

Franco Nori

Education

1987: Ph.D. in Physics, University of Illinois at Urbana-Champaign, USA.

1983: M.S. in Physics, University of Illinois at Urbana-Champaign, USA.

1982: Licenciado (i.e., B.S.) in Physics, Cum Laude, Univ. Simon Bolivar, Venezuela.

Professional Positions

- 2013— present: Chief Scientist. Also: Group Director of the Quantum Condensed Matter Research Group, CEMS. Also: Team Leader at iTHES (Interdisciplinary Theoretical Sciences). All at RIKEN, Saitama, Japan.
- 2002— 2012: Team Leader, Frontier Research System and Advanced Science Institute, RIKEN, Saitama, Japan.
- 1990— present: Assistant Professor, Associate Professor, Full Professor and Research Scientist; Dept. of Physics, University of Michigan, Ann Arbor, USA.
- 1987—89: Postdoctoral Research Fellow, Institute for Theoretical Physics, University of California, Santa Barbara.
- 1982—87: Conicit Fellow and Graduate Research Assistant; Physics Department. Also at the Materials Research Laboratory; University of Illinois.

Selected Distinctions, Awards, and Honors

- 2017: Listed as a *“Highly Cited Researcher”*, based on the Web of Science data. The only one from the entire University of Michigan in the Physics category for 2017. This because, during the last decade, his research group produced many (~28) highly cited publications (top 1% cited papers among all papers in all areas of physics).
- 2017: Elected Member of the Latin American Academy of Sciences.
- 2016: Elected Foreign Member of the Swedish Royal Society of Arts and Sciences, in Gothenburg, Sweden.

- 2014: Elected Fellow of the Optical Society of America (OSA) “for fundamental contributions to quantum information science and optics, including circuit quantum electrodynamics, and the interface between quantum optics and quantum circuits”.
- 2014: (\$20K) Prize for Research in Physics, Matsuo Foundation, Japan. For research on: “Atomic physics and quantum optics using superconducting quantum circuits.”
- 2013: (Sept.) Korea University Distinguished Visiting Professorship.
- 2013: Prize for Science: the Commendation for Science and Technology, by the Minister of Education, Culture, Sports, Science and Technology, Japan.
- 2007: Elected Fellow of the American Association for the Advancement of Science (AAAS), USA.
- 2003: Elected Fellow of the Institute of Physics (IoP), UK.
- 2002: Elected Fellow of the American Physical Society (APS): “for innovative theoretical contributions to the study of vortex dynamics, dynamical instabilities, Josephson junction arrays and quantum interference”.
- 1998: "Excellence in Research Award" from the University of Michigan.
- 1997: "Excellence in Education Award" from the University of Michigan.

Additional distinctions:

- 2016-: Member of the Board of QuSTaR, a non-profit organization dedicated to furthering research in the quantum sciences through open-source tools, educational resources, and workshops.
- 2016-: Advisory Board Member, npj Quantum Information, Nature Partner Journal.
- 2014-2015-2016: Recognition to peer-quality reviewing, from the Optical Society of America.
- 2015: Outstanding Reviewer: Physics Letters A.
- 2014: Elected member of FQXi, the Foundational Questions Institute.
- 2015: Annals of Physics “Most Valued Reviewers” of 2015.
- 2014: Annals of Physics “Most Valued Reviewers” of 2014.
- 2014—present: only member for the area of “Quantum Physics” of the Editorial Advisory Panel of Nature’s Scientific Reports.
- 2014: Selected as outstanding referee (top 5%) of the New Journal of Physics.

- 2014: EPL Distinguished Referee
- 2013: EPL Distinguished Referee
- 2011: *Physics World* Magazine Top-5 Breakthrough of the year. Also, named #1 reader's choice for 2001 in "Nature News". Prominently featured by the press worldwide.
- 2011: Elected as Outstanding Referee of the American Physical Society (APS).
- 2011: (\$5K) Croucher Foundation Advanced Study Institute Lecturer, Hong Kong.
- 2000: US National Academy of Sciences Frontiers of Science Symposium (only three speakers from Physics, all under 45 years old).
- 1992: General Electric Junior Faculty Fellow at the University of Michigan.
- 1992: Conicit Fellow at the University of Illinois
- 1982: Highest GPA among all graduating students at the USB (undergraduate school).

Areas of Active Research: Interdisciplinary research at the interface between condensed matter physics, quantum information, classical optics, quantum optics, atomic physics, mesoscopics, and nano-science.

Generally speaking, studying the interdisciplinary interface between quantum information, nanoscience, condensed matter physics, quantum optics, and atomic physics. Examples include: atomic-physics-like phenomena in quantum circuitry, quantum-optics-like-phenomena in quantum nano-electro-mechanical systems, optomechanics, hybrid quantum circuitry, coupling resonators and qubits, non-classical photon state generation from qubits, designing artificial atoms, micromasers from artificial atoms, cooling artificial atoms, decoherence/entanglement/scalability of quantum circuits, quantum simulators, quantum measurements, and quantum interferometry. Also topics related to optics, including optical diodes, PT-symmetry in optics, evanescent waves, transverse and longitudinal angular momenta of light, quantum spin Hall effect of light, electron vortex beams, and duality in electromagnetic fields. Also more traditional condensed matter physics, including superconductivity, semiconductors, and graphene.

Invited Talks, Colloquia, Seminars: Over 300 (invited talks at international conferences; also seminars and colloquia at Universities, and Industrial or National Laboratories).

Publications in Refereed Journals:

Are available online here: <http://dml.riken.jp/pub/>

<http://www.researcherid.com/rid/B-1222-2009>

<http://scholar.google.com/citations?user=SRUYLREAAAAJ&hl=en>

ISI Web of Science: > 26K citations and h-index 80.

Google Scholar: ~ 36K citations & h-index 93 (since 2012: > 23K cites, h-index 64)

About 90 publications in *Physical Review Letters*.

Over 300 publications in *Physical Review (A, B, E, X)*, including over 125 in PRA, over 160 in PRB, over 20 in PRE, and 2 in PRX;

37 publications in *Science* and *Nature* journals;

5 in *Reviews of Modern Physics*, 10 in *Physics Reports*, 3 in *Reports on Progress in Physics*;

Over 20 in *New J. Phys.*, 11 in *Europhysics Letters*. Over 30 in *Physica A/B/C/E*, 5 in *J. Appl. Phys.*, 2 in *Appl. Phys. Lett.* and one in each of the following journals: *Physics Today*, *Scientific American*, *Advances in Physics*, among many others.

In the past decade, Dr. Nori's group has published **28 papers ranked in the top 1% cited papers in all areas of Physics**. This is based on the Web of Science data. Some of these papers are in the top 0.1% and 0.01% most cited papers in physics.

Dr. Nori was ranked third in the world (out of a total of 12,269 authors) in the Thompson Reuters Science-Watch census of authors in terms of contributions to quantum computing over the decade 2001-2010 (sciencewatch.com).

His 5-year-index is 33, over refereed papers from 2010-2014 (50 on Google Scholar). These numbers are extremely high, for a single author, as can be seen by direct comparison with the total 2010-2014 journal article output of the major international physics collaborations: Belle (~400 authors) h=19; Ligo (~800 authors) h=23; and Atlas (~3,000 authors) h=40.

Just a few very recent (mostly from 2011-2016) publications from our group:

D. Leykam, K.Y. Bliokh, C. Huang, Y.D. Chong, F. Nori, *Edge Modes, Degeneracies, and Topological Numbers in Non-Hermitian Systems*, Phys. Rev. Lett. **118**, 040401 (2017). [[PDF](#)][[Link](#)][[arXiv](#)][[Supplementary information](#)]

M. Asano, K.Y. Bliokh, Y.P. Bliokh, A.G. Kofman, R. Ikuta, T. Yamamoto, Y.S. Kivshar, L. Yang, N. Imoto, Ş.K. Özdemir, F. Nori, *Anomalous time delays and quantum weak measurements in optical micro-resonators*, Nature Communications **7**, 13488 (2016). [[PDF](#)][[Link](#)][[arXiv](#)][[Supplementary information](#), [Reviewers' Comments](#)]

E.A. Ostrovskaya, F. Nori, *Giant Rydberg excitons probing quantum chaos*, Nature Materials **15**, 702–703 (2016). [[PDF](#)][[Link](#)][[Link2](#)]

M. Antognozzi, C. R. Bermingham, R.L. Harniman, S. Simpson, J. Senior, R. Hayward, H. Hoerber, M.R. Dennis, A.Y. Bekshaev, K.Y. Bliokh, F. Nori, *Direct measurements of the extraordinary optical momentum and transverse spin-dependent force using a nano-cantilever*, Nature Physics **12**, 731–735 (2016). [[PDF](#)][[Link](#)][[arXiv](#)][[Supplementary information](#)]. Featured in a "News and Views": Optomechanical tomography, Nature Physics **12**, 725 (2016). [[PDF](#)][[Link](#)]

F. Monifi, J. Zhang, S. Ozdemir, B. Peng, Y.-X. Liu, F. Bo, F. Nori, and L. Yang, *Optomechanically-induced stochastic resonance and chaos transfer between optical fields*, Nature Photonics **10**, 399–405 (2016). [[PDF](#)][[Link](#)][[Supplementary information](#)]. Nature Photonics Cover [[PNG](#)]. Featured in a "News and Views": Optomechanics: Vibrations copying optical chaos, Nature Photonics **10**, 366–368 (2016). [[PDF](#)][[Link](#)]

C.Y. Chiu, N. Lambert, T.L. Liao, F. Nori, C.M. Li, *No-cloning of quantum steering*, Nature Partner Journal: Quantum Information **2**, 16020 (2016). [[PDF](#)][[Link](#)][[arXiv](#)]

K. Bartkiewicz, A. Černoč, G. Chimczak, K. Lemr, A. Miranowicz, F. Nori, *Experimental quantum forgery of quantum optical money*, npj Quantum Information, **3**, 7 (2017). [[PDF](#)][[Link](#)][[arXiv](#)][[Supplementary information](#)]

S.L. Chen, N. Lambert, C.M. Li, A. Miranowicz, Y.N. Chen, F. Nori, *Quantifying Non-Markovianity with Temporal Steering*, Phys. Rev. Lett. **116**, 020503 (2016). [[PDF](#)][[Link](#)][[arXiv](#)]

M. Cirio, S.D. Liberato, N. Lambert, F. Nori, *Ground State Electroluminescence*, Phys. Rev. Lett. **116**, 113601 (2016). [[PDF](#)][[Link](#)][[arXiv](#)]

- P.B. Li, Z.L. Xiang, P. Rabl, F. Nori, *Hybrid Quantum Device with Nitrogen-Vacancy Centers in Diamond Coupled to Carbon Nanotubes*, Phys. Rev. Lett. **117**, 015502 (2016). [[PDF](#)][[Link](#)][[arXiv](#)][[Supplementary information](#)]
- L. Garziano, V. Macrì, R. Stassi, O.D. Stefano, F. Nori, S. Savasta, *One Photon Can Simultaneously Excite Two or More Atoms*, Phys. Rev. Lett. **117**, 043601 (2016). [[PDF](#)][[Link](#)][[arXiv](#)][[Supplementary information](#)]
- Z.P. Liu, J. Zhang, Ş.K. Özdemir, B. Peng, H. Jing, X.Y. Lü, C.W. Li, L. Yang, F. Nori, Y.X. Liu, *Metrology with PT-Symmetric Cavities: Enhanced Sensitivity near the PT-Phase Transition*, Phys. Rev. Lett. **117**, 110802 (2016). [[PDF](#)][[Link](#)][[arXiv](#)][[Supplementary information](#)]
- K.Y. Bliokh, F. Nori, *Transverse and longitudinal angular momenta of light*, Physics Reports 592, 1-38 (2015). [[PDF](#)] [[Link](#)] [[arXiv](#)]
- K.Y. Bliokh, D. Smirnova, F. Nori, *Quantum spin Hall effect of light*, Science 348, 1448-1451 (2015). [[PDF](#)][[Link](#)][[arXiv](#)]. Featured in a Science "Perspective" [[PDF](#)][[Link](#)].
- A.Y. Bekshaev, K.Y. Bliokh, and F. Nori, *Transverse Spin and Momentum in Two-Wave Interference*, Phys. Rev. X 5, 011039 (2015). [[PDF](#)][[Link](#)][[arXiv](#)]
- T. Gao, et al., *Observation of non-Hermitian degeneracies in a chaotic exciton-polariton billiard*, Nature 526, 15522 (2015). [[PDF](#)][[Link](#)][[arXiv](#)]
- K.Y. Bliokh, F.J. Rodríguez-Fortuño, F. Nori, A.V. Zayats, *Spin-orbit interactions of light* Nature Photonics 9, 796–808 (2015). [[PDF](#)][[Link](#)][[arXiv](#)]
- D. Zhang, X.M. Wang, T.F. Li, X.Q. Luo, W. Wu, F. Nori, J. You, *Cavity quantum electrodynamics with ferromagnetic magnons in a small yttrium-iron-garnet sphere* Nature Partner Journal: Quantum Information 1, 15014 (2015). [[PDF](#)][[Link](#)][[arXiv](#)]
- X.-Y. Lü, Y. Wu, J. R. Johansson, H. Jing, J. Zhang, and F. Nori, *Squeezed Optomechanics with Phase-Matched Amplification and Dissipation*, Phys. Rev. Lett. **114**, 093602 (2015). [[PDF](#)][[Link](#)][[arXiv](#)]
- G.W. Deng, et al., *Charge Number Dependence of the Dephasing Rates of a Graphene Double Quantum Dot in a Circuit QED Architecture*, Phys. Rev. Lett. **115**, 126804 (2015). [[PDF](#)][[Link](#)][[arXiv](#)]
- N. Lambert, F. Nori, C. Flindt, *Bistable Photon Emission from a Solid-State Single-Atom Laser*, Phys. Rev. Lett. **115**, 216803 (2015). [[PDF](#)][[Link](#)][[arXiv](#)]

- I. Georgescu, S. Ashhab, F. Nori, *Quantum Simulation*, Rev. Mod. Phys. 86, 153 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]. Also the cover figure of the Jan-March issue of Rev. of Modern Physics
- C. Emary, N. Lambert, F. Nori, *Leggett-Garg Inequalities*, Reports on Progress in Physics 77, 016001 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- B. Peng, et al., *Loss-induced suppression and revival of lasing*, Science, 346, 328-332 (2014). [[PDF](#)][[Link](#)]. Featured in a "Perspective" Science 346, 304-305 (2014) [[PDF](#)].
- K. Y. Bliokh, A. Y. Bekshaev, F. Nori, *Extraordinary momentum and spin in evanescent waves*, Nature Communications 5, 3300 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- S. Okaba, et al., *Lamb-Dicke spectroscopy of atoms in a hollow-core photonic crystal fibre*, Nature Communications 5, 4096 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- P. Schattschneider, et al., *Imaging the Dynamics of Free-Electron Landau States*, Nature Communications 5, 4586 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- B. Peng, S.K. Ozdemir, W. Chen, F. Nori, L. Yang, *What is- and what is not-Electromagnetically-Induced-Transparency in Whispering-Gallery-Microcavities* Nature Communications, 5, 5082 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- B. Peng, et al., *Nonreciprocal light transmission in parity-time-symmetric whispering-gallery microcavities*, Nature Physics 10, 394-398 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]. Featured in a Nature "Research Highlights", and a "News and Views" in Nature Physics.
- J. Dressel, K. Y. Bliokh, F. Nori, *Classical Field Approach to Quantum Weak Measurements*, Phys. Rev. Lett. 112, 110407 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- K. Y. Bliokh, Y. S. Kivshar, F. Nori, *Magnetolectric Effects in Local Light-Matter Interactions*, Phys. Rev. Lett. 113, 033601 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- H. Jing, S.K. Ozdemir, X.Y. Lu, J. Zhang, L. Yang, F. Nori, *PT-Symmetric Phonon Laser* Phys. Rev. Lett. 113, 053604 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- Y.O. Averkov, V.M. Yakovenko, V.A. Yampol'skii, F. Nori, *Terahertz transition radiation of bulk and surface electromagnetic waves by an electron entering a layered superconductor*, Phys. Rev. B 89, 094506 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]
- J. Lu, L. Zhou, L.-M. Kuang, F. Nori, *Single-photon router: Coherent Control of multi-channel scattering for single-photons with quantum interferences*, Phys. Rev. A 89, 013805 (2014). [[PDF](#)][[Link](#)][[arXiv](#)]

K.Y. Bliokh, A.Y. Bekshaev, A.G. Kofman, F. Nori, *Photon trajectories, anomalous velocities and weak measurements: a classical interpretation*, New J. Phys. 15, 073022 (2013). [[PDF](#)][[Link](#)][[arXiv](#)] Selected as an Editor's "Highlight of 2013".

K.Y. Bliokh, A.Y. Bekshaev, F. Nori, *Dual electromagnetism: helicity, spin, momentum, and angular momentum*, New J. Phys. 15, 033026 (2013). [[PDF](#)][[Link](#)][[arXiv](#)]

K.Y. Bliokh, Y.V. Izdebskaya, F. Nori, *Transverse relativistic effects in paraxial wave interference*, Journal of Optics 15, 044003 (2013). [[PDF](#)][[Link](#)][[arXiv](#)]

A.Y. Bekshaev, K.Y. Bliokh, F. Nori, *Mie scattering and optical forces from evanescent fields: A complex-angle approach*, Optics Express 21, 7082 (2013). [[PDF](#)][[Link](#)][[arXiv](#)]

Y.P. Bliokh, V. Freilikher, F. Nori, *Ballistic charge transport in graphene and light propagation in periodic dielectric structures with metamaterials: A comparative study*, Phys. Rev. B 87, 245134 (2013). [[PDF](#)][[Link](#)][[arXiv](#)]

Z.-L. Xiang, S. Ashhab, J.Q. You, F. Nori, *Hybrid quantum circuits: Superconducting circuits interacting with other quantum systems*, Rev. Mod. Phys. 85, 623 (2013) [[PDF](#)][[arXiv](#)]

N. Lambert, Y.N. Chen, Y.C. Chen, C.M. Li, G.Y. Chen, F. Nori, *Quantum biology*, Nature Physics 9, 10-18 (2013). [[PDF](#)][[Link](#)]

A.G. Kofman, S. Ashhab, F. Nori, *Nonperturbative theory of weak pre- and post-selected measurements*, Physics Reports 520, 43-133 (2012) [[PDF](#)][[Link](#)][[arXiv](#)] (about 20 pages review plus 70 pages of original work)

K.Y. Bliokh, F. Nori, *Transverse spin of a surface polariton*, Phys. Rev. A 85, 061801 (2012). [[PDF](#)][[Link](#)][[arXiv](#)]

K.Y. Bliokh, F. Nori, *Characterizing optical chirality*, Phys. Rev. A 83, 021803 (R) (2011). [[PDF](#)][[Link](#)][[arXiv](#)]

P.D. Nation, J.R. Johansson, M.P. Blencowe, F. Nori, *Stimulating uncertainty: Amplifying the quantum vacuum with superconducting circuits*, Reviews of Modern Physics 84, 1-24 (2012). [[PDF](#)][[Link](#)][[arXiv](#)]

J.Q. You, F. Nori, *Atomic Physics and Quantum Optics using Superconducting circuits*, Nature, 474, 589 (2011). Nine-pages-long paper. [[PDF](#)][[Link](#)]

C.M. Wilson, et al., *Observation of the dynamical Casimir effect in a superconducting circuit*, Nature 479, 376 (2011). [[PDF](#)][[Link](#)]. Featured in a Nature "News & Views" ([local](#))

[PDF](#) [Link](#), American Scientist, Forbes, and the press worldwide. Also, selected as *Physics World* top five Physics breakthrough of the year 2011. According to Nature, coverage of our work on “Nature News” was “The most read news story of 2011”.

I. Buluta, S. Ashhab, F. Nori, *Natural and artificial atoms for quantum computation*, Reports on Progress in Physics, 74, 104401 (2011). [PDF](#)[Link](#)[arXiv](#)

J. Ma, X. Wang, C. P. Sun, F. Nori, *Quantum spin squeezing*, Physics Reports 509, 89 (2011). [PDF](#)[Link](#)[arXiv](#)

A.V. Rozhkov, G. Giavaras, Y.P. Bliokh, V. Freilikher, F. Nori, *Electronic properties of mesoscopic graphene structures*, Phys. Reports 503, 77 (2011). [PDF](#)[Link](#)[arXiv](#)

A few overviews of our work, from before 2011, are below:

S.N. Shevchenko, S. Ashhab, F. Nori, *Landau-Zener-Stuckelberg interferometry*, Phys. Reports 492, 1 (2010). [PDF](#)[Link](#)[arXiv](#) (50-50 split between review and new results)

I. Buluta, F. Nori, *Quantum Simulators*, Science 326, 108 (2009). [PDF](#)[Link](#)

K.Y. Bliokh, Y.P. Bliokh, V. Freilikher, S. Savel'ev, F. Nori, *Unusual resonators: Plasmonics, metamaterials, and random media*, Rev. Mod. Phys. 80, 1201 (2008). [PDF](#)[Link](#)[arXiv](#)

J.Q. You, F. Nori, *Superconducting circuits and quantum information*, Physics Today 58 (11), 42-47 (2005). [PDF](#)[Link](#)

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