.

**DOI:** 10.1098/rsta.2021.0064

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 3 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 21 **Corresponding author:** No

**Impact source:** ISI **Category:** Science Edition - MULTIDISCIPLINARY SCIENCES

**Impact index in year of publication:** 4.226 **Journal in the top 25%:** Yes

**Position of publication:** 18 **No. of journals in the cat.:** 72

**Source of citations:** WOS **Citations:** 1

**Source of citations:** Google Scholar **Citations:** 7

**21** L. Ziegler; E. Tirrito; M. Lewenstein; S. Hands; A. Bermudez. Large-N Chern insulators: Lattice field theory and quantum simulation approaches to correlation effects in the quantum anomalous Hall effect. Annals of Physics. 100, pp. 168763-1 - 168763-49. Elsevier, 21/01/2022. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S0003491622000057>.

**DOI:** 10.1016/j.aop.2022.168763

**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** Yes
**Impact source:** ISI
**Source of citations:** Google Scholar
**Citations:** 1

**22** Emanuele Tirrito; Simon Hands; Alejandro Bermudez. Large-S and Tensor-Network Methods for Strongly-Interacting Topological Insulators. Symmetry. 14 - 4, 2022. Available on-line at: <https://www.mdpi.com/2073-8994/14/4/799>. ISSN 2073-8994
**Type of production:** Scientific paper
**Format:** Journal

**23** P. Parrado; C. Ryan-Anderson; A. Bermudez; M. Muller. Crosstalk Suppression for Fault-tolerant Quantum Error Correction with Trapped Ions. Quantum. 5, pp. 1 - 30. 29/06/2021. Available on-line at: <https://royalsocietypublishing.org/doi/10.1098/rsta.2021.0064>.
**DOI:** 10.22331/q-2021-06-29-487
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 3
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 4
**Corresponding author:** No
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 6.777
**Journal in the top 25%:** Yes
**Position of publication:** 9
**No. of journals in the cat.:** 86
**Source of citations:** WOS
**Citations:** 0
**Source of citations:** Google scholar
**Citations:** 10

**24** A. Rodriguez-Balnco; A. Bermudez; M. Muller; F. Shahandeh. Efficient and Robust Certification of Genuine Multipartite Entanglement in Noisy Quantum Error Correction Circuits. Physical Review X Quantum. 2, pp. 020304-1 - 020304-27. APS, 08/04/2021. Available on-line at: <https://royalsocietypublishing.org/doi/10.1098/rsta.2021.0064>.
**DOI:** 10.1103/PRXQuantum.2.020304
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 2
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 4
**Corresponding author:** No
**Impact source:** ISI
**Source of citations:** WOS
**Citations:** 1
**Source of citations:** Google scholar
**Citations:** 5

**25** A. Bermudez; D. Gonzalez-Cuadra; A. Dauphin; P.R. Grzybowski; M. Lewenstein. Z(n) solitons in intertwined topological phases. Physical Review B. 5, pp. 245137-1 - 245137-17. APS, 23/12/2020. Available on-line at: <https://journals.aps.org/prb/abstract/10.1103/PhysRevB.102.245137>.
**DOI:** 10.1103/PhysRevB.102.245137
**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 5
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** No
**Impact source:** ISI
**Category:** PHYSICS, CONDENSED MATTER
**Impact index in year of publication:** 4.036
**Journal in the top 25%:** No

**Position of publication:** 22
**No. of journals in the cat.:** 69
**Source of citations:** WOS
**Citations:** 3
**Source of citations:** Google scholar
**Citations:** 24

**26** D. Gonzalez-Cuadra; A. Dauphin; P.R. Grzybowski; M. Lewenstein; A Bermudez. Dynamical Solitons and Boson Fractionalization in Cold-Atom Topological Insulators. Physical Review Letters. 125, pp. 265301-1 - 265301-6. APS, 23/12/2020. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.125.265301>.
**DOI:** 10.1103/PhysRevB.102.245137
**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 5
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** No
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 9.161
**Journal in the top 25%:** Yes
**Position of publication:** 7
**No. of journals in the cat.:** 86
**Source of citations:** WOS
**Citations:** 2
**Source of citations:** Google scholar
**Citations:** 10
**Relevant publication:** No

**27** D. Gonzalez-Cuadra; A. Dauphin; M Aidelsburger; M. Lewenstein; A Bermudez. Rotor Jackiw-Rebbi Model: A Cold-Atom Approach to Chiral Symmetry Restoration and Charge Confinement. Physical Review X Quantum. 1, pp. 020321-1 - 020321-28. APS, 16/12/2020. Available on-line at: <https://link.aps.org/doi/10.1103/PRXQuantum.1.020321>.
**DOI:** 10.1103/PRXQuantum.1.020321
**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 5
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** No
**Impact source:** ISI
**Source of citations:** WOS
**Citations:** 1
**Source of citations:** Google scholar
**Citations:** 1

**28** D. Gonzalez-Cuadra; A. Dauphin; P.R. Grzybowski; M. Lewenstein; A Bermudez. Robust Topological Order in Fermionic Z(2) Gauge Theories: From Aharonov-Bohm Instability to Soliton-Induced Deconfinement. Physical Review X. 10, pp. 041007-1 - 041007-17. APS, 09/10/2020. Available on-line at: <https://journals.aps.org/prx/abstract/10.1103/PhysRevX.10.041007>.
**DOI:** 10.1103/PhysRevX.10.041007
**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 5
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** No
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 15.762
**Journal in the top 25%:** Yes
**Position of publication:** 6
**No. of journals in the cat.:** 86
**Source of citations:** WOS
**Citations:** 7

**Source of citations:** Google scholar **Citations:** 12

**Relevant publication:** No

**29** V. Kaushal; B. Lekitsch; A. Stahl; J. Hilder; D. Pijn; C. Schmiegelow; A. Bermudez; M. Müller; F. Schmidt-Kaler; U. Poschinger. Shuttling-based trapped-ion quantum information processing. AVS Quantum Science. 2 - 1, pp. 014101 - 014101. 04/03/2020. Available on-line at: <https://doi.org/10.1116/1.5126186>.

**DOI:** 10.1116/1.5126186

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 7 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 10

**Source of citations:** Google Scholar **Citations:** 34

**30** A. Bermudez; X. Xu; M. Gutierrez; S. Benjamin; M. Müller. Fault-tolerant protection of near-term trapped-ion topological qubits under realistic noise sources. Physical Review A. 100, pp. 062307-1 - 022330-23. APS, 04/12/2019. Available on-line at: <https://journals.aps.org/pra/abstract/10.1103/PhysRevA.100.062307>.

**DOI:** 10.1103/PhysRevA.100.062307

**Type of production:** Scientific paper **Format:** Scientific and technical document or report

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 5 **Corresponding author:** Yes

**Impact source:** ISI **Category:** Science Edition - OPTICS

**Impact index in year of publication:** 2.909 **Journal in the top 25%:** Yes

**Position of publication:** 23 **No. of journals in the cat.:** 94

**Source of citations:** WOS **Citations:** 7

**Source of citations:** Google Scholar **Citations:** 23

**Relevant results:** Editor's suggestion

**Relevant publication:** No

**31** P. Kiefer; F. Hakelberg; M Wittemer; A. Bermudez; D. Porras; U. Warring; T. Schaetz. Floquet-engineered vibrational dynamics in a two-dimensional array of trapped ions. Physical Review Letters. 123, pp. 213605-1 - 213605-6. American Physical Society (APS), 21/11/2019. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.123.213605>.

**DOI:** 10.1103/PhysRevLett.123.213605

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 4 **Degree of contribution:** Author or co-author of article in journal without external admissions assessment committee

**Total no. authors:** 7 **Corresponding author:** No

**Impact source:** ISI **Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 8,839 **Journal in the top 25%:** Yes

**Position of publication:** 6 **No. of journals in the cat.:** 78

**Source of citations:** WOS **Citations:** 16

**Source of citations:** Google Scholar **Citations:** 21

**32** G. Magnifico; D. Vodola; E. Ercolessi; M. Müller; A. Bermudez. Z_N gauge theories coupled to topological fermions: QED with a quantum-mechanical angle. Physycal Review B. 110, pp. 115152-1 - 115152-17. APS, 25/08/2019. Available on-line at: <https://journals.aps.org/prb/abstract/10.1103/PhysRevB.100.115152>.

**DOI:** 10.1103/PhysRevB.100.115152

**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 5
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, CONDENSED MATTER
**Impact index in year of publication:** 3.813
**Journal in the top 25%:** No
**Position of publication:** 18
**No. of journals in the cat.:** 67
**Source of citations:** WOS
**Citations:** 23
**Source of citations:** Google Scholar
**Citations:** 29

**33** D. González-Cuadra; A. Bermudez; P.R. Grzybowski; M. Lewenstein; A. Dauphin. Intertwined topological phases induced by emergent symmetry protection. Nature Communications. 10 - 2694, pp. 1 - 7. Nature, 19/06/2019. Available on-line at: <https://www.nature.com/articles/s41467-019-10796-8>.

**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 2
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** No
**Impact source:** ISI
**Category:** Science Edition - MULTIDISCIPLINARY SCIENCES
**Impact index in year of publication:** 12,353
**Journal in the top 25%:** Yes
**Position of publication:** 3
**No. of journals in the cat.:** 64
**Source of citations:** WOS
**Citations:** 4
**Source of citations:** Google Scholar
**Citations:** 8
**Relevant publication:** No

**34** E. Tirrito; M. Rizzi; G. Sierra; M. Lewenstein; A. Bermudez. Renormalization group flows for Wilson-Hubbard matter and the topological Hamiltonian. Physycal Review B. 99 - 045139, pp. 125106-1 - 125106-17. APS, 06/03/2019. Available on-line at: <https://dx.doi.org/10.1103/PhysRevB.99.125106>.

**DOI:** 10.1103/PhysRevB.99.125106

**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 5
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, CONDENSED MATTER
**Impact index in year of publication:** 3.813
**Journal in the top 25%:** No
**Position of publication:** 18
**No. of journals in the cat.:** 67
**Source of citations:** WOS
**Citations:** 12
**Source of citations:** Google Scholar
**Citations:** 20

**35** A. Bermudez; X. Xu; M. Gutierrez; S. Benjamin; M. Müller. Transversality and lattice surgery: Exploring realistic routes toward coupled logical qubits with trapped-ion quantum processors. Physical Review A. 99, pp. 022330-1 - 022330-29. APS, 25/02/2019. Available on-line at: <https://journals.aps.org/pra/abstract/10.1103/PhysRevA.99.022330>.

**DOI:** 10.1103/PhysRevA.99.022330

**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - OPTICS
**Impact index in year of publication:** 2.909
**Journal in the top 25%:** Yes
**Position of publication:** 23
**No. of journals in the cat.:** 94
**Source of citations:** WOS
**Citations:** 13
**Source of citations:** Google Scholar
**Citations:** 26

**36** D. Gonzalez-Cuadra; A. Dauphin; P.R. Grzybowski; P. Wójcik; M. Lewenstein; A. Bermudez. Symmetry-Breaking Topological Insulators in the Bose-Hubbard Model. Physycal Review B. 99 - 045139, pp. 045139-1 - 045139-16. APS, 24/01/2019. Available on-line at: <https://journals.aps.org/prb/abstract/10.1103/PhysRevB.99.045139>.

**DOI:** 10.1103/PhysRevB.99.045139

**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 6
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 6
**Corresponding author:** No
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, CONDENSED MATTER
**Impact index in year of publication:** 3.813
**Journal in the top 25%:** No
**Position of publication:** 18
**No. of journals in the cat.:** 67
**Source of citations:** WOS
**Citations:** 31
**Source of citations:** Google Scholar
**Citations:** 42

**37** A. Bermudez; E. Tirrito; M. Rizzi; M. Lewenstein; S. Hands. Gross–Neveu–Wilson model and correlated symmetry-protected topological phases. Annals of Physics. 399, pp. 149 - 180. Sceince Direct, 19/01/2019. Available on-line at: <https://www.sciencedirect.com/science/article/pii/S0003491618302690>.

**DOI:** 10.1016/j.aop.2018.10.007

**Type of production:** Scientific paper
**Format:** Scientific and technical document or report
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 2.367
**Journal in the top 25%:** No
**Position of publication:** 20
**No. of journals in the cat.:** 78
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 2.367
**Journal in the top 25%:** No
**Position of publication:** 20
**No. of journals in the cat.:** 78
**Source of citations:** WOS
**Citations:** 20
**Source of citations:** Google Scholar
**Citations:** 29

**Source of citations:** Google Scholar **Citations:** 7

**38** G. Magnifico; D. Vodola; E. Ercolessi; S. P. Kumar; M. Mueller; A. Bermudez. Symmetry-protected topological phases in lattice gauge theories: topological QED_2. Physycal Review D. 99 - 014503, pp. 014503-1 - 014503-12. APS, 04/01/2019. Available on-line at: <https://journals.aps.org/prd/abstract/10.1103/PhysRevD.99.014503>.

**DOI:** 10.1103/PhysRevD.99.014503

**Type of production:** Scientific paper **Format:** Scientific and technical document or report

**Position of signature:** 6 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 6 **Corresponding author:** Yes

**Impact source:** ISI **Category:** Science Edition - ASTRONOMY & ASTROPHYSICS

**Impact index in year of publication:** 4.394 **Journal in the top 25%:** Yes

**Position of publication:** 15 **No. of journals in the cat.:** 66

**Source of citations:** WOS **Citations:** 28

**Source of citations:** Google Scholar **Citations:** 36

**Relevant publication:** No

**39** A. Bermudez; X. Xu; R. Nigmatulin; J. O'Gorman; V. Negnevitsky; P. Schindler; T. Monz; U. G. Poschinger; C. Hempel; J. Home; F. Schmidt-Kaler; M. Biercuk; R. Blatt; S. Benjamin; M. Mueller. Assessing the progress of trapped-ion processors towards fault-tolerant quantum computation. Physical Review X. 7, pp. 041061-1 - 041061-41. APS, 13/12/2017. Available on-line at: <https://journals.aps.org/prx/abstract/10.1103/PhysRevX.7.041061>.

**DOI:** 10.1103/PhysRevX.7.041061

**Type of production:** Scientific paper **Format:** Scientific and technical document or report

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 15 **Corresponding author:** Yes

**Impact source:** ISI **Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 14,385 **Journal in the top 25%:** Yes

**Position of publication:** 4 **No. of journals in the cat.:** 78

**Source of citations:** WOS **Citations:** 60

**Source of citations:** Google Scholar **Citations:** 138

**40** A. Bermudez; G. Aarts; M. Mueller. Quantum sensors for the generating functional of interacting quantum field theories. Physical Review X. 7, pp. 041012-1 - 041012-18. APS, 19/10/2017. Available on-line at: <https://journals.aps.org/prx/abstract/10.1103/PhysRevX.7.041012>.

**DOI:** 10.1103/PhysRevX.7.041012

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 3 **Corresponding author:** Yes

**Impact source:** ISI **Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 14,385 **Journal in the top 25%:** Yes

**Position of publication:** 4 **No. of journals in the cat.:** 78

**Source of citations:** WOS **Citations:** 14

**Source of citations:** Google Scholar **Citations:** 29

**41** J. Juenemann; A. Piga; S.-J. Ran; M. Lewenstein; M. Rizzi; A. Bermudez. Exploring Interacting Topological Insulators with Ultracold Atoms: the Synthetic Creutz-Hubbard Model. Physical Review X. 7, pp. 031057-1 - 031057-25. APS, 27/09/2017. Available on-line at: <https://journals.aps.org/prx/abstract/10.1103/PhysRevX.7.041012>.

**DOI:** 10.1103/PhysRevX.7.031057

**Type of production:** Scientific paper **Format:** Scientific and technical document or report

**Position of signature:** 6 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 6 **Corresponding author:** Yes

**Impact source:** ISI **Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 14,385 **Journal in the top 25%:** Yes

**Position of publication:** 4 **No. of journals in the cat.:** 78

**Source of citations:** WOS **Citations:** 82

**Source of citations:** Google Scholar **Citations:** 110

**42** A. Bermudez; P. Schindler; T. Monz; R. Blatt; M. Mueller. Micromotion-enabled improvement of quantum logic gates with trapped ions. New Journal of Physics. 19, pp. 113038-1 - 113038-25. IOP, 10/04/2017. Available on-line at: <http://iopscience.iop.org/article/10.1088/1367-2630/aa86eb/meta>.

**DOI:** 10.1088/1367-2630/aa86eb

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 5 **Corresponding author:** Yes

**Impact source:** ISI **Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 3,579 **Journal in the top 25%:** Yes

**Position of publication:** 11 **No. of journals in the cat.:** 78

**Source of citations:** WOS **Citations:** 5

**Source of citations:** Google Scholar **Citations:** 10

**43** A. Bermudez; L. Taglicozzo; G. Sierra; P. Richerme. Long-range Heisenberg models in quasi-periodically driven crystals of trapped ions. Physical Review B. 95, pp. 024431-1 - 024431-14. APS, 30/01/2017.

**DOI:** 10.1103/PhysRevB.95.024431

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 4 **Corresponding author:** Yes

**Impact source:** ISI **Category:** Science Edition - PHYSICS, CONDENSED MATTER

**Impact index in year of publication:** 3.813 **Journal in the top 25%:** No

**Position of publication:** 18 **No. of journals in the cat.:** 67

**Source of citations:** WOS **Citations:** 20

**Source of citations:** Google scholar **Citations:** 37

**44** A. Bermudez; T. Schaetz. Quantum Transport of Energy in Controlled Synthetic Quantum Magnets. New Journal Physics. 18 - 083006, pp. 1 - 16. IOP, 28/07/2016. Available on-line at: <https://iopscience.iop.org/article/10.1088/1367-2630/18/8/083006>.

**DOI:** 10.1088/1367-2630/18/8/083006

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 2
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 3,579
**Journal in the top 25%:** Yes
**Position of publication:** 11
**No. of journals in the cat.:** 78
**Source of citations:** Google scholar
**Citations:** 9

**Relevant results:** Highlighted in Phys.org with a cover story "Physicists propose first method to control single quanta of energy"

**45** G. Díaz-Camacho; A. Bermudez; JJ. García-Ripoll. Dynamical polaron ansatz: a theoretical tool for the ultra-strong coupling regime of circuit QED. Physical Review A. 93 - 043843, pp. 043843-1 - 043843-13. American Physical Society, 25/04/2016. Available on-line at: <https://journals.aps.org/pra/abstract/10.1103/PhysRevA.93.043843>.

**DOI:** 10.1103/PhysRevA.93.043843

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 2
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** No
**Impact source:** ISI
**Category:** Science Edition - OPTICS
**Impact index in year of publication:** 2,925
**Journal in the top 25%:** Yes
**Position of publication:** 21
**No. of journals in the cat.:** 92
**Source of citations:** WOS
**Citations:** 31
**Source of citations:** Google Scholar
**Citations:** 43

**46** T. Grass; M. Lewenstein; A. Bermudez. Dual trapped-ion quantum simulators: an alternative route towards exotic quantum magnets. New Journal of Physics. 18 - 033011, IOP, 03/03/2016. Available on-line at: <https://iopscience.iop.org/article/10.1088/1367-2630/18/3/033011>.

**DOI:** 10.1088/1367-2630/18/3/033011

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 3
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 3,786
**Journal in the top 25%:** Yes
**Position of publication:** 10
**No. of journals in the cat.:** 79
**Source of citations:** WOS
**Citations:** 12
**Source of citations:** Google Scholar
**Citations:** 7

**Relevant results:** Editors selection in IOPselect

**47** A. Kurcz; J.J. García-Ripoll; A. Bermudez. Driven Spin-Boson Luttinger Liquids. New Journal of Physics. 15 - 115011, pp. 115011-1 - 115011-13. IOP, 02/11/2015. Available on-line at: <https://iopscience.iop.org/article/10.1088/1367-2630/17/11/115011>.

**DOI:** 10.1088/1367-2630/17/11/115011

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 3
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 3,57
**Journal in the top 25%:** Yes
**Position of publication:** 10
**No. of journals in the cat.:** 79
**Source of citations:** WOS
**Citations:** 3
**Source of citations:** Google Scholar
**Citations:** 3

**48** A. Bermudez; D. Porras. Interaction-Dependent Photon-Assisted Tunneling in Optical Lattices: A Quantum Simulator of Strongly-Correlated Electrons and Dynamical Gauge Fields. New Journal of Physics. 17 - 103021, pp. 103021-1 - 103021-31. IOP, 17/10/2015. Available on-line at: <https://www.webofscience.com/wos/woscc/full-record/WOS:000367329600004>.

**DOI:** 10.1088/1367-2630/17/10/103021

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 2
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 3,57
**Journal in the top 25%:** Yes
**Position of publication:** 10
**No. of journals in the cat.:** 79
**Source of citations:** WOS
**Citations:** 36
**Source of citations:** Google Scholar
**Citations:** 52

**49** A. Kurcz; J. J. García-Ripoll; A. Bermudez. The Interspersed Spin Boson Lattice Model. The European Physical Journal Special Topics. 224 - 483, pp. 483 - 496. Springer, 08/08/2014. Available on-line at: <https://link.springer.com/article/10.1140%2Fepjst%2Fe2015-02378-x>.

**DOI:** 10.1140/epjst/e2015-02378-x

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 3
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 2.707
**Journal in the top 25%:** No
**Position of publication:** 34
**No. of journals in the cat.:** 86
**Source of citations:** WOS
**Citations:** 2
**Source of citations:** Google Scholar
**Citations:** 4

**50** A. Kurcz; A. Bermudez; J. J. García-Ripoll. Hybrid quantum magnetism in circuit-QED: from spin-photon waves to many-body spectroscopy. Physical Review Letters. 18, pp. 180405-1 - 180405-5. American Physical Society (APS), 08/05/2014. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.112.180405>.

**DOI:** 10.1103/PhysRevLett.112.180405

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 2
**Degree of contribution:** Author or co-author of article in journal without external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** No
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 7,512
**Journal in the top 25%:** Yes
**Position of publication:** 6
**No. of journals in the cat.:** 78
**Source of citations:** WOS
**Citations:** 34
**Source of citations:** Google Scholar
**Citations:** 41

**51** A. Lemmer; A. Bermudez; M. B. Plenio. Noise Studies of Driven Geometric Phase Gates with Trapped Ions. Proceedings of the International School of Physics "Enrico Fermi" (in press), preprint server arXiv:1312.3227. IOS Press, 11/12/2013.

**DOI:** 10.3254/978-1-61499-526-5-229

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 2
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** No

**52** J. Jünemann; A. Cardarso; D. Pérez-García; A. Bermudez; J. J. García-Ripoll. Lieb-Robinson bounds for spin-boson lattice models and trapped ions. Physical Review Letters. 111, pp. 230404-1 - 230404-5. American Physical Society (APS), 06/12/2013. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.111.230404>.

**DOI:** 10.1103/PhysRevLett.111.230404

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 4
**Degree of contribution:** Author or co-author of article in journal without external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** No
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 7.728
**Journal in the top 25%:** Yes
**Position of publication:** 6
**No. of journals in the cat.:** 78
**Source of citations:** WOS
**Citations:** 25
**Source of citations:** Google scholar
**Citations:** 41

**53** A. Lemmer; A. Bermudez; M. B. Plenio. Driven Geometric Phase Gates with Trapped Ions. New Journal of Physics. 15 - 083001, pp. 083001-1 - 083001-38. Institute of Physics IOP, 01/08/2013. Available on-line at: <https://www.webofscience.com/wos/woscc/full-record/WOS:000322569500001>.

**DOI:** 10.1088/1367-2630/15/8/083001

**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 2
**Degree of contribution:** Author or co-author of article in journal without external admissions assessment committee
**Corresponding author:** No

**Impact source:** ISI
**Impact index in year of publication:** 3.671
**Position of publication:** 10
**Category:** PHYSICS, MULTIDISCIPLINARY
**Journal in the top 25%:** Yes
**No. of journals in the cat.:** 78

**Source of citations:** WOS
**Citations:** 24

**Source of citations:** Google Scholar
**Citations:** 39

**54** C. Cormick; A. Bermudez; S. F. Huelga; M. B. Plenio. Dissipative ground-state preparation of a spin chain by a structured environment. New Journal of Physics. 15, pp. 073027-1 - 073027-30. Institute of Physics IOP, 15/07/2013. Available on-line at: <https://iopscience.iop.org/article/10.1088/1367-2630/15/7/073027>.
**DOI:** 10.1088/1367-2630/15/7/073027
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 2
**Degree of contribution:** Author or co-author of article in journal without external admissions assessment committee
**Total no. authors:** 4
**Corresponding author:** No
**Impact source:** ISI
**Impact index in year of publication:** 3.671
**Position of publication:** 10
**Category:** PHYSICS, MULTIDISCIPLINARY
**Journal in the top 25%:** Yes
**No. of journals in the cat.:** 78

**Source of citations:** WOS
**Citations:** 31

**Source of citations:** Google Scholar
**Citations:** 39

**55** A. Bermudez; M. Bruderer; M. B. Plenio. Controlling and measuring quantum transport of heat in trapped-ion crystals. Physical Review Letters. 111, pp. 040601-1 - 040601-5. American Physical Society (APS), 22/06/2013. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.111.040601>.
**DOI:** 10.1103/PhysRevLett.111.040601
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal without external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes
**Impact source:** ISI
**Impact index in year of publication:** 7.728
**Position of publication:** 6
**Category:** PHYSICS, MULTIDISCIPLINARY
**Journal in the top 25%:** Yes
**No. of journals in the cat.:** 78

**Source of citations:** WOS
**Citations:** 77

**Source of citations:** Google scholar
**Citations:** 115

**56** A. Bermudez; T. Schaetz; M. B. Plenio. Dissipation-Assisted Quantum Information Processing with Trapped Ions. Physical Review Letters. 110, pp. 110502-1 - 110502-5. American Physical Society (APS), 14/03/2013. Available on-line at: <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjcnKGuy9z1AhXqi_0HHQQCDnMQFnoECA%3A%2F%2Flink.aps.org%2Fdoi%2F10.1103%2FPhysRevLett.110.110502&usg=AOvVaw2eK6LUGqCFmu8sB6raCKYi>.
**DOI:** 10.1103/PhysRevLett.110.110502
**Type of production:** Scientific paper
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 7.728
**Journal in the top 25%:** Yes
**Position of publication:** 6
**No. of journals in the cat.:** 78

**Source of citations:** WOS
**Citations:** 44

**Source of citations:** Google scholar
**Citations:** 60

**57** A. Bermudez; J. Almeida; K. Ott; H. Kaufmann; S. Ulm; U. Poschinger; F. Schmidt- Kaler; A. Retzker; M. B. Plenio. Quantum Magnetism of Spin-Ladder Compounds with Trapped-Ion Crystals,. New Journal of Physics. 14, pp. 093042-1 - 093042-51. IOP publishing, 25/09/2012. Available on-line at: <https://iopscience.iop.org/article/10.1088/1367-2630/14/9/093042/meta>.
**DOI:** 10.1088/1367-2630/14/9/093042
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 9
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 4.063
**Journal in the top 25%:** Yes
**Position of publication:** 9
**No. of journals in the cat.:** 83

**Source of citations:** WOS
**Citations:** 21

**Source of citations:** Google Scholar
**Citations:** 35

**Relevant results:** Editors suggestion IOPselect Highlight of the year 2012 IOPselect (section Quantum Physics)

**58** A. Bermudez; M.B. Plenio. Spin-Peierls Quantum Phase Transition in Coulomb Crystals. Physical Review Letters. 109, pp. 010501-1 - 010501-5. APS, 06/07/2012. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.109.010501>.
**DOI:** 10.1103/PhysRevLett.110.169903
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 2
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 7.943
**Journal in the top 25%:** Yes
**Position of publication:** 5
**No. of journals in the cat.:** 83

**Source of citations:** WOS
**Citations:** 24

**Source of citations:** Google Scholar
**Citations:** 29

**59** A. Bermudez; T. Schaetz; D. Porras. Photon-assisted-tunneling toolbox for quantum simulations in ion traps. New Journal of Physics. 14, pp. 053049-1 - 053049-31. IOP, 31/05/2012. Available on-line at: <https://iopscience.iop.org/article/10.1088/1367-2630/14/5/053049>.
**DOI:** 10.1088/1367-2630/14/5/053049
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 4.063
**Journal in the top 25%:** Yes
**Position of publication:** 9
**No. of journals in the cat.:** 83

**Source of citations:** WOS **Citations:** 35

**Source of citations:** Google Scholar **Citations:** 63

**Relevant results:** Editors suggestion IOPselect Highlight of the year 2012 IOPselect (section Atomic and Molecular Physics)

**60** A. Bermudez; P.O. Schmidt; M. B. Plenio; A. Retzker. Robust trapped-ion quantum logic gates by continuous dynamical decoupling. Physical Review A (Rapid Communications). 85, pp. 040302-1 - 040302-5. APS, 04/04/2012. Available on-line at: <https://journals.aps.org/pra/abstract/10.1103/PhysRevA.85.040302>.

**DOI:** 10.1103/PhysRevA.85.040302

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 4 **Corresponding author:** Yes

**Impact source:** ISI **Category:** PHYSICS, ATOMIC, MOLECULAR & CHEMICAL

**Impact index in year of publication:** 3.042 **Journal in the top 25%:** No

**Position of publication:** 9 **No. of journals in the cat.:** 34

**Source of citations:** WOS **Citations:** 70

**Source of citations:** Google Scholar **Citations:** 102

**Relevant results:** Selected for the Virtual Journal of Quantum Information 12, Issue 14 Chosen as a highlight of the European FP7 project QESSENCE.

**61** L. Mazza; A. Bermudez; M. Rizzi; N. Goldman; M.A. Martin-Delgado; M. Lewenstein. An optical-lattice-based quantum simulator for relativistic field theories and topological insulator. New Journal of Physics. 14, pp. 015007-1 - 015007-27. IOP, 31/01/2012. Available on-line at: <https://dx.doi.org/10.1088/1367-2630/14/1/015007>.

**DOI:** 10.1088/1367-2630/14/1/015007

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 2 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 6 **Corresponding author:** Yes

**Impact source:** ISI **Category:** PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 4.063 **Journal in the top 25%:** Yes

**Position of publication:** 9 **No. of journals in the cat.:** 83

**Source of citations:** WOS **Citations:** 107

**Source of citations:** Google Scholar **Citations:** 153

**Relevant results:** Article in Focus on Quantum Simulation Highlight of the year 2012 IOPSelect (section Atomic and Molecular Physics)

**62** A. Bermudez; J. Almeida; F. Schmidt-Kaler; A. Retzker; M.B. Plenio. Frustrated Quantum Spin Models with Cold Coulomb Crystals. Physical Review Letters. 107, pp. 207209-1 - 207209-5. APS, 11/11/2011. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.107.207209>.

**DOI:** 10.1103/PhysRevLett.107.207209

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 5 **Corresponding author:** Yes

**Impact source:** ISI **Category:** PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 7.370 **Journal in the top 25%:** Yes

**Position of publication:** 5 **No. of journals in the cat.:** 84

**Source of citations:** WOS **Citations:** 32

**Source of citations:** Google Scholar **Citations:** 42

**Relevant results:** Selected for the Virtual Journal of Quantum Information 11, Issue 1. Selected for the Virtual Journal of Nan. Sci. and Tech. 24, Issue 22.

**63** Z. Lan; N. Goldman; A. Bermudez; W. Lu; P. Ohberg. Dirac-Weyl fermions with arbitrary spin in two-dimensional optical superlattices. Physical Review B. 84, pp. 165115-1 - 165115-16. APS, 14/10/2011. Available on-line at: <https://journals.aps.org/prb/abstract/10.1103/PhysRevB.84.165115>.

**DOI:** 10.1103/PhysRevB.84.165115

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 3 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 5 **Corresponding author:** No

**Impact source:** ISI **Category:** PHYSICS, CONDENSED MATTER

**Impact index in year of publication:** 3.691 **Journal in the top 25%:** Yes

**Position of publication:** 13 **No. of journals in the cat.:** 69

**Source of citations:** WOS **Citations:** 85

**Source of citations:** Google Scholar **Citations:** 103

**Relevant results:** Selected for Physical Review B Kaleidoscope, october 2011. Selected for the Virtual Journal of Atomic Quantum Fluids 3, Issue 11.

**64** A Bermudez; F. Jelezko; M.B. Plenio; A. Retzker. Electron-Mediated Nuclear-Spin Interactions between Distant Nitrogen-Vacancy Centers. Physical Review Letters. pp. 150503-1 - 150503-5. APS, 03/10/2011. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.107.150503>.

**DOI:** 10.1103/PhysRevLett.107.150503

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 4 **Corresponding author:** Yes

**Impact source:** ISI **Category:** PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 7.370 **Journal in the top 25%:** Yes

**Position of publication:** 5 **No. of journals in the cat.:** 84

**Source of citations:** WOS **Citations:** 69

**Source of citations:** Google Scholar **Citations:** 103

**Relevant results:** Editors' suggestion with accompanying Viewpoint Physics 4, 78 (2011). Research highlight in Nature Materials Nature Materials 10, 808 (2011). Selected for the Virtual Journal of Quantum Information 11, Issue 10. Selected for the Virtual Journal of Nan. Sci. and Tech. 24, Issue 16.

**Reviews in journals:** 2

**65** A. Bermudez; T. Schaetz; D. Porras. Synthetic Gauge Fields for Vibrational Excitations of Trapped Ions. Physical Review Letters. 107, pp. 150501-1 - 150501-4. APS, 03/10/2011. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.107.150501>.

**DOI:** 10.1103/PhysRevLett.107.150501

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 3 **Corresponding author:** Yes

**Impact source:** ISI
**Category:** Science Edition - PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 7.370
**Journal in the top 25%:** Yes
**Position of publication:** 5
**No. of journals in the cat.:** 84
**Source of citations:** WOS
**Citations:** 89
**Source of citations:** Google Scholar
**Citations:** 122

**Relevant results:** Selected for the Virtual Journal of Quantum Information 11, Issue 10

**66** N. Goldman; I. Satija; P. Nikolic; A. Bermudez; M.A. Martin-Delgado; M. Lewenstein; I.B. Spielman. Realistic Time-Reversal Invariant Topological Insulators With Neutral Atoms. Physical Review Letters. 105, pp. 255302-1 - 255302-4. APS, 16/12/2010. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.105.255302>.
**DOI:** 10.1103/PhysRevLett.105.255302
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 4
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 7
**Corresponding author:** No
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 7.622
**Journal in the top 25%:** Yes
**Position of publication:** 5
**No. of journals in the cat.:** 80
**Source of citations:** WOS
**Citations:** 246
**Source of citations:** Google Scholar
**Citations:** 335

**Relevant results:** Selected for the Virtual Journal of Quantum Information 11, Issue 1 Selected for the Virtual Journal of Atomic Quantum Fluids 3, Issue 1 Selected for the Virtual Journal of Nan. Sci. and Tech. 22, Issue 26.

**67** A. Bermudez; M.A. Martin-Delgado; D. Porras. The localization of phonons in ion traps with controlled quantum disorder. New Journal of Physics. 12, pp. 123016-1 - 123016-10. IOP, 09/12/2010. Available on-line at: <https://dx.doi.org/10.1088/1367-2630/12/12/123016>.
**DOI:** 10.1088/1367-2630/12/12/123016
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 3.849
**Journal in the top 25%:** Yes
**Position of publication:** 9
**No. of journals in the cat.:** 80
**Source of citations:** WOS
**Citations:** 22
**Source of citations:** Google Scholar
**Citations:** 28

**Relevant results:** Selected for the Virtual Journal of Atomic Quantum Fluids 2, Issue 12.

**68** A. Bermudez; L. Mazza; M. Rizzi; N. Goldman; M. Lewenstein; M.A. Martin-Delgado. Wilson Fermions and Axion Electrodynamics in Optical Lattices. Physical Review Letters. 105, pp. 190404-1 - 190404-4. APS, 04/11/2010. Available on-line at: <https://dx.doi.org/10.1103/PhysRevLett.105.190404>.
**DOI:** 10.1103/PhysRevLett.105.190404
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 6
**Corresponding author:** Yes

**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 7.622
**Journal in the top 25%:** Yes
**Position of publication:** 5
**No. of journals in the cat.:** 80

**Source of citations:** WOS
**Citations:** 118

**Source of citations:** Google Scholar
**Citations:** 169

**Relevant results:** Selected for the Virtual Journal of Atomic Quantum Fluids 2, Issue 12 Chosen as highlight of the European FP7 project AQUTE (http://qurope.eu/db/publications/wilson-fermions-and-axion-electrodynamics-optical-lattices)

**69** A. Bermudez; L. Amico; M.A. Martin-Delgado. Dynamical delocalization of Majorana edge states by sweeping across a quantum critical point. New Journal of Physics. 12, pp. 055014-1 - 055014-14. IOP, 28/05/2010. Available on-line at: <https://iopscience.iop.org/article/10.1088/1367-2630/12/5/055014>.
**DOI:** 10.1088/1367-2630/12/5/055014
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 3,894
**Journal in the top 25%:** Yes
**Position of publication:** 9
**No. of journals in the cat.:** 80

**Source of citations:** WOS
**Citations:** 55

**Source of citations:** Google Scholar
**Citations:** 77

**Relevant results:** Article in Focus on dynamics and thermalization in isolated quantum many-body systems.

**70** A. Bermudez; N. Goldman; A. Kubasiak; M. Lewenstein; M.A. Martin-Delgado. Topological phase transitions in the non-Abelian honeycomb lattice. New Journal of Physics. 12, pp. 033041-1 - 033041-38. IOP, 24/03/2010.
**DOI:** 10.1088/1367-2630/12/3/033041
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 3.894
**Journal in the top 25%:** Yes
**Position of publication:** 9
**No. of journals in the cat.:** 80

**Source of citations:** WOS
**Citations:** 76

**Source of citations:** Google Scholar
**Citations:** 97

**Relevant results:** Selected for the Virtual Journal of Atomic Quantum Fluids 2, Issue 6

**71** N. Goldman; A. Kubasiak; A. Bermudez; M. Lewenstein; M.A. Martin-Delgado. Non-Abelian Optical Lattices: Anomalous Quantum Hall Effect and Dirac Fermions. Physical Review Letters. 103, pp. 035301-1 - 035301-4. APS, 14/08/2009. Available on-line at: <https://dx.doi.org/10.1103/PhysRevLett.103.035301>.
**DOI:** 10.1103/PhysRevLett.103.035301
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 3
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 5
**Corresponding author:** No
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 7.328
**Journal in the top 25%:** Yes
**Position of publication:** 6
**No. of journals in the cat.:** 71

**Source of citations:** WOS
**Citations:** 163

**Source of citations:** Google Scholar
**Citations:** 206

**Relevant results:** Selected for the Virtual Journal of Atomic Quantum Fluids 1, Issue 2,

**72** A. Bermudez; D. Porras; M.A. Martin-Delgado. Competing many-body interactions in systems of trapped ions. Physical Review A (Rapid Communication). 79, pp. 060303-1 - 060303-4. APS, 09/07/2009. Available on-line at: <https://arxiv.org/abs/0812.3812>.
**DOI:** 10.1103/PhysRevA.79.060303
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 3
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** Science Edition - PHYSICS, ATOMIC, MOLECULAR & CHEMICAL
**Impact index in year of publication:** 2.866
**Journal in the top 25%:** No
**Position of publication:** 9
**No. of journals in the cat.:** 33

**Source of citations:** WOS
**Citations:** 37

**Source of citations:** Google Scholar
**Citations:** 46

**Relevant results:** Selected for the Virtual Journal of Quantum Information 9, Issue 6, Selected for the Virtual Journal of Nan. Sci. and Tech. 19, Issue 25,

**73** A. Bermudez; D. Patane; L. Amico; M. A. Martin-Delgado. Topology-Induced Anomalous Defect Production by Crossing a Quantum Critical Point. Physical Review Letters. 102, pp. 135702-1 - 135702-4. APS, 03/04/2009. Available on-line at: <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.102.135702>.
**DOI:** 10.1103/PhysRevLett.102.135702
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 4
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** PHYSICS, MULTIDISCIPLINARY
**Impact index in year of publication:** 7.328
**Journal in the top 25%:** Yes
**Position of publication:** 6
**No. of journals in the cat.:** 71

**Source of citations:** WOS
**Citations:** 130

**Source of citations:** Google Scholar
**Citations:** 162

**74** A. Bermudez; M.A. Martin-Delgado. Hyper-entanglement in a relativistic two-body system. Journal of Physics A: Mathematical and Theoretical,. 41, pp. 485302-1 - 485302-21. IOP, 22/10/2008.
**DOI:** 10.1088/1751-8113/41/48/485302
**Type of production:** Scientific paper
**Format:** Journal
**Position of signature:** 1
**Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee
**Total no. authors:** 2
**Corresponding author:** Yes
**Impact source:** ISI
**Category:** PHYSICS, MATHEMATICAL
**Impact index in year of publication:** 1.540
**Journal in the top 25%:** No
**Position of publication:** 19
**No. of journals in the cat.:** 46

**Source of citations:** WOS **Citations:** 5

**Source of citations:** Google Scholar **Citations:** 11

**75** A. Bermudez; M.A. Martin-Delgado; A. Luis. Chirality quantum phase transition in the Dirac oscillator. Physical Review A. 77, pp. 063815-1 - 063815-13. APS, 11/07/2008. Available on-line at: <https://journals.aps.org/pra/abstract/10.1103/PhysRevA.77.063815>.

**DOI:** 10.1103/PhysRevA.77.063815

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 3 **Corresponding author:** Yes

**Impact source:** ISI **Category:** PHYSICS, ATOMIC, MOLECULAR & CHEMICAL

**Impact index in year of publication:** 2.908 **Journal in the top 25%:** Yes

**Position of publication:** 6 **No. of journals in the cat.:** 31

**Source of citations:** WOS **Citations:** 79

**Source of citations:** Google Scholar **Citations:** 114

**Relevant results:** Selected for the Virtual Journal of Quantum Information 8, Issue 6

**76** A. Bermudez; M.A. Martin-Delgado; A. Luis. Nonrelativistic limit in the 2+1 Dirac oscillator: A Ramsey-interferometry effect. Physical Review A. 77, pp. 033832-1 - 033832-9. APS, 18/03/2008. Available on-line at: <https://journals.aps.org/pra/abstract/10.1103/PhysRevA.77.033832>.

**DOI:** 10.1103/PhysRevA.77.033832

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 3 **Corresponding author:** Yes

**Impact source:** ISI **Category:** PHYSICS, ATOMIC, MOLECULAR & CHEMICAL

**Impact index in year of publication:** 2.908 **Journal in the top 25%:** Yes

**Position of publication:** 6 **No. of journals in the cat.:** 31

**Source of citations:** WOS **Citations:** 55

**Source of citations:** Google Scholar **Citations:** 73

**Relevant results:** Selected for the Virtual Journal of Ultrafast Science 7, Issue 4,

**77** A. Bermudez; M. A. Martin-Delgado; E. Solano. Exact mapping of the 2+1 Dirac oscillator onto the Jaynes-Cummings model: Ion-trap experimental proposal. Physical Review A (Rapid Communication). 76, pp. 041801-1041801 - -4. APS, 02/10/2007. Available on-line at: <https://dx.doi.org/10.1103/PhysRevA.76.041801>.

**DOI:** 10.1103/PhysRevA.76.041801

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 3 **Corresponding author:** Yes

**Impact source:** ISI **Category:** PHYSICS, ATOMIC, MOLECULAR & CHEMICAL

**Impact index in year of publication:** 2.893 **Journal in the top 25%:** Yes

**Position of publication:** 7 **No. of journals in the cat.:** 32

**Source of citations:** WOS **Citations:** 164

**Source of citations:** Google Scholar **Citations:** 205

**78** A. Bermudez; M.A. Martin-Delgado; E. Solano. Mesoscopic Superposition States in Relativistic Landau Levels. Physical Review Letters. 99, pp. 123602-1 - 123602-4. APS, 18/09/2007. Available on-line at: <https://link.aps.org/doi/10.1103/PhysRevLett.99.123602>.

**DOI:** 10.1103/PhysRevLett.99.123602

**Type of production:** Scientific paper **Format:** Journal

**Position of signature:** 1 **Degree of contribution:** Author or co-author of article in journal with external admissions assessment committee

**Total no. authors:** 3 **Corresponding author:** Yes

**Impact source:** ISI **Category:** PHYSICS, MULTIDISCIPLINARY

**Impact index in year of publication:** 6.944 **Journal in the top 25%:** Yes

**Position of publication:** 5 **No. of journals in the cat.:** 69

**Source of citations:** WOS **Citations:** 78

**Source of citations:** Google Scholar **Citations:** 118

**Relevant results:** Selected for the Virtual Journal of Quantum Information vol. 7, Issue 10 Selected for the Virtual Journal of Nanoscale Science and Technology 16, Issue 14

## Works submitted to national or international conferences

**1** **Title of the work:** Long-range Ising models: Probing the renormalisation of sound in non-perturbative QFTs with crystals of trapped ions

**Name of the conference:** 3rd North American Conference on Trapped Ions (NACTI)

**Type of event:** Conference **Geographical area:** National

**Type of participation:** 'Participatory - poster **Reasons for participation:** Upon invitation

**City of event:** Durham,, United States of America

**Date of event:** 01/08/2022

**End date:** 04/08/2022

**Organising entity:** Duke University

**City organizing entity:** Bilbao, United States of America

Available on-line at: <https://sites.duke.edu/nacti2022/>.

**2** **Title of the work:** Long-range Ising models: Probing the renormalisation of sound in non-perturbative QFTs with crystals of trapped ions

**Name of the conference:** New trends in complex quantum systems dynamics 2022

**Type of event:** Conference **Geographical area:** National

**Type of participation:** Participatory - invited/keynote talk **Reasons for participation:** INVITED talk

**City of event:** SAN SEBASTIAN, Basque Country, Spain

**Date of event:** 20/06/2022

**End date:** 24/06/2022

**Organising entity:** UPV/EHU - Ikerbasque

**City organizing entity:** Bilbao, Basque Country, Spain

Available on-line at: <https://www.uik.eus/en/activity/new-trends-complex-quantum-systems-dynamics-2022>.

**3** **Title of the work:** Cold-atom regularizations of relavistic 4-Fermi QFTs: Exploring correlated topological phases
**Name of the conference:** Discrete Lattice Gauge Theories - Emergence and Quantum Simulations
**Type of event:** Conference **Geographical area:** National
**Type of participation:** Participatory - invited/keynote talk **Reasons for participation:** INVITED talk
**City of event:** MUNICH, Germany
**Date of event:** 09/05/2022
**End date:** 13/05/2022
**Organising entity:** Munich Center for Quantum Science and Technology
**City organizing entity:** MUNICH, Germany
Available on-line at: <https://www.mcqst.de/news-and-events/gauge-workshop-munich-2022/>.

**4** **Title of the work:** Cold-atom regularizations of relativistic 4-Fermi QFTs: Exploring correlated topological phases
**Name of the conference:** Atomtronics (benasque center )
**Type of event:** Conference **Geographical area:** National
**Type of participation:** Participatory - invited/keynote talk **Reasons for participation:** INVITED talk
**City of event:** Benasque, Aragon, Spain
**Date of event:** 01/05/2022
**End date:** 12/10/2021
**City organizing entity:** Spain
Available on-line at: <https://www.benasque.org/2022atomtronics/>.

**5** **Title of the work:** Cold-atom regularizations of four-Fermi field theories in 2+1 dimensions
**Name of the conference:** APS DNP Fall Meeting 2021 (Division of Nuclear Physics, American Physical Society), Minisymposium on "Developments in Quantum Simulations for Nuclear Physics"
**Type of event:** Conference **Geographical area:** Non EU International
**Type of participation:** Participatory - oral communication **Reasons for participation:** Contributed talk
**City of event:** Boston, United States of America
**Date of event:** 12/10/2021
**End date:** 12/10/2021
**Organising entity:** American Physical Society **Type of entity:** Sociedad Americana de Física
**City organizing entity:** United States of America
Available on-line at: <https://meetings.aps.org/Meeting/DNP21/Session/DN.5>.

**6** **Title of the work:** Quantum sensors for the generating functional
**Name of the conference:** International Workshop on" Quantum Simulation of Strong Interactions (QuaSI-2)"
**Type of event:** Conference
**Type of participation:** Participatory - invited/keynote talk **Reasons for participation:** Upon invitation
**City of event:** Washington, United States of America
**Date of event:** 07/06/2021
**End date:** 12/07/2019
**Organising entity:** Incubator for Quantum simulations (IQus) **Type of entity:** Public Research Body
**City organizing entity:** Washington, United States of America
A. Bermudez. Available on-line at: <https://iqus.uw.edu/events/quantum-simulation-of-strong-interactions-quasi-workshop-2-implementation-strategies-for-gauge-theories/>.

**7** **Title of the work:** Photon-assisted tunneling in cold atoms: from background gauge fields to an Aharonov-Bohm instability  towards a deconfined phase
**Name of the conference:** International INT Program 21-1a "Topological Phases of Matter: From Low to High Energy"
**Type of event:** Conference
**Type of participation:** Participatory - invited/keynote  **Reasons for participation:** Upon invitation talk
**City of event:** Washington,, United States of America
**Date of event:** 01/03/2021
**End date:** 19/03/2021
**Organising entity:** Institute of Nuclear Theory (INT),  **Type of entity:** University
University of Washington,
**City organizing entity:** Washington, United States of America
A. Bermudez. Available on-line at: <https://docs.google.com/spreadsheets/d/e/2PACX-1vTQx476O7b8L2Hkvr1H30qbQ4wkPobD-wv8Y7zujqlnSWs-TDrCd1zx29F5MsQ5HuXodxLMzVGq34FH/pubhtml#>.

**8** **Title of the work:** Topological fermions coupled to gauge fields: strong correlations and the quantum-mechanical theta angle"
**Name of the conference:** International Workshop on “Quantum Simulation: Gauge fields, Holography and Topology"
**Type of event:** Conference
**Type of participation:** Participatory - invited/keynote  **Reasons for participation:** Upon invitation talk
**City of event:** Bilbao, Spain
**Date of event:** 10/07/2019
**End date:** 12/07/2019
**Organising entity:** Universidad del País Vasco
**City organizing entity:** Bilbao, Spain
A. Bermudez. Available on-line at: <https://sites.google.com/view/quant-sim-ght>.

**9** **Title of the work:** Assessing the progress of trapped-ion processors towards fault-tolerant quantum computation
**Name of the conference:** International Workshop on “Dynamical Gauge Fields and lattice gauge theories with ultra cold atoms"
**Type of event:** Conference
**Type of participation:** Participatory - oral communication
**City of event:** Zurich, Switzerland
**Date of event:** 26/06/2019
**End date:** 28/06/2019
**Organising entity:** ETH
**City organizing entity:** Zurich, Switzerland
A. Bermudez. Available on-line at: <https://www.quantumoptics.ethz.ch/index.php?id=231>.

**10** **Title of the work:** Assessing the progress of trapped-ion processors towards fault-tolerant quantum computation
**Name of the conference:** International Workshop on “Quantum Simulation & Computation: Advantage, Scalability, and Verification”
**Type of event:** Conference
**Type of participation:** Participatory - oral communication
**City of event:** Bilbao, Basque Country, Spain

**Date of event:** 12/02/2018
**End date:** 16/05/2018
**Organising entity:** Universidad del País Vasco **Type of entity:** University
**City organizing entity:** Bilbao, Basque Country, Spain
A. Bermudez. Available on-line at: <http://qsc2018.hbar.es>.

**11** **Title of the work:** Interacting topological insulators with ultra-cold atoms in synthetic dimensions
**Name of the conference:** Synthetic dimensions in quantum engineered systems
**Type of event:** Conference
**Type of participation:** Participatory - invited/keynote talk
**City of event:** Zurich, Switzerland
**Date of event:** 21/11/2017
**End date:** 23/11/2017
**Organising entity:** ETH Zurich **Type of entity:** University
**City organizing entity:** Zurich, Switzerland
A Bemrudez. Available on-line at: <https://quest.phys.ethz.ch/synth_17/program.html>.

**12** **Title of the work:** Tutorial on Quantum Computing and Error Correction with Trapped Ions
**Name of the conference:** ICE-4 (workshop of the Spanish Network on Quantum Information and Quantum Technologies)
**Type of event:** Conference
**Type of participation:** Participatory - invited/keynote talk
**City of event:** Madrid, Community of Madrid, Spain
**Date of event:** 10/07/2017
**End date:** 14/07/2017
**Organising entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**City organizing entity:** Madrid, Community of Madrid, Spain
A Bermudez. Available on-line at: <http://benasque.org/2017ice4/>.

**13** **Title of the work:** Hybrid Quantum Magnetism in circuit-QED: from spin-photon waves to many-body spectroscopy
**Name of the conference:** APS Annual Conference (American Physical Society)
**Type of event:** Conference
**Type of participation:** Participatory - oral communication **Reasons for participation:** Contributed talk
**City of event:** Denver, United States of America
**Date of event:** 03/03/2014
**End date:** 07/03/2014
**Organising entity:** American Physical Society
Available on-line at: <http://meetings.aps.org/Meeting/MAR14/Session/A34.9>.

**14** **Title of the work:** Sympathetic dissipative gadgets and quantum transport of correlations in ion crystals,
**Name of the conference:** Junior Researcher Conference "Quantum Simulations of Open Quantum Systems"
**Type of event:** Conference **Geographical area:** European Union
**Type of participation:** Participatory - invited/keynote talk **Reasons for participation:** Upon invitation
**City of event:** Freiburg, Freiburg, Germany
**Date of event:** 13/11/2013
**End date:** 15/11/2013

**Organising entity:** Freiburg Institute for Advanced Studies (FRIAS)
**City organizing entity:** Freiburg, Freiburg, Germany
Available on-line at: <http://www.frias.uni-freiburg.de/en/events/current-events/junior-researcher-conference-quantum-simulations-of-open-quantum-systems>.

**15** **Title of the work:** Tailoring the emergence of many-body phenomena with trapped-ion crystals
**Name of the conference:** European Conference on Trapped Ions
**Type of event:** Conference **Geographical area:** European Union
**Type of participation:** Participatory - invited/keynote talk **Reasons for participation:** Upon invitation
**City of event:** Obergurgl, Austria
**Date of event:** 10/09/2012
**End date:** 14/09/2012
**Organising entity:** Universität Innsbruck
**City organizing entity:** Innsbruck, Austria
A. Bermudez. Available on-line at: <http://www.uibk.ac.at/news/ecti/>.

**16** **Title of the work:** Quantum Simulations of Frustrated Quantum Ising Models with Cold Ion Crystals
**Name of the conference:** DPG Annual Conference (Deutsche Physikalische Gesellschaft)
**Type of event:** Conference **Geographical area:** European Union
**Type of participation:** Participatory - oral communication **Reasons for participation:** Contributed talk
**City of event:** Stuttgart, Germany
**Date of event:** 12/03/2012
**End date:** 16/03/2012
**Organising entity:** Deutsche Physikalische Gesellschaft
**City organizing entity:** Germany
**With external admission assessment committee:** Yes
Available on-line at: <http://www.dpg-verhandlungen.de/year/2012/conference/stuttgart/static/a35.pdf>.

**17** **Title of the work:** 3-body quantum magnetism in trapped ions
**Name of the conference:** Quantum Simulators Conference, Wilhelm und Else Heraeus Seminar
**Type of event:** Conference **Geographical area:** European Union
**Type of participation:** 'Participatory - poster **Reasons for participation:** Contributed poster
**City of event:** Bad Honnef, Germany
**Date of event:** 12/09/2009
**End date:** 15/09/2009
**Organising entity:** Technische Universität München **Type of entity:** University
**City organizing entity:** Munich, Germany
**With external admission assessment committee:** Yes
Available on-line at: <http://www.ph.tum.de/quantumdynamics/qs_workshop/>.

**18** **Title of the work:** Dirac Equation in Trapped ions
**Name of the conference:** Conference MATHQCI (Mathematical Foundations of Quantum Control and Quantum Information theory)
**Type of event:** Conference **Geographical area:** European Union
**Type of participation:** Participatory - oral communication **Reasons for participation:** Contributed talk
**City of event:** Madrid, Spain
**Date of event:** 26/05/2008
**End date:** 30/05/2008

**Organising entity:** Universidad Carlos III de Madrid **Type of entity:** University
**City organizing entity:** Madrid, Community of Madrid, Spain
**With external admission assessment committee:** Yes
Available on-line at: <http://pendientedemigracion.ucm.es/info/rsef/iwork_mathematical/>.

**19** **Title of the work:** Exact mappings between quantum relativistic and quantum optical models,
**Name of the conference:** APS Annual Conference (American Physical Society)
**Type of event:** Conference **Geographical area:** Non EU International
**Type of participation:** Participatory - oral communication **Reasons for participation:** Contributed talk
**City of event:** New orleans, United States of America
**Date of event:** 10/03/2008
**End date:** 14/03/2008
**Organising entity:** American Physical Society **Type of entity:** Sociedad Americana de Física
**City organizing entity:** United States of America
Available on-line at: <http://meetings.aps.org/Meeting/MAR08/Session/D15.10>.

**20** **Title of the work:** Relativistic Quantum Mechanics vs. Quantum Optics
**Name of the conference:** Conference YEP (Young European Physicist)
**Type of event:** Conference **Geographical area:** European Union
**Type of participation:** Participatory - oral communication **Reasons for participation:** Contributed Talk
**City of event:** Munich, Germany
**Date of event:** 17/09/2007
**End date:** 21/09/2007
**Organising entity:** Max-Planck-Institut für Quantenoptik
**City organizing entity:** Munich, Germany
Available on-line at: <http://www2.mpq.mpg.de/Theorygroup/CIRAC/wiki/index.php/YEP-07.html>.

**21** **Title of the work:** Exact Mappings between Relativistic Quantum Mechanics and Quantum Optics models
**Name of the conference:** Conference EYSCQI (European Young Scientists Conference on Quantum Information)
**Type of event:** Conference **Geographical area:** European Union
**Type of participation:** 'Participatory - poster **Reasons for participation:** Contributed poster
**City of event:** Vienna, Austria
**Date of event:** 27/08/2007
**End date:** 31/08/2007
**Organising entity:** Universität Wien
**City organizing entity:** Viena, Austria
Available on-line at:
<http://conferences-in-vienna.info/en/2007/august/conference-329/conference-dates.html>.

## Works submitted to national or international seminars, workshops and/or courses

**1** **Title of the work:** Synthetic gauge fields in trapped-ion crystals: From background Peierls phases to Z2 gauge fields
**Name of the event:** Atomtronics workshop
**Type of event:** Workshop
**Corresponding author:** Yes
**City of event:** Benasque, Spain

**Date of event:** 20/05/2024
**End date:** 24/05/2024
**Organising entity:** FUNDACION CENTRO DE CIENCIAS DE BENASQUE
**City organizing entity:** Benasque, Spain
**With external admission assessment committee:** Yes
A Bermudez. "Synthetic gauge fields in trapped-ion crystals: From background Peierls phases to Z2 gauge fields". En: Invited talk. 24/05/2024, Available on-line at: <https://www.benasque.org/2024atomtronics/cgi-bin/talks/allprint.pl>.

2 **Title of the work:** Cold-atom regularizations of Gross-Neveu-type relativistic QFTs
**Name of the event:** TOWARD QUANTUM ADVANTAGE IN HIGH ENERGY PHYSICS (https://www.munich-iapbp.de/quantum-computing/tws-2023-3)
**Type of event:** Workshop
**Corresponding author:** Yes
**City of event:** Munich, Germany
**Date of event:** 19/04/2024
**End date:** 21/04/2024
**Organising entity:** MIAPbP **Type of entity:** R&D Centre
**City organizing entity:** Munich, Germany
**With external admission assessment committee:** Yes
A Bermudez. "Cold-atom regularizations of Gross-Neveu-type relativistic QFTs". En: Lightning talk. 20/04/2023, Available on-line at: <https://indico.ph.tum.de/event/7112/contributions/>.

3 **Title of the work:** Simulation and sensing of quantum field theories with quantum technologies
**Name of the event:** MIAPbP program "Quantum Computing Methods for High Energy Physics"
**Type of event:** Workshop
**Corresponding author:** Yes
**City of event:** Munich, Germany
**Date of event:** 13/04/2024
**End date:** 05/05/2024
**Organising entity:** MIAPbP **Type of entity:** R&D Centre
**City organizing entity:** Munich, Germany
**With external admission assessment committee:** Yes
A Bermudez. "Simulation and sensing of quantum field theories with quantum technologies". En: Regular talk. 12/04/2023, Available on-line at: <https://www.munich-iapbp.de/quantum-computing>.

4 **Title of the work:** HIGH-ENERGY PHYSICS @ ULTRACOLD TEMPERATURES A quantum simulation approach
**Name of the event:** Quantum matter seminar
**Type of event:** Seminar
**City of event:** Madrid, Spain
**Date of event:** 01/12/2021
**Organising entity:** Instituto de Física Teórica **Type of entity:** State agency
**City organizing entity:** Madrid, Spain

5 **Title of the work:** Photon-assisted tunneling of cold atoms: exploring Z2 gauge theories coupled to fermionic matte
**Name of the event:** Fundamental Particle Physics group seminar
**Type of event:** Seminar
**City of event:** Liverpool, United Kingdom
**Date of event:** 10/11/2021

**Organising entity:** Liverpool University
**City organizing entity:** Liverpool, United Kingdom

6 **Title of the work:** TOPOLOGICAL LATTICE FIELDS Cold-atom quantum simulators for High-Energy physics
**Name of the event:** TU Munich seminar
**Type of event:** Seminar
**City of event:** Munich, Germany
**Date of event:** 16/12/2020
**Organising entity:** Technical University Munich (TUM) **Type of entity:** University
**City organizing entity:** Munich, Germany

7 **Title of the work:** Cold-atom interacting topological insulators and their connection to high-energy physics
**Name of the event:** Quantum Optics seminar at IQOQI
**Type of event:** Seminar
**City of event:** Innsbruck, Austria
**Date of event:** 22/03/2018
**Organising entity:** Universidad de Innsbruck
**City organizing entity:** Innsbruck, Austria

8 **Title of the work:** A Photon-Assisted Tunneling Quantum Simulator of Strongly-Correlated Electrons and Dynamical Gauge Fields in Optical Lattices
**Name of the event:** Theorie kolloquium at J. Guttenberg Universität
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**Geographical area:** European Union
**City of event:** Mainz, Germany
**Date of event:** 08/12/2016
**End date:** 08/12/2016
**Organising entity:** J. Guttenberg Universität **Type of entity:** University
**City organizing entity:** Mainz, Germany
En: Invited seminar. 13/07/2015, Available on-line at: <http://seminar.physik.uni-mainz.de/abstract.php?linkTalkID=4288>.

9 **Title of the work:** Quantum transport of energy in synthetic quantum magnets
**Name of the event:** 8th meeting of the Madrid Cold Atoms Network
**Type of event:** Workshop
**Reasons for participation:** Speaker
**Geographical area:** Non EU International
**City of event:** Madrid, Spain
**Date of event:** 11/01/2016
**End date:** 11/01/2016
**Organising entity:** Universidad Complutense de Madrid **Type of entity:** University
**City organizing entity:** Madrid, Spain
En: Contributed talk. 11/01/2016,

10 **Title of the work:** A Photon-Assisted Tunneling Quantum Simulator of Strongly-Correlated Electrons and Dynamical Gauge Fields in Optical Lattices
**Name of the event:** Seminar at the Institute of Phtonic Sciences (ICFO)

**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**Geographical area:** Non EU International
**City of event:** Barcelona, Spain
**Date of event:** 13/07/2015
**End date:** 13/07/2015
**Organising entity:** Institut de Ciències Fotòniques **Type of entity:** Foundation
**City organizing entity:** Barcelona, Spain
En: Invited seminar. 13/07/2015, Available on-line at: <https://www.icfo.eu/newsroom/calendar2.php?news=2751>.

**11** **Title of the work:** A Photon-Assisted Tunneling Quantum Simulator of Strongly-Correlated Electrons and Dynamical Gauge Fields in Optical Lattices
**Name of the event:** Seminar at the Quantum Optica Group (Ludwig Maximillian Universitaet, Munich)
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**Geographical area:** European Union
**City of event:** Munich, Germany
**Date of event:** 30/06/2015
**End date:** 30/06/2015
**Organising entity:** Ludwig Maximillian Universitaet **Type of entity:** University
**City organizing entity:** Munich, Germany
En: Invited seminar. 30/06/2015, Available on-line at: <http://www.quantum-munich.de/seminars-events/seminars/seminar/article//group-seminar-lmu-a-photon-assisted-tunneling-quantum-simulator-of-strongly-correlated-electrons-and-dynamical-gauge-fields-in-optical-lattices/>.

**12** **Title of the work:** Interaction-Dependent Photon-Assisted Tunneling in Optical Lattices: A Quantum Simulator of Strongly-Correlated Electrons and Dynamical Gauge Fields
**Name of the event:** Workshop de Información Cuántica en España (ICE-2)
**Type of event:** Workshop
**Reasons for participation:** Speaker
**Geographical area:** Non EU International
**City of event:** Bilbao, Spain
**Date of event:** 01/06/2015
**End date:** 03/06/2015
**Organising entity:** Universidad de Pais Vasco **Type of entity:** University
**City organizing entity:** Bilbao, Spain
En: Contributed workshop talk. 03/06/2015, Available on-line at: <https://sites.google.com/site/ice2bilbao/schedule>.

**13** **Title of the work:** Driven spin-boson Luttinger liquids with trapped ions
**Name of the event:** Workshop on Quantum Information and Quantum Dynamics in ion traps (QION15)
**Type of event:** Workshop
**Reasons for participation:** Upon invitation
**Geographical area:** Non EU International
**City of event:** Tel Aviv, Israel
**Date of event:** 15/03/2015
**End date:** 19/03/2015
**Organising entity:** Weizmann Institute of Science **Type of entity:** Public Research Body
**City organizing entity:** Tel Aviv, Israel

En: Invited workshop talk. 15/03/2015, Available on-line at: <http://www.phys.huji.ac.il/~retzker/qion15/Program.html>.

**14** **Title of the work:** Spin-boson lattice models
**Name of the event:** Workshop de Información Cuántica en España (ICE-1)
**Type of event:** Workshop
**Reasons for participation:** Upon invitation
**City of event:** zaragoza, Aragon, Spain
**Date of event:** 25/06/2014
**End date:** 27/06/2014
**Organising entity:** Universidad de Zaragoza
En: Invited workshop talk. Available on-line at: <http://complex.unizar.es/~ice1/>.

**15** **Title of the work:** Spin-boson quantum simulators on the lattice
**Name of the event:** Workshop on Quantum Gases and Quantum Coherence (BEC2014)
**Type of event:** Workshop
**Reasons for participation:** Upon invitation
**City of event:** Levico Terme, Italy
**Date of event:** 28/05/2014
**End date:** 31/05/2014
**Organising entity:** University of Trento
En: Invited talk. Available on-line at: <http://bec2014.science.unitn.it/>.

**16** **Title of the work:** Spin-boson lattice models: Lieb-Robinson bounds, Ising phase transitions, and Luttinger liquids
**Name of the event:** Seminar of the Ion Storage Group at the National Institute of Standards and Technology (NIST)
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**City of event:** Boulder, Colorado, United States of America
**Date of event:** 10/03/2014
**End date:** 10/03/2014
**Organising entity:** National Institute of Standards and Technology (NIST)

**17** **Title of the work:** Sympathetic dissipative gadgets for quantum information processing and quantum simulations with trapped ions
**Name of the event:** Workshop on Quantum Simulations with Trapped Ions (IQsim13)
**Type of event:** Workshop
**Reasons for participation:** Speaker
**City of event:** Brighton, United Kingdom
**Date of event:** 16/12/2013
**End date:** 19/12/2013
**Organising entity:** University of Sussex
En: Contributed talk. Available on-line at: <http://www.sussex.ac.uk/amo/iqsim13/>.

**18** **Title of the work:** Sympathetic dissipative gadgets for quantum information processing and quantum simulations with trapped ions
**Name of the event:** Seminar of the Atomic, Molecular and Optical Physics Group in Sussex University
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**City of event:** Brighton, United Kingdom

**Date of event:** 04/12/2013
**End date:** 04/12/2013
**Organising entity:** University of Sussex

**19** **Title of the work:** Sympathetic dissipative gadgets for quantum information processing and quantum simulations with trapped ions
**Name of the event:** Seminar of the Institute of Photonics and Quantum Sciences (IPAQS)
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**City of event:** Edinburgh, United Kingdom
**Date of event:** 29/11/2013
**End date:** 29/11/2013
**Organising entity:** Heriot-Watt University

**20** **Title of the work:** Sympathetic dissipative gadgets and quantum transport of correlations in ion crystals
**Name of the event:** Workshop on Quantum Applications with Trapped Ions
**Type of event:** Workshop
**Reasons for participation:** Upon invitation
**City of event:** Boston, United States of America
**Date of event:** 16/09/2013
**End date:** 18/09/2013
**Organising entity:** Harvard University, Institute for Theoretical Atomic Molecular and Optical Physics (ITAMP)
En: Invited talk. Available on-line at: <http://www.cfa.harvard.edu/itamp/Trapped-Ion-2013.html>.

**21** **Title of the work:** Quantum Heat Transport in Coulomb Crystals
**Name of the event:** Seminar of Institut für Experimentelle Quantenmetrologie (QUEST),
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**City of event:** Braunschweig, Germany
**Date of event:** 08/04/2013
**End date:** 08/04/2013
**Organising entity:** Physikalisch-Technische Bundesanstalt (PTB)

**22** **Title of the work:** Frustrated Quantum Magnetism and Spin-Peierls Phases with Trapped Ions
**Name of the event:** Workshop on Quantum Simulations
**Type of event:** Workshop
**Reasons for participation:** Speaker
**City of event:** Bilbao, Basque Country, Spain
**Date of event:** 22/10/2012
**End date:** 25/10/2012
**Organising entity:** Universidad del País Vasco UPV/EHU **Type of entity:** University
En: Contributed talk. Available on-line at: <https://sites.google.com/site/quantumsimulationsbilbao12/>.

**23** **Title of the work:** Tailoring the emergence of quantum many-body phenomena with trapped-ion crystals
**Name of the event:** Seminar SFB/TR49-Kolloquium experimentelle Physik der kondensierten Materie
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**Geographical area:** European Union
**City of event:** Mainz, Germany

**Date of event:** 12/07/2012
**End date:** 12/07/2012
**Organising entity:** Johannes Gutenberg-Universität Mainz
**City organizing entity:** Mainz, Germany
Available on-line at: <http://seminar.physik.uni-mainz.de/abstract.php?linkTalkID=2825>.

**24** **Title of the work:** Frustrated Quantum Magnetism and Spin-Peierls phases with trapped ions,
**Name of the event:** Workshop on Control of Quantum Dynamics of Atoms, Molecules and Ensembles by Light (CAMEL8)
**Type of event:** Workshop
**Reasons for participation:** Speaker
**City of event:** Nessebar, Bulgaria
**Date of event:** 25/06/2012
**End date:** 29/06/2012
**Organising entity:** University of Sofia
En: Contributed talk.

**25** **Title of the work:** Robust Quantum Gates by Continuous Dynamical Decoupling
**Name of the event:** Workshop on Quantum Information and Quantum Dynamics in Ion Traps, QION12
**Type of event:** Workshop
**Reasons for participation:** Speaker
**City of event:** Tel-Aviv, Israel
**Date of event:** 25/04/2012
**End date:** 29/04/2012
**Organising entity:** Weizmann Institute of Science
En: Contributed talk. Available on-line at: <http://qion12.info/>.

**26** **Title of the work:** Quantum Simulations with Phonons in Ion Traps
**Name of the event:** Workshop on Quantum Information and Quantum Dynamics in Ion Traps, QION11
**Type of event:** Workshop
**City of event:** Madrid, Community of Madrid, Spain
**Date of event:** 26/04/2011
**End date:** 29/04/2011
**Organising entity:** Universidad Complutense de Madrid
En: Contributed poster. Available on-line at: <http://qion11.info/>.

**27** **Title of the work:** Wilson fermions and three-dimensional topological insulators in optical lattices
**Name of the event:** Workshop on Quantum Simulations
**Type of event:** Workshop
**Reasons for participation:** Speaker
**City of event:** Benasque, Aragon, Spain
**Date of event:** 28/02/2011
**End date:** 05/03/2011
**Organising entity:** Universidad del País Vasco UPV/EHU
**City organizing entity:** Bilbao,
En: Contributed talk. Available on-line at: <http://benasque.org/2011qs/cgi-bin/talks/allprint.pl>.

**28** **Title of the work:** Non-Abelian Optical lattices: Dirac fermions and topological phase transitions
**Name of the event:** 4th GIQ Mini-workshop: An introduction to lattice gauge theories in ultracold gases and quantum information
**Type of event:** Workshop

**Reasons for participation:** Upon invitation
**City of event:** Barcelona, Spain
**Date of event:** 25/02/2011
**End date:** 25/02/2011
**Organising entity:** Universitat Autònoma of Barcelona
En: Invited talk.

29 **Title of the work:** 2D and 3D Topological Insulators in Condensed Matter and High Energy Physics
**Name of the event:** Seminar of the Institute for Quantum Optics and Quantum Information (IQOQI)
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**City of event:** Innsbruck, Austria
**Date of event:** 26/05/2010
**End date:** 26/05/2010
**Organising entity:** Institute for Quantum Optics and Quantum Information (IQOQI)
Available on-line at: <http://iqoqi.at/en/events/event/644>.

30 **Title of the work:** Anderson localization of phonons in ion traps with controlled quantum disorder
**Name of the event:** Seminar of the Center for Nonlinear Phenomena and Complex Systems
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**City of event:** Brussels, Belgium
**Date of event:** 09/04/2010
**End date:** 08/04/2010
**Organising entity:** Université Libre de Bruxelles **Type of entity:** University
Available on-line at: <http://complex.ulb.ac.be/tiki/tiki-calendar_edit_item.php?viewcalitemId=14>.

31 **Title of the work:** 3-Body Interactions in Trapped Ions: Beyond the Usual Pairwise Scenario
**Name of the event:** Seminar of Institut de Ciències Fotòniques (ICFO) Seminar
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**City of event:** Barcelona, Spain
**Date of event:** 28/11/2008
**End date:** 28/11/2008
**Organising entity:** Institut de Ciències Fotòniques (ICFO)
Available on-line at: <http://www.icfo.eu/newsroom/calendar2.php?event=775>.

32 **Title of the work:** A quantum optics perspective into relativistic systems
**Name of the event:** Seminar of the Max-Planck-Institut für Quantenoptik
**Type of event:** Seminar
**Reasons for participation:** Upon invitation
**City of event:** Munich, Germany
**Date of event:** 27/07/2008
**End date:** 27/06/2008
**Organising entity:** Max-Planck-Institut für Quantenoptik (MPQ)
Available on-line at: <http://www2.mpq.mpg.de/Theorygroup/CIRAC/wiki/index.php/Seminars_2008.html>.

## Science Outreach activities

1 **Title of the work:** Editor of the Ion Trapper's Newsletter
**Type of event:** Monthly newsletter
**Date of event:** 01/01/2015
**Organising entity:** Scientific network established stablished as a follow-up of the COST action MP1001 IOTA (Ion traps for tomorrow's applications)
Available on-line at: <http://www.cost-iota.org/news>.

2 **Title of the work:** Divulgation contribution to the Spanish Physics Journal
**Name of the event:** Revista Española de Física
**Geographical area:** National
**Reasons for participation:** Upon invitation
**City of event:** Madrid, Community of Madrid, Spain
**Date of event:** 01/01/2008
**Organising entity:** REAL SOCIEDAD ESPAÑOLA DE FISICA
**With external admission assessment committee:** Yes
**Type:** Scientific paper
A. Bermudez; M.A. Martin-Delgado. "El oscilador de Dirac en iones atrapados y Gatos de Dirac relativistas". En: Revista Española de Física. 22 - 3, pp. 27 - 35. 01/01/2008. Available on-line at: <http://www.revistadefisica.es/index.php/ref/article/view/892>.

# R&D management and participation in scientific committees

## Scientific, technical and/or assessment committees

1 **Committee title:** PhD Thesis defense Committee of Dr. Alvaro Parra (vocal)
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Affiliation entity:** Universidad Complutense de Madrid
**City affiliation entity:** Madrid, Community of Madrid, Spain
**Start-End date:** 13/12/2024 - 13/12/2024

2 **Committee title:** PhD Thesis defense Committee of Dr.Manuel Campos Yuste (secretario)
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Affiliation entity:** Universidad Autónoma de Madrid **Type of entity:** University
**City affiliation entity:** Madrid, Community of Madrid, Spain
**Start-End date:** 25/04/2023 - 25/04/2023

3 **Committee title:** PhD Thesis defense Committee of Dr. Santiago Varona (secretario)
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Affiliation entity:** Universidad Complutense de Madrid **Type of entity:** University

**City affiliation entity:** Madrid, Community of Madrid, Spain
**Start-End date:** 10/12/2020 - 10/12/2020

4 **Committee title:** PhD Thesis defense Committee of Dr. Sergi Julia Farre (vocal)
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Affiliation entity:** Universidad Politecnica de Barcelona
**City affiliation entity:** Barcelona, Catalonia, Spain
**Start date:** 28/06/2022

5 **Committee title:** PhD Thesis defense Committee of Dr. Blanca Silvia Fernández (reserve)
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Affiliation entity:** Universidad Autónoma de Madrid **Type of entity:** University
**City affiliation entity:** Madrid, Community of Madrid, Spain
**Start date:** 20/12/2016

6 **Committee title:** PhD Thesis defense Committee of Dr. David Paul Colás (reserve)
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Affiliation entity:** Universidad Autónoma de Madrid **Type of entity:** University
**City affiliation entity:** Zaragoza, Aragon, Spain
**Start date:** 29/06/2016

7 **Committee title:** PhD Thesis defense Committee of Dr. Fernando Quijandría (reserve)
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Affiliation entity:** Universidad de Zaragoza **Type of entity:** University
**City affiliation entity:** Zaragoza, Aragon, Spain
**Start date:** 20/10/2015

## Organization of R&D activities

1 **Title of the activity:** ETVII workshop on "Randomness, Complexity and Quantum Circuits" (https://www.benasque.org/2023entangle/)
**Type of activity:** International workshop
**City of event:** baneasque, Spain
**Convening entity:** FUNDACION CENTRO DE CIENCIAS DE BENASQUE
**City convening entity:** Benasque, Spain
**Type of participation:** Organiser
**Nº assistants:** 100
**Start-End date:** 11/06/2023 - 17/06/2023 **Duration:** 5 days

2 **Title of the activity:** ECT* workshop on "High-Energy Physics at ultra cold temperatures" (https://www.ectstar.eu/workshops/high-energy-physics-at-ultra-cold-temperatures/)
**Type of activity:** International workshop

**City of event:** Trento, Italy
**Convening entity:** ECT* (European centre for Theoretical Studies)
**City convening entity:** Trento, Jamaica
**Type of participation:** Organiser
**Nº assistants:** 35
**Start-End date:** 10/06/2019 - 14/10/2019 **Duration:** 5 days

## R&D management

**1** **Name of the activity:** Project Modular Logical Qubits (W911NF-23-S-0004, MODULARIS, IARPA, USA).
**Type of management:** Management of R&D&I actions and projects
**Performed tasks:** Investigador Principal
**City of entity:** Madrid, Spain
**Entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Start date:** 01/11/2023 **Duration:** 3 years
**Access system:** By competition
**Average annual budget:** 156.000 **Nº of people:** 3
**Specific tasks:** Principal investigator of the noise at IFT CSIC-UAM

**2** **Name of the activity:** project: Modular industrial large-scale quantum computing with trapped ions, phase 1, ("MILLENION-SGA1" EU Project,101114305, Quantum Technologies Flagship EU).
**Type of management:** Management of R&D&I actions and projects
**Performed tasks:** Workpackage coordinator and principal investigator
**City of entity:** Madrid, Spain
**Entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Start date:** 01/03/2023 **Duration:** 3 years - 6 months
**Access system:** By competition
**Average annual budget:** 168.000 **Nº of people:** 3
**Specific tasks:** Coordinator or Workpackage 4. Principal investigator of the node at IFT CSIC-UAM

**3** **Name of the activity:** Verification and Certification of Quantum Fault-Tolerance (VEQTOR, W911NF-20-S-0004, LPS-ARO, USA)
**Type of management:** Management of R&D&I actions and projects
**Performed tasks:** Investigador Principal
**City of entity:** Madrid, Spain
**Entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Start date:** 01/11/2021 **Duration:** 5 years
**Access system:** By competition
**Average annual budget:** 105.000 **Nº of people:** 3
**Specific tasks:** Principal investigator of the node at IFT CSIC-UAM

**4** **Name of the activity:** Advanced Quantum Computing with trapped ions (Aqtion, 820495, Quantum Technologies Flagship EU).
**Type of management:** Management of R&D&I actions and projects
**Performed tasks:** Investigador Principal
**City of entity:** Madrid, Spain
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Start date:** 01/04/2020 **Duration:** 1 year - 8 months

**Access system:** By competition
**Average annual budget:** 94.000 **Nº of people:** 3
**Specific tasks:** Principal investigator of the node at IFT CSIC-UAM

**5** **Name of the activity:** Proyecto Generación de conocimiento, PGC2018-099169-B-100, Tecnologías Cuánticas Topológicas (ToQTech)
**Type of management:** Management of R&D&I actions and projects
**Performed tasks:** Investigador Principal
**City of entity:** Madrid, Spain
**Entity:** Universidad Complutense de Madrid **Type of entity:** University
**Start date:** 01/01/2019 **Duration:** 3 years
**Access system:** By competition
**Average annual budget:** 32.000 **Nº of people:** 6

## Evaluation and revision of R&D projects and articles

**1** **Name of the activity:** external panel
**Performed tasks:** Evaluation expert for HORIZON MSCA-PF-2024 proposals
**Entity where activity was carried out:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Start-End date:** 16/10/2024 - 22/11/2024

**2** **Name of the activity:** external panel
**Performed tasks:** Evaluation expert for Fundación Séneca, Saavedra Fajardo tenure-track program
**Entity where activity was carried out:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**City of entity:** murcia, Region of Murcia, Spain
**Start-End date:** 12/11/2024 - 19/11/2024

**3** **Name of the activity:** external panel
**Performed tasks:** Evaluation expert for Fundación Séneca, Saavedra Fajardo tenure-track program
**Entity where activity was carried out:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**City of entity:** murcia, Region of Murcia, Spain
**Start-End date:** 12/11/2024 - 19/11/2024

**4** **Name of the activity:** external panel
**Performed tasks:** Expert Peer Reviewer for HEP QuantISED 2.0, U.S. Department of Energy Office of Science High Energy Physics (HEP) program
**Entity where activity was carried out:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Start-End date:** 29/08/2024 - 27/09/2024

**5** **Name of the activity:** external panel
**Performed tasks:** Project monitoring expert for MicroQC - 820314 - PMON-820314-2 , European research council
**Entity where activity was carried out:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Start-End date:** 14/10/2022 - 14/10/2022

6 **Name of the activity:** external panel
**Performed tasks:** Evaluation expert for QUSTEC doctoral program, Horizon2020-Project doctoral training program,
**Entity where activity was carried out:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** Freiburg, Basel, Strasbourg,
**Start-End date:** 21/11/2020 - 22/11/2020

7 **Name of the activity:** external panel
**Performed tasks:** Evaluation expert for QUSTEC doctoral program, Horizon2020-Project doctoral training program,
**Entity where activity was carried out:** Universidad Complutense de Madrid **Type of entity:** University
**City of entity:** Freiburg, Basel, Strasbourg,
**Start-End date:** 08/10/2019 - 23/10/2019

## Other achievements

### Stays in public or private R&D centres

1 **Entity:** University of Oxford **Type of entity:** University
**Faculty, institute or centre:** Department of Laser and Atomic Physics
**City of entity:** Oxford, United Kingdom
**Start-End date:** 01/09/2023 - 30/07/2024 **Duration:** 11 months
**Goals of the stay:** Guest
**Narrative explanation:** 6 months funded by the Salvador Madariaga program for research stays of senior scientists, ministerio de ciencia, innovation e universidades. 5 additional months as a guest of Prof. D. Lucas, housing allowance on behalf of Balliol college and local grant.
**Type of stay:** Investigación

2 **Entity:** University of Swansea **Type of entity:** University
**Faculty, institute or centre:** Department of Physics
**City of entity:** Swansea, United Kingdom
**Start-End date:** 10/05/2016 - 30/04/2017 **Duration:** 9 months
**Goals of the stay:** Post-doctoral

3 **Entity:** University of Freiburg
**Faculty, institute or centre:** Physics
**City of entity:** Freiburg, Freiburg, Germany
**Start-End date:** 01/08/2015 - 15/08/2015 **Duration:** 15 days
**Goals of the stay:** Post-doctoral
**Provable tasks:** Short Scientific Mission under the program “Designed quantum transport in complex materials”

4 **Entity:** University of Sussex
**City of entity:** Brighton, United Kingdom
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Start-End date:** 20/11/2012 - 20/12/2012 **Duration:** 1 month

**Goals of the stay:** Post-doctoral
**Provable tasks:** research in quantum simulations

**5** **Entity:** Imperial College of London **Type of entity:** University
**Faculty, institute or centre:** Institute of Mathematical Physics
**City of entity:** London, United Kingdom
**Primary (UNESCO code):** 220000 - Physics
**Secondary (UNESCO code):** 221200 - Theoretical physics
**Tertiary (UNESCO code):** 221023 - Quantum theory
**Start-End date:** 08/06/2009 - 08/09/2009 **Duration:** 3 months
**Goals of the stay:** Doctorate
**Provable tasks:** research in quantum information science

## Obtained grants and scholarships

**1** **Name of the grant:** Jose Castillejo grant (ESTANCIAS DE PERSONAL DOCENTE Y/O INVESTIGADOR SENIOR EN CENTROS EXTRANJEROS)
**City awarding entity:** Oxford, United Kingdom
**Aims:** Post-doctoral
**Awarding entity:** PRX22/00423 **Type of entity:** Public Research Body
**Amount of the grant:** 19.430 €
**Conferral date:** 01/09/2023 **Duration:** 6 months
**End date:** 28/02/2024
**Entity where activity was carried out:** University of Oxford

**2** **Name of the grant:** Ramón y Cajal fellowship
**City awarding entity:** Spain
**Aims:** Post-doctoral
**Awarding entity:** Ministerio de Economía, Industria y Competitividad
**Amount of the grant:** 208.600 €
**Conferral date:** 01/03/2018 **Duration:** 5 years
**End date:** 28/02/2022
**Entity where activity was carried out:** Universidad Complutense de Madrid
**Faculty, institute or centre:** Facultad de Ciencias Físicas

**3** **Name of the grant:** COST grant (short scientific mission)
**City awarding entity:** Swansea, United Kingdom
**Aims:** Post-doctoral
**Awarding entity:** COST action CA-17113
**Amount of the grant:** 2.000 €
**Conferral date:** 28/07/2019 **Duration:** 14 days
**End date:** 11/08/2019
**Entity where activity was carried out:** University of Swansea

**4** **Name of the grant:** Postdoctoral Research contract under eQual grant (encoding a Qubit alive)
**Aims:** Post-doctoral
**Awarding entity:** logiQ program (IARPA, USA army Intelligence service) **Type of entity:** State agency
**Conferral date:** 10/05/2016 **Duration:** 1 year
**End date:** 30/04/2017

**5** **Name of the grant:** Juan de La Cierva fellowship
**Aims:** Post-doctoral
**Awarding entity:** Ministerio de Ciencia e Innovación. **Type of entity:** ministerio Investigación
**Amount of the grant:** 86.400 €
**Conferral date:** 01/01/2014 **Duration:** 3 years
**End date:** 31/12/2016
**Entity where activity was carried out:** Consejo Superior de Investigaciones Científicas
**Faculty, institute or centre:** INSTITUTO DE FISICA FUNDAMENTAL

**6** **Name of the grant:** COST grant (short scientific mission)
**City awarding entity:** Brighton, United Kingdom
**Aims:** Post-doctoral
**Awarding entity:** COST action MP1001 **Type of entity:** Public Research Body
**Amount of the grant:** 2.300 €
**Conferral date:** 20/11/2013 **Duration:** 1 month
**End date:** 20/12/2013
**Entity where activity was carried out:** University of Sussex

**7** **Name of the grant:** Postdoctoral Research contract under PICC grant (Physics of Ion Coulomb Crystals)
**City awarding entity:** Ulm, Germany
**Aims:** Post-doctoral
**Awarding entity:** European 7th framework program **Type of entity:** European project
**Amount of the grant:** 88.000 €
**Conferral date:** 01/03/2011 **Duration:** 2 years
**End date:** 01/03/2012

**8** **Name of the grant:** Erasmus Scholarship (Nottingham University)
**Aims:** Undergraduate
**Awarding entity:** MINISTERIO DE EDUCACION Y CIENCIA
**Conferral date:** 01/07/2003 **Duration:** 1 year
**End date:** 01/06/2004
**Entity where activity was carried out:** Nottingham University
**Faculty, institute or centre:** School of Physics and Astronomy

**9** **Name of the grant:** PhD scientific stay
**City awarding entity:** London, United Kingdom
**Aims:** Pre-doctoral
**Awarding entity:** MINISTERIO DE EDUCACION Y CIENCIA
**Amount of the grant:** 5.150 €
**Conferral date:** 31/07/2009 **Duration:** 3 months
**Entity where activity was carried out:** Imperial College of London

**10** **Name of the grant:** PhD grant (Formación de Personal Universitario-FPU)
**City awarding entity:** Madrid, Community of Madrid, Spain
**Identify key words:** Quantum information and associated physical effects
**Aims:** Pre-doctoral
**Awarding entity:** MINISTERIO DE EDUCACION Y CIENCIA
**Amount of the grant:** 64.000 €
**Conferral date:** 27/03/2007 **Duration:** 4 years

11 **Name of the grant:** PhD grant Universidad Complutense de Madrid (rejected in favor of the FPU PhD grant)
**Aims:** Pre-doctoral
**Awarding entity:** Universidad Complutense de Madrid **Type of entity:** University
**Conferral date:** 27/03/2007

12 **Name of the grant:** Beca de colaboración Departamento de Física Teórica I
**Aims:** Pre-doctoral
**Awarding entity:** Universidad Complutense de Madrid **Type of entity:** University
**Conferral date:** 01/09/2005 **Duration:** 6 months
**Entity where activity was carried out:** Universidad Complutense de Madrid
**Faculty, institute or centre:** Facultad de Ciencias Físicas

13 **Name of the grant:** Beca de Introducción a la Investigación para alumnos de último curso (rejected in favor of beca de colaboración con el departamento de Física Teórica I)
**Aims:** Pre-doctoral
**Awarding entity:** Consejo Superior de Investigaciones Científicas **Type of entity:** State agency
**Conferral date:** 26/04/2005 **Duration:** 2 months
**Entity where activity was carried out:** Consejo Superior de Investigaciones Científicas

## Scientific societies and professional associations

1 **Name of the society:** American Physical Society
**Affiliation entity:** American Physical Society **Type of entity:** Public Research Body
**City affiliation entity:** United States of America
**Start-End date:** 01/03/2013 - 28/02/2014

2 **Name of the society:** American Physical Society
**Affiliation entity:** American Physical Society
**City affiliation entity:** United States of America
**Start-End date:** 01/03/2008 - 28/02/2009

## Prizes, mentions and distinctions

1 **Description:** Extraordinary Prize for the PhD degree in Physics (1st position)
**Awarding entity:** Universidad Complutense de Madrid **Type of entity:** University
**City awarding entity:** Madrid, Community of Madrid, Spain
**Conferral date:** 2011
**Recognition linked:** Best PhD qualification in the year 2010/2011, Facultad de Física, Universidad Complutense de Madrid

2 **Description:** Selected by Spain to attend the Lindau Nobel Meeting-58th Meeting of Nobel Prize Winners
**Awarding entity:** Council for the Lindau Nobel Laureate Meetings
**City awarding entity:** Lindau, Germany
**Conferral date:** 2008

**Recognition linked:** Covered in the media by El Pais, "14 españooles reciben clases particulares de los supergenios", (http://elpais.com/diario/2008/07/09/futuro/1215554401_850215.html)

**3** **Description:** Extraordinary Prize for the B.Sc. Degree in Physics (1st position)
**Awarding entity:** Universidad Complutense de Madrid **Type of entity:** University
**City awarding entity:** Madrid, Community of Madrid, Spain
**Conferral date:** 2007
**Recognition linked:** Best average mark of the full degree in Physics, Facultad de Física, Universidad Complutense

**4** **Description:** Mention in the National Extraordinary Prize for the B.Sc. Degree in Physics (4th position)
**Awarding entity:** MINISTERIO DE EDUCACION Y CIENCIA
**City awarding entity:** Madrid, Community of Madrid, Spain
**Conferral date:** 2007
**Recognition linked:** Best average mark for the Physics degree in Spain

**5** **Description:** Undergraduate Award "Físicos del 60"
**Awarding entity:** "Físicos del 60", Universidad Complutense de Madrid **Type of entity:** Sociedad
**City awarding entity:** Madrid, Community of Madrid, Spain
**Conferral date:** 2005
**Recognition linked:** Best marks for certain subjects in the first 3 years of the degree