ANA ASENJO-GARCIA

Personal Information

Position (since July 2023):	**Associate Professor of Physics at Columbia University**
Address:	704 Pupin Hall MC 5255, New York, NY 10027
Place and Date of Birth:	Pamplona, Spain | October 7, 1986
Citizenship:	Spanish, permanent resident of the United States
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Research Interests

Quantum optics, atomic physics, open quantum systems, many body physics.

Previous academic positions

2019-2023	Assistant Professor of Physics at Columbia University
2015-2018	IQIM and Marie Curie Postdoctoral Fellow
2015-2018	California Institute of Technology (Caltech)
2018	The Institute of Photonic Sciences (ICFO)
2014-2015	Postdoctoral Scholar, ICFO

Education

2010-2014	Ph.D. in Physics, Universidad Complutense de Madrid
2009-2010	MSc in Theoretical Physics, Universidad Complutense de Madrid
2004-2009	Extended BSc in Physics (5 years), Universidad Complutense de Madrid

Fellowships and Awards

2022	Early Career Scientist Prize in AMO Physics, International Union of Pure and Applied Physics
2021	Packard Fellowship, David and Lucile Packard Foundation
2021	AFOSR Young Investigator Award, Air Force Office of Scientific Research
2021	NSF CAREER Award, National Science Foundation
2021	Sloan Fellowship, Alfred P. Sloan Foundation
2019	Lenfest Junior Faculty Development Grant, Columbia University
2016 – 2018	Marie Curie Global Postdoctoral Fellowship, European Commission
2015 – 2017	IQIM Postdoctoral Fellowship, Institute of Quantum Information and Matter, Caltech
2010 – 2014	Ph.D. Fellowship (FPU), Spanish Department of Education

Students and postdoctoral associates

Current

Amaya Calvo Sanchez, undergraduate student, summer of 2023.

Avishi Poddar, undergraduate student, since March 2023.

Dr. Cosimo Rusconi, postdoc, since February 2022.

Eric Sierra, PhD student, since September 2022.

Joseph Lee, PhD student (NSF GRFP), since September 2021.

Silvia Cardenas-Lopez, PhD student, since September 2020.

Dr. Stuart J. Masson, postdoc, since April 2019.

Former

Dr. Ricardo Gutierrez-Jauregui, postdoc (2019 - 2023), now Assistant Professor at UNAM, Mexico.

Zoe Zager, undergraduate student (2021-2022), now graduate student at Princeton.

Jireh Garcia, Bridge to PhD student (2020-2022), now graduate student at the University of Chicago.

Dr. Bihui Zhu, postdoc (2020 - 2021), now Assistant Professor at the University of Oklahoma.

Supantho Rakshit, undergraduate student (2020-2021), now graduate student at Princeton.

Publications and preprints

google scholar

Super-radiant and sub-radiant cavity scattering by atom arrays
Z. Yan, J. Ho, Y.-H. Lu, S. J. Masson, A. Asenjo-Garcia, and D. M. Stamper-Kurn
arXiv:2307.13321 (2023).

Dynamical beats of short pulses in waveguide QED
D. Su, Y. Joy, S. Cardenas-Lopez, A. Asenjo-Garcia, P. Solano, L. A. Orozco, and Y. Zhao
arXiv:2304.09277 (2023).

Dicke superradiance in ordered arrays of multilevel atoms
S. J. Masson, J. Covey, S. Will, and A. Asenjo-Garcia
arXiv:2304.00093 (2023).

Many-body superradiance and dynamical symmetry breaking in waveguide QED
S. Cardenas-Lopez, S. J. Masson, Z. Zager, A. Asenjo-Garcia
Physical Review Letters 131, 033605 (2023).

Metasurface holographic optical traps for ultracold atoms
X. Huang, W. Yuan, A. Holman, M. Kwon, S. J. Masson, R. Gutierrez-Jauregui, A. Asenjo-Garcia, S. Will, and N. Yu
Progress in Quantum Electronics 89, 100470 (2023).

Dicke superradiance requires interactions beyond nearest-neighbors
W.-K. Mok, A. Asenjo-Garcia, T. C. Sum, and L.-C. Kwek
Physical Review Letters 130, 213605 (2023).

Dissipative stabilization of dark quantum dimers via squeezed vacuum
R. Gutierrez-Jauregui, A. Asenjo-Garcia, and G. Agarwal
Physical Review Research 5, 013127 (2023).

Optical precursors in waveguide quantum electrodynamics
S. Cardenas-Lopez, P. Solano, L. A. Orozco, and A. Asenjo-Garcia
Physical Review Research 5, 013133 (2023).

Control of localized single- and many-body dark states in waveguide QED
R. Holzinger, R. Gutierrez-Jauregui, T. Hönigl-Decrinis, G. Kirchmair, A. Asenjo-Garcia, and H. Ritsch
Physical Review Letters 129, 253601 (2022).

Darkness tamed with superconducting qubits
S. J. Masson, and A. Asenjo-Garcia
Nature Physics (News and Views) 18, 490 (2022).

Directional transport along an atomic chain
R. Gutierrez-Jauregui, and A. Asenjo-Garcia
Physical Review A 105, 043703 (2022).

Dicke superradiance in ordered lattices: dimensionality matters
E. Sierra, S. J. Masson and A. Asenjo-Garcia
Physical Review Research 4, 023207 (2022).

Universality of Dicke superradiance in arrays of quantum emitters
S. J. Masson and A. Asenjo-Garcia
Nature Communications 13, 2285 (2022).

Coherent control in atomic chains: to trap and release a traveling excitation
R. Gutierrez-Jauregui, and A. Asenjo-Garcia
Physical Review Research 3, 033233 (2022).

Finding light in dark atomic clouds
A. Asenjo-Garcia
Physics 14, 69 (2021).

Many-body localization in waveguide QED
N. Fayard, L. Henriet, A. Asenjo-Garcia, and D. E. Chang
Physical Review Research 3, 033233 (2021).

Polariton panorama
D. N. Basov, A. Asenjo-Garcia, J. P. Schuck, X. Zhu, and A. Rubio
Nanophotonics 10, 549 (2021).

Enhanced Tunable Second Harmonic Generation from Twistable Interfaces and Vertical Superlattices in Boron Nitride Homostructures
K. Yao, N. R. Finney, J. Zhang, S. L. Moore, L. Xian, N. Tancogne-Dejean, F. Liu, J. Ardelean, X. Xu, D. Halbertal, K. Watanabe, T. Taniguchi, H. Ochoa, A. Asenjo-Garcia, X. Zhu, D. N. Basov, A. Rubio, C. R. Dean, J. Hone, P. J. Schuck
Science Advances 7, eabe8691 (2021).

Many-body signatures of collective decay in atomic chains
S. J. Masson, I. Ferrier-Barbut, L. A. Orozco, A. Browaeys, and A. Asenjo-Garcia
Physical Review Letters 125, 263601(2020).

Flat bands and chiral optical response of moiré insulators
H. Ochoa and A. Asenjo-Garcia
Physical Review Letters 125, 037402 (2020).

Atomic-Waveguide Quantum Electrodynamics
S. J. Masson and A. Asenjo-Garcia
Physical Review Research 2, 043213 (2020).

Optical waveguiding by atomic entanglement in multilevel atom arrays
A. Asenjo-Garcia, H. J. Kimble, and D. E. Chang
Proceedings of the National Academy of Sciences 116, 25503 (2019).

Cavity quantum electrodynamics with atom-like mirrors
M. Mirhosseini, E. Kim, X. Zhang, A. Sipahigil, P. B. Dieterle, A. J. Keller, A. Asenjo-Garcia, D. E. Chang, and O. J. Painter
Nature 569, 692 (2019).

Subradiant states of quantum bits coupled to a one-dimensional waveguide
L. Henriet, A. Albrecht, A. Asenjo-Garcia, P. Dieterle, O. J. Painter, and D. E. Chang,
New Journal of Physics 21, 025003 (2019).

Population mixing due to dipole-dipole interactions in a 1D array of multilevel atoms
E. Munro, A. Asenjo-Garcia, Y. Lin, L. C. Kwek, C. A. Regal, and D. E. Chang,
Physical Review A 98, 033815 (2018).

Optimization of photon storage fidelity in ordered atomic arrays
M. T. Manzoni, M. Moreno-Cardoner, A. Asenjo-Garcia, J. V. Porto, A. V. Gorshkov, and D. E. Chang,
New Journal of Physics 20, 083048 (2018).

Exponential improvement in photon storage fidelities using subradiance and selective radiance in atomic arrays
A. Asenjo-Garcia, M. Moreno-Cardoner, A. Albrecht, H. J. Kimble, and D. E. Chang,
Physical Review X 7, 031024 (2017).

Atom-light interactions in quasi-one-dimensional systems: a Green's function perspective
A. Asenjo-Garcia, J. D. Hood, D. E. Chang, and H. J. Kimble,
Physical Review A 95, 033818 (2017).

Atom-atom interactions around the band edge of a photonic crystal
J. D. Hood, A. Goban, A. Asenjo-Garcia, M. Lu, S.-P. Yu, D. E. Chang, and H. J. Kimble,
Proceedings of the National Academy of Sciences 113, 10507 (2016).

Hot-electron dynamics and thermalization in small metallic nanoparticles
J. R. M. Saavedra, A. Asenjo-Garcia, and F. J. García de Abajo,
ACS Photonics 13, 1637 (2016).

Dichroism in the interaction between vortex electron beams, plasmons, and molecules
A. Asenjo-Garcia, and F. J. García de Abajo,
Physical Review Letters 113, 066102 (2014).

3D plasmonic chiral colloids
X. Shen, P. Zhan, A. Kuzyk, Q. Liu, A. Asenjo-Garcia, H. Zhang, F. J. García de Abajo, A. Govorov, B. Ding, and N. Liu,
Nanoscale 6, 2077-2081 (2014).

Plasmon electron energy gain spectroscopy
A. Asenjo-Garcia, and F. J. García de Abajo,
New Journal of Physics 15, 103021 (2013).

Three-dimensional plasmonic chiral tetramers assembled by DNA origami
X. Shen, A. Asenjo-Garcia, Q. Liu, Q. Jiang, F. J. García de Abajo, N. Liu, and B. Ding,
Nano Letters 13, 2128-2133 (2013).

Alternating plasmonic nanoparticle heterochains made by polymerase chain reaction and their optical properties
Y. Zhao, L. Xu, L. M. Liz-Marzán, H. Kuang, W. Ma, A. Asenjo-Garcia, F. J. García de Abajo, N. A. Kotov, L. Wang, and C. Xu,
J. Phys. Chem. Lett. 4, 641 (2013).

Magnetic polarization in the optical absorption of metallic nanoparticles
A. Asenjo-Garcia, A. Manjavacas, V. Myroshnychenko, and F. J. García de Abajo,
Optics Express 20, 28142 (2012).

Stimulated light emission and inelastic scattering by a classical linear system of rotating particles
A. Asenjo-Garcia, A. Manjavacas, and F. J. García de Abajo,
Physical Review Letters 106, 213601 (2011).

Multiphoton absorption and emission by interaction of swift electrons with evanescent light fields
F. J. García de Abajo, A. Asenjo-Garcia, and M. Kociak,
Nano Letters 10, 1859-1863 (2010).

Rotating beams in isotropic optical system
T. Alieva, E. Abramochkin, A. Asenjo-Garcia, and E. Razueva,
Optics Express 18, 3568 (2010).

Lectures, talks, seminars, and colloquia

Those indicated by ✛ were virtual.

Invited lectures

Dec 2021	Physics Public Lecture, Aspen Center for Physics, CO. Watch the talk **here**
July 2021	Boulder School for Condensed Matter and Materials Physics, Boulder, CO ✛
April 2021	Frederica Darema Lecture Series, UC Davis, CA ✛
June 2020	DAMOP Meeting of the American Physical Society ✛
Nov 2019	Science-on-Hudson Public Lecture, Columbia University, NY
Oct 2019	Interaction of light and cold atoms, Les Houches School of Physics, France

Invited talks, seminars, and colloquia

July 2023	DIPC Seminar, Donostia International Physics Center, Spain
June 2023	IQOQI Quantum Seminar, University of Innsbruck, Austria
June 2023	Seminar, Max Planck Institute for Quantum Optics, Germany
June 2023	CLEO Europe, Munich, Germany
June 2023	Gordon conference in atomic physics, Newport, RI
May 2023	Workshop on waveguide QED, Erice, Italy
Feb 2023	Princeton Quantum Colloquium, Princeton University, NJ
Jan 2023	Physics Colloquium, University of Hamburg, Germany
Dec 2022	CUbit seminar, University of Colorado at Boulder and JILA, CO
Nov 2022	CQuIC seminar, University of New Mexico, NM
Nov 2022	Condensed and Living Matter Seminar, University of Pennsylvania, PA
Nov 2022	AMO seminar, Rice University, TX
Oct 2022	DAALI workshop, ICFO, Spain
Sep 2022	Q-FARM Seminar, Stanford University, CA

Aug 2022 Harnessing light-matter interactions in quantum materials, **Flatiron Institute, NY**
July 2022 International Conference in Atomic Physics (ICAP), **Toronto, Canada**
July 2022 Physics Colloquium, **Humboldt University of Berlin, Germany**
June 2022 C2QA Colloquium, **Brookhaven National Laboratory, NY** ✛
June 2022 DAMOP, **Orlando, FL**
May 2022 Seminar, **University of Oulu, Finland** ✛
May 2022 JQI Seminar, **Joint Quantum Institute, University of Maryland, MD**
April 2022 AMO Seminar, **University of California Berkeley, CA**
April 2022 PME Quantum Seminar Series, **University of Chicago, IL**
Mar 2022 Physics Seminar, **University of Illinois at Urbana-Champaign, IL**
Feb 2022 CUA Seminar, **MIT-Harvard Center for Ultracold Atoms, MA**
Feb 2022 Physical Seminar, **Purdue University, IN**
Jan 2022 Quantum Cooperativity of Light and Matter, **Saarland University, Germany** ✛
Nov 2021 IQUIST seminar, **University of Illinois at Urbana-Champaign, IL** ✛
Nov 2021 Seminar in Theoretical Physics, **University of Massachusetts Lowell, MA** ✛
Oct 2021 Physics Colloquium, **Columbia University, NY** ✛
Oct 2021 Physics Colloquium, **Penn State, PA** ✛
Oct 2021 Seminar, **Macquarie University, Sydney, Australia** ✛
Sept 2021 Physics Colloquium, **University of Sao Paulo, Brazil** ✛
June 2021 Workshop on waveguide QED, **Mazara del Vallo, Italy** ✛
April 2021 Center for Quantum Research and Technology Seminar, **University of Oklahoma** ✛
Jan 2021 Fall and Winter Seminar Series, **Queen's University, Canada** ✛
Dec 2020 ITAMP seminar, **Harvard University, MA** ✛
Dec 2020 Seminario de Tecnologias Cuánticas, **Madrid, Spain** ✛
Nov 2020 Colloquium of the Quantum Institute, **University of Sherbrooke, Canada** ✛
Nov 2020 Ginzton seminar, **Stanford, CA** ✛
Oct 2020 Guest virtual seminar, **Xerox PARC, CA** ✛
Sept 2020 Metamaterials 2020, **New York** ✛
Aug 2020 Quantum Huddle, **Harvard University, MA** ✛
Aug 2020 Virtual AMO Seminar (VAMOS), **Watch the talk here** ✛
April 2020 AMO seminar, **Stony Brook University, NY** ✛
Nov 2019 Center for Nonequilibrium Quantum Phenomena Workshop, **Flatiron Institute, NY**
Nov 2019 Physics Colloquium, **Miami University, OH**
Aug 2019 8th Conference for Quantum Information and Quantum Control, **Toronto, Canada**
Aug 2019 Rochester Conference on Coherence and Quantum Optics, **Rochester, NY**
May 2019 Physics Colloquium, **Queens College New York (CUNY), NY**
April 2019 Condensed Matter Seminar, **Rutgers University, NJ**
Feb 2019 Physics Colloquium, **City College New York , NY**
Jan 2019 Columbia-Flatiron-Max Planck Institute kick-off meeting, **Flatiron Institute, NY**

Jan 2019	Winter Colloquium on the Physics of Quantum Electronics (PQE), **Snowbird, UT**
Dec 2018	Nevis Retreat, **Columbia University, NY**
Nov 2018	Frontiers of Condensed Matter Physics, **Columbia University, NY**
May 2018	Central European Workshop on Quantum Optics, **Mallorca, Spain**
Feb 2018	Nanoscale Quantum Optics Workshop, **Prague, Czech Republic**
Feb 2018	IQC Seminar, **University of Waterloo, Canada**
Feb 2018	Condensed matter and AMO seminar, **Columbia University, NY**
Feb 2018	Optics Colloquium, **University of Rochester, NY**
Feb 2018	Special Physics Seminar, **McGill University, Canada**
Dec 2017	IQOQI Seminar, **University of Innsbruck, Austria**
Oct 2017	Many-body cavity QED, **ITAMP-Harvard, MA**
Oct 2017	Quantum Innovators, **IQC, Waterloo, Canada**
May 2017	Light-Matter Interactions in Low Dimensions, **ICFO, Barcelona, Spain**
April 2017	CQuIC Seminar, **University of New Mexico, NM**
April 2017	IQIM Seminar, **Caltech, CA**
March 2017	JQI Special Seminar, **University of Maryland, MD**
May 2016	IQIM Retreat, **Caltech, CA**
Aug 2014	IQIM Seminar, **Caltech, CA**
Aug 2011	SPIE Optics+Photonics, **San Diego, CA**

Mentoring, Outreach, and Diversity Initiatives

Fall 2020 to date | **Founder** of Coding Club at Democracy Prep Harlem High School.
This after school tutoring and outreach program serves underrepresented students from a high school in Harlem, and it is run by graduate students in the department. The fall season of 2020 consisted of informal physics talks. Starting spring 2021, the program has become a coding bootcamp using Snap and Python. In the fall of 2022, it received a Diversity Initiative Grant from the Arts & Sciences Graduate Council. See a Columbia highlight here.

Jan 2023 | **Plenary speaker** at the APS Conference for Undergraduate Women in Physics (CUWiP) at Cornell University and Ithaca College.

May 2020 | **Speaker** for the Bridge Program at Columbia.
Shared career advice with students from underrepresented groups who want to pursue Ph.D. studies in STEM disciplines.

Oct 2018 | **Speaker** at the STEM sisters club at La Cañada High School
Informal discussion with young female students who want to pursue STEM careers.

Teaching

Spring 2023	Quantum Mechanics II, GU4022 Undergraduate-level class
Spring 2021-2022	Quantum Optics: Atoms and Photons, GR6065 Graduate-level class
Fall 2019-2021	Statistical Mechanics, GR6036 Graduate-level class
Spring 2019	General Physics I, UN1201 First year class for pre-med students
Spring 2019	Graduate student seminar, PHYSG6905 Class for first year graduate students in physics

Service

Organizer of KITP program on Many-body quantum optics, taking place in the fall of 2024.

Scientific committee member of DAMOP at the March meeting, since summer of 2022.

Co-organizer of the session "Fundamental Science: Quantum Optics of Atoms, Molecules and Solids" for CLEO 2021-2023.

Scientific committee member of the conferences "Quantum Information in Spain (ICE)", May 2021, and "International Conference on Quantum Communication (IQCOM2021)", October 2021 in Paris.

Co-organizer of the workshop Collective phenomena in driven quantum systems, in Mainz (Germany), July 10-13, 2018.

Referee for Nature, Science, Nature Physics, Nature Communications, Science Advances, Physical Review Letters, Physical Review A, npj Quantum Information, Scientific Reports, Quantum Science and Technology, Journal of Applied Physics, Physics Letters A.

NSF Reviewer for AMO-Theory and Quantum Information Science programs.

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