

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, Universidad Simon Bolivar, Venezuela

Professional Positions

- 90— Assistant Professor, Associate Professor, Full Professor and Research Scientist; Dept. of Physics, University of Michigan, Ann Arbor, USA.
Also, since 2002: Team Leader of the Digital Materials Laboratory, Advanced Science Institute, RIKEN, Saitama, Japan.
- 87--89: Postdoctoral Research Fellow, Institute for Theoretical Physics, University of California, Santa Barbara.
- 82--87: Conicit Fellow and Graduate Research Assistant; Physics Department.
Also at Materials Research Laboratory; University of Illinois.

Selected Recent Awards (1997-present):

- 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), USA;
- 1998: Received an "Excellence in Research Award" from the Univ. of Michigan;
- 1997: Received an "Excellence in Education Award" from the Univ. of Michigan.

Areas of Active Research: nano-science; condensed matter physics; quantum circuitry; quantum information processing; dynamics of complex systems. Interface between mesoscopics, quantum optics, atomic physics, and nano-science. More recent efforts: Energy-related research (solar energy, light-to-electricity conversion, photosynthesis, proton pumps, etc.).

Specific areas include: superconducting qubits, quantum circuits using Josephson junctions, quantum information science, atomic-physics-like phenomena in quantum circuitry, quantum nano-electro-mechanical systems, 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, adiabatic quantum computing, quantum interferometry, quantum thermodynamics, biologically-inspired micro- and nano-devices for controlling the motion of tiny particles and quanta, vortex dynamics, superconductivity, design of tera-Hertz radiation sources/filters/detectors, metamaterials, quantum metamaterials, dynamical instabilities (avalanches), complex spatio-temporal nonlinear dynamics, transport phenomena (of electrons, phonons, vortices, grains) in systems that have disorder and/or reduced dimensionality, quantum noise

control and squeezed states in condensed matter (squeezed phonons and suppressed quantum fluctuations in superconductors), Josephson junction arrays and micro- and nano-networks, acoustic interference, path-integral analytical studies of quantum interference effects due to electron motion in magnetic fields.

Invited Talks, Colloquia, Seminars: Over 250 (invited talks at international conferences; also seminars and colloquia at Universities, and Industrial or National Laboratories).

Publications in Refereed Journals:

Are all available online here: <http://dml.riken.jp/publications.php> and also here:

www.umich.edu/~nori. Also classified by topic.

Over 320 publications in refereed journals.

About 9,000 citations; more than 1,000 citations per year for the past several years.

h-index: 45 (to reach mid-50s in about 2 to 3 years)

Over 62 publications in *Physical Review Letters*,

Over 170 publications in *Physical Review (A, B, E)*,

6 publications in *Science*,

10 in *Nature* journals (including a 9-page paper to appear in *Nature*, on June 30, 2011),

3 in *Reviews of Modern Physics* (two published, and one accepted),

3 in *Physics Reports*,

2 in *Reports on Progress in Physics*,

11 in *Europhys. Lett.*, 10 in *New J. Phys.*,

Over 30 in *Physica A/B/C/E*,

4 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 others.

Also, over 30 articles (based on invited talks) published in books or journals.

Recent overviews of research areas we are working on:

(all of these publications are from 2010-2011, besides two: from 2005 and 2009)

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

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

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

I. Georgescu, F. Nori, *Quantum Simulation*, manuscript commissioned for *Reviews of Modern Physics*. Completed and under revision.

I. Buluta, S. Ashhab, F. Nori, *Natural and artificial atoms for quantum computation*, [[arXiv](#)]. [arXiv:1002.1871v2](#). *Reports on Progress in Physics*, in press (2011).

S.N. Shevchenko, S. Ashhab, F. Nori, *Landau-Zener-Stuckelberg interferometry*, *Phys. Reports* **492**, 1 (2010). [[PDF](#)][[Link](#)][[arXiv](#)]

J. Ma, X. Wang, C. P. Sun, F. Nori, *Quantum spin squeezing*, (2010). [[arXiv](#)]. [arXiv:1011.2978v2](#). *Physics Reports*, in press (2011).

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

P.D. Nation, J.R. Johansson, M.P. Blencowe, F. Nori, *Stimulating uncertainty: Amplifying the quantum vacuum with superconducting circuits*, (2011). [[arXiv](#)]. [arXiv:1103.0835v1](#). For *Rev. Mod. Physics*.

Our other publications (over 320) are all available online here:

<http://dml.riken.jp/publications.php>. and also here: www.umich.edu/~nori.

Energy-related research

(solar energy, light-to-electricity conversion, photosynthesis, proton pumps, etc.)

A.Yu. Smirnov, L.G. Mourokh, F. Nori
Forster mechanism of electron-driven proton pump
Phys. Rev. E **77**, 011919 (2007). [[PDF](#)][[Link](#)][[arXiv](#)]

A.Yu. Smirnov, S. Savel'ev, L.G. Mourokh, F. Nori
Proton transport and torque generation in rotary biomotors
Phys. Rev. E **78**, 031921 (2008). [[PDF](#)][[Link](#)][[arXiv](#)]

A.Yu. Smirnov, S. Savel'ev, F. Nori
Diffusion-controlled generation of a proton-motive force across a biomembrane
Phys. Rev. E **80**, 011916 (2009). [[PDF](#)][[Link](#)][[arXiv](#)]

A.Yu. Smirnov, L.G. Mourokh, F. Nori
Kinetics of proton pumping in cytochrome c oxidase
J. Chem. Phys. **130**, 235105 (2009). [[PDF](#)][[Link](#)][[arXiv](#)]

P.K. Ghosh, A.Yu. Smirnov, F. Nori
Modelling light-driven proton pumps in artificial photosynthetic reaction centers
J. Chem. Phys. **131**, 035102 (2009). [[PDF](#)][[Link](#)][[arXiv](#)]
Selected as the only "Research Highlight" ([local PDF](#)) of that issue of the [Journal of Chemical Physics](#) (JCP).
Featured in "Riken Research News": [Forecasting solar-energy harvests \(local PDF\)](#) .

A.Yu. Smirnov, L.G. Mourokh, P.K. Ghosh, F. Nori
High-Efficiency Energy Conversion in a Molecular Triad Connected to Conducting Leads
J. Phys. Chem. C. **113**, 21218 (2009). [[PDF](#)][[Link](#)]
Supporting online information is available: [[click here](#)]

P.K. Ghosh, A.Yu. Smirnov, F. Nori
Artificial photosynthetic reaction centers coupled to light-harvesting antennas
(2010). [[arXiv](#)] [arXiv:1010.1984v1](#)

A.Yu. Smirnov, L.G. Mourokh, F. Nori
Electrostatic models of electron-driven proton transfer across a lipid membrane
J. Phys.: Condens. Matter **23**, 234101 (2011). [[PDF](#)][[Link](#)]
Invited article for the special issue on "Transport Phenomena in Proton Conducting Media".

P.K. Ghosh, A.Yu. Smirnov, F. Nori
Quantum effects in energy and charge transfer in an artificial photosynthetic complex
J. Chem. Phys. **134**, 244103 (2011). [[PDF](#)]

This paper has been selected for the June 2011 issue of JCP: BioChemical Physics (at <http://jcp-bcp.aip.org>)