

CURRICULUM VITAE



Nicola Manini
birth place / date Cles (Trento, Italy) / 6-06-1967
current position associate professor
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OrcId orcid.org/0000-0003-4374-6374

Past Employment

2001-2011: assistant professor - Università degli Studi di Milano, Italy.
2000-2001: research scientist - I.N.F.M. and SISSA - Trieste, Italy, in E. Tosatti's group.
1995-2000: research scientist - E.S.R.F. - Grenoble, France, in M. Altarelli's group.
1992: 6 months' research grant - Yale Univ. - New Haven CT, USA, in F. Iachello's group.

Education

1995, Oct. 27 - Ph.D. in Condensed Matter Theory at SISSA - Trieste - Italy *cum summa laude*. Supervisor: E. Tosatti. External referee: D. Baeriswyl. Thesis title: *Electron - Vibron Coupling in Charged Fullerene, Berry Phase, and Superconductivity*, <https://iris.sissa.it/handle/20.500.11767/3874> .

1991, Sep. 19 - M.Sc. in Physics at Università degli Studi di Trento - Italy, with full marks and honor *110/110 cum laude*. Thesis title: *Vibrational Spectroscopy of Four-atomic Molecules*. Supervisors: F. Iachello (Yale University), S. Oss, and M. Scotoni (Trento University).

Current Research Projects

Nanofriction: understanding the nanoscale mechanisms for the conversion of mechanical energy into heat; bridging the gap from the nano to the macro scale; friction and dissipation in layers of colloids.

Quantum dissipation in ion-trap experiments.

Radiation-matter scattering beyond the perturbative limit, with applications to free-electron laser high-intensity radiation pulses.

Structural and transport properties of nanoconfined ionic liquids.

Calculation of the vibrational spectra of triatomic and 4-atomic molecules, within an algebraic model based on anharmonic Morse coordinates.

Research Focus

NM has been carrying out theoretical/computational research encompassing a broad range of themes and phenomena in the field of friction at the atomic scale. In detail, NM has contributed to the discovery and characterization of soliton-related velocity-quantization phenomena in models for the sliding of solid surfaces separated by hard lubricants. NM's group has brought this this phenomenon from the domain of 1D models to realistic 3D conditions, and connected it with known dynamical synchronization phenomena of the Shapiro-steps type. Related research has focused on energy dissipation in quantum-mechanical mesoscopic models, energy transport in quasicrystals, and friction/dissipation/synchronization in colloidal layers. NM has lead a COST Action on nano and mesoscale friction, and has contributed to the assessment of the present state of the art of this field, with a *Reviews of Modern Physics* Colloquium. Research in nanofriction involves collaboration with several top scientists in the field, including O.M. Braun, E. Gnecco, G.E. Santoro, E. Tosatti, M. Urbakh, A. Vanossi, S. Zapperi.

Further interests of NM's research include:

- The structuring of thin films of organic ionic liquids in contact with solid surfaces, and their rheologic properties (collaboration with P. Ballone and A. Podestà).
- Ab-initio and model simulation of structural, mechanical, spectroscopic, and reactivity properties of linear chains composed by sp-hybridized carbon, the so-called carbynes (collaboration with G. Onida, P. Milani, and P. Piseri).
- The collective dynamics of ultracold interacting atomic fermions, bosons, and mixtures thereof. NM's research on ultracold fermions in the crossover from the Bardeen-Cooper-Schrieffer (BCS) limit to the Bose-Einstein-Condensate (BEC) limit had a significant impact with: (i) a mean-field expression for the self-interaction, (ii) the nonlinear dynamics of atomic gas droplets in experimentally relevant configurations, and (iii) an expression for the condensate fraction (collaboration with L. Salasnich, A. Parola, and F. Toigo).
- Strain effects on the band structure of semiconductors (collaboration with G.M. Vancore, F. Montalenti, A. Tagliaferri, G. Onida).
- Ab-initio self-energy corrections for the electron dynamics in metals: a procedure was developed to account systematically for the Drude contribution to the dielectric response

of metals, with applications for the ab-initio evaluation of optical and electron-energy-loss spectra (collaboration with G. Onida).

- The vibrational spectra of polyatomic molecules. NM proposed a novel method to compute ab-initio the full vibrational spectrum, including high overtone and combination states, in the spectral regions where anharmonic effects are dominant (collaboration with T. Sedivcova). NM's early interest in molecular spectroscopy arose in his master's thesis work, where he applied algebraic models to analyze the vibrational spectra of HCNO and H₂O₂ (software maintained at <http://alpha.science.unitn.it/~oss/vibr3at.html>).
- Fundamental quantum mechanics: NM introduced the concept of off-diagonal geometric phases, extending the traditional Berry phase to open paths and multiple quantum states (collaboration with F. Pistolesi).
- Electron-phonon interaction and dynamic Jahn-Teller effect. NM investigated how the ground-state symmetry of the entangled vibrational-electronic (vibronic) motion is affected by a geometric phase (collaboration with E. Tosatti and P. De Los Rios).
- Fullerene ions and their solid-state compounds. By means of ab-initio simulations, NM investigated (i) the electron-vibration couplings in C₆₀ ionic states; (ii) the electron-electron screened Coulomb couplings in the degenerate shells of C₆₀ ions; (iii) the structure of novel intercalated solid-state compounds of C₆₀. Additionally, NM constructed and studied models for several experimental phenomena including: (i) the anomalous attachment of thermal electrons to fullerene; (ii) the reduction of the magnetic g-factor of fullerene anions; (iii) phonon shakeups in photoemission from molecular C₆₀, with full account of vibronic interaction in the final C₆₀⁺ states; (iv) pairing and superconductivity in solid-state ionic compounds (collaborations with E. Tosatti, G.E. Santoro, M. Fabrizio, O. Gunnarsson, A. Auerbach, A. Potočnik).
- Electron-electron correlation, including (i) photoemission from heavy-fermion metals, within the Kondo lattice model, (ii) the insulating and superconducting states of alkali-doped C₆₀ materials such as NH₃ K₃C₆₀, and (iii) magnetic circular dichroism in X-ray absorption spectroscopy of metallic Ni (collaborations with T.A. Costi, G.E. Santoro, and M. Altarelli).

In carrying out his research, NM has collaborated with several scientists, notably young researchers, Ph.D research students and undergraduates. Co-authorship in the publication list cover these interactions at least partly. Among those collaborators, a mention should be made of T. Sedivcova, whom NM directed for her postdoc work in Milano from Mar 01, 2007 to Nov 30, 2008.

Research Grants

2012-2017: NM led the collaborative effort culminating in the COST Action *Understanding and Controlling Nano and Mesoscale Friction*, approved in May 2013, and running from 08/10/2013 to 07/10/2017 http://www.cost.eu/domains_actions/mpns/Actions/MP1303, on an annual budget in the 130 Keuro region, involving 200+ participants from 27 countries. The Action web site <http://www.nanofriction.org/> records the organized events. NM has served MP1303 as Chair.

2015-2017: participation to a H2020 Innovative Training Network (ITN) Excellent Science, Call H2020-MSCA-ITN-2015, in the role of local coordinator (scored above threshold but not funded, resubmitted Jan 2016 and Jan 2017).

2001-current: participation to several funded projects (several Italian PRIN/COFIN, FIRB, the EU-funded projects NANOQUANTA Network of Excellence - VI FP - and e-I3-ETSF - VII FP).

Teaching Experience

Supervised students (Milan University):

Ph.D. in physics:

1. A. Bordoni - <http://materia.fisica.unimi.it/manini/theses/BordoniPhD.pdf>

M.Sc. (*laurea magistrale*) in physics:

18. A. Silva - <http://materia.fisica.unimi.it/manini/theses/silva.pdf>
17. M. Mantovani - <http://materia.fisica.unimi.it/manini/theses/mantovani.pdf>
16. F. Arrigoni - <http://materia.fisica.unimi.it/manini/theses/arrigoni.pdf>
15. P. Ponzellini - <http://materia.fisica.unimi.it/manini/theses/ponzelliniMag.pdf>
14. S.V. Paronuzzi Ticco - <http://materia.fisica.unimi.it/manini/theses/paronuzziMag.pdf>
13. R. Manenti - <http://materia.fisica.unimi.it/manini/theses/manenti.pdf>
12. E. Arduca - <http://materia.fisica.unimi.it/manini/theses/arduca.pdf>
11. D. Dragoni - <http://materia.fisica.unimi.it/manini/theses/dragoni.pdf>
10. N. Ferri - <http://materia.fisica.unimi.it/manini/theses/ferriMag.pdf>
9. I.E. Castelli - <http://materia.fisica.unimi.it/manini/theses/castelliMag.pdf>
8. C. Negri - <http://materia.fisica.unimi.it/manini/theses/negriMag.pdf>
7. M. Cesaratto - <http://materia.fisica.unimi.it/manini/theses/cesarattoMag.pdf>
6. F. Bonelli - <http://materia.fisica.unimi.it/manini/theses/bonelliMag.pdf>
5. A. Miglio - <http://materia.fisica.unimi.it/manini/theses/miglio.pdf>
4. M. Cazzaniga - <http://materia.fisica.unimi.it/manini/theses/cazzaniga.pdf>
3. P. Gattari - <http://materia.fisica.unimi.it/manini/theses/gattari.pdf>
2. A. Del Monte - http://materia.fisica.unimi.it/manini/theses/del_monte.pdf
1. A. Bordoni - <http://materia.fisica.unimi.it/manini/theses/bordoni.pdf>

B.Sc. (*laurea triennale*) in physics:

63. M. Colombo - <http://materia.fisica.unimi.it/manini/theses/colombo.pdf>
62. G. Riva - <http://materia.fisica.unimi.it/manini/theses/riva.pdf>
61. M. Rossini - <http://materia.fisica.unimi.it/manini/theses/rossini.pdf>
60. S. Trevisan - <http://materia.fisica.unimi.it/manini/theses/trevisan.pdf>
59. E. Tentori - <http://materia.fisica.unimi.it/manini/theses/tentori.pdf>
58. C. Apostoli - <http://materia.fisica.unimi.it/manini/theses/apostoli.pdf>
57. C. Paulin - <http://materia.fisica.unimi.it/manini/theses/paulin.pdf>
56. L. Consonni - <http://materia.fisica.unimi.it/manini/theses/consonni.pdf>
55. M. Bellagente - <http://materia.fisica.unimi.it/manini/theses/bellagente.pdf>
54. P. Torta - <http://materia.fisica.unimi.it/manini/theses/torta.pdf>
53. A. Stenco - <http://materia.fisica.unimi.it/manini/theses/stenco.pdf>
52. J. Ciccoianni - <http://materia.fisica.unimi.it/manini/theses/ciccoianni.pdf>
51. M. Bozzetti - <http://materia.fisica.unimi.it/manini/theses/bozzetti.pdf>
50. G. Giusti - <http://materia.fisica.unimi.it/manini/theses/giusti.pdf>
49. A. Culatti - <http://materia.fisica.unimi.it/manini/theses/culatti.pdf>
48. M. Redaelli - <http://materia.fisica.unimi.it/manini/theses/reddaelli.pdf>
47. F. Di Giovanni - http://materia.fisica.unimi.it/manini/theses/di_giovanni.pdf
46. F. Civillini - <http://materia.fisica.unimi.it/manini/theses/civillini.pdf>
45. G. Fornasier - <http://materia.fisica.unimi.it/manini/theses/fornasier.pdf>
44. P. Valena - <http://materia.fisica.unimi.it/manini/theses/valena.pdf>
43. M. Mirigliano - <http://materia.fisica.unimi.it/manini/theses/mirigliano.pdf>
42. S. Mandelli - <http://materia.fisica.unimi.it/manini/theses/mandelli.pdf>
41. F. Vannini - <http://materia.fisica.unimi.it/manini/theses/vannini.pdf>
40. A. Nomellini - <http://materia.fisica.unimi.it/manini/theses/nomellini.pdf>
39. T. Meledina - <http://materia.fisica.unimi.it/manini/theses/meledina.pdf>
38. J. Marchi - <http://materia.fisica.unimi.it/manini/theses/marchi.pdf>
37. C. Agnesi - <http://materia.fisica.unimi.it/manini/theses/agnesi.pdf>
36. C.M. Sanavio - <http://materia.fisica.unimi.it/manini/theses/sanavio.pdf>
35. A. Falbo - <http://materia.fisica.unimi.it/manini/theses/falbo.pdf>
34. M. Invernizzi - <http://materia.fisica.unimi.it/manini/theses/invernizzi.pdf>
33. F. Delodovici - <http://materia.fisica.unimi.it/manini/theses/delodovici.pdf>
32. T.M. Mazzolari - <http://materia.fisica.unimi.it/manini/theses/mazzolari.pdf>
31. A. Vigentini - <http://materia.fisica.unimi.it/manini/theses/vigentini.pdf>
30. G. Faraone - <http://materia.fisica.unimi.it/manini/theses/faraone.pdf>

29. G.E. Roat - <http://materia.fisica.unimi.it/manini/theses/roat.pdf>
28. M. Isella - <http://materia.fisica.unimi.it/manini/theses/isella.pdf>
27. S.V. Paronuzzi Ticco - <http://materia.fisica.unimi.it/manini/theses/paronuzzi.pdf>
26. P. Comensoli - <http://materia.fisica.unimi.it/manini/theses/comensoli.pdf>
25. G. Pungillo - <http://materia.fisica.unimi.it/manini/theses/pungillo.pdf>
24. M. Manzoni - <http://materia.fisica.unimi.it/manini/theses/manzoni.pdf>
23. R. Meloni - <http://materia.fisica.unimi.it/manini/theses/meloni.pdf>
22. M. Zecchin - <http://materia.fisica.unimi.it/manini/theses/zecchin.pdf>
21. F. Brivio - <http://materia.fisica.unimi.it/manini/theses/brivio.pdf>
20. P. Ponzellini - <http://materia.fisica.unimi.it/manini/theses/ponzellini.pdf>
19. G. Pagano - <http://materia.fisica.unimi.it/manini/theses/pagano.pdf>
18. A. Paroni - <http://materia.fisica.unimi.it/manini/theses/paroni.pdf>
17. E. Diato - <http://materia.fisica.unimi.it/manini/theses/diato.pdf>
16. N. Ferri - <http://materia.fisica.unimi.it/manini/theses/ferri.pdf>
15. N.S. Falzoi - <http://materia.fisica.unimi.it/manini/theses/falzoi.pdf>
14. B. Van Hattem - http://materia.fisica.unimi.it/manini/theses/van_hattem.pdf
13. E. Distanto - <http://materia.fisica.unimi.it/manini/theses/distante.pdf>
12. C. Negri - <http://materia.fisica.unimi.it/manini/theses/negri.pdf>
11. I.E. Castelli - <http://materia.fisica.unimi.it/manini/theses/castelli.pdf>
10. F. Caruso - <http://materia.fisica.unimi.it/manini/theses/caruso.pdf>
9. M. Cesaratto - <http://materia.fisica.unimi.it/manini/theses/cesaratto.pdf>
8. M. Korbman - <http://materia.fisica.unimi.it/manini/theses/korbman.pdf>
7. F. Bonelli - <http://materia.fisica.unimi.it/manini/theses/bonelli.pdf>
6. A. Bugada - <http://materia.fisica.unimi.it/manini/theses/bugada.pdf>
5. G. Diana - <http://materia.fisica.unimi.it/manini/theses/diana.pdf>
4. E. Cinquanta - <http://materia.fisica.unimi.it/manini/theses/cinquanta.pdf>
3. G. Divitini - <http://materia.fisica.unimi.it/manini/theses/divitini.pdf>
2. G. La Spada - http://materia.fisica.unimi.it/manini/theses/la_spada.pdf
1. F. Dalla Piazza - http://materia.fisica.unimi.it/manini/theses/dalla_piazza.pdf

Courses Taught:

2011-current: *Solid-State Physics 1 (Fisica dei Solidi 1*, 48 hours/year) for the Master's degree in Physics - Milan University.

2011-current: *Structure of Matter 1 (Struttura della Materia 1*, 80 hours/year) for the Bachelor's degree in Physics - Milan University. Lecture notes and proposed exercises are available at http://materia.fisica.unimi.it/manini/dida/Struttura_della_Materia_1.html .

2010: *Surface Physics 1 (Fisica delle Superfici 1*, 48 hours/year) for the Master's degree in Physics - Milan University.

2008-2009: *Physical methods applied to biotechnology (Metodi fisici applicati alle biotecnologie*, 24 hours/year) for the Master's degree in biotechnology - Milan University. Detailed program and slides are available at http://materia.fisica.unimi.it/manini/dida/Metodi_Fisici_Biotecnologie.html .

2003-current: *Quantum Theory of Matter* for the Physics, Astrophysics and Applied Physics PhD School - Milan University (10 hours/year).

2003-2009: *Structure of Matter 1 (Struttura della Materia 1*, 60 hours/year) for the Bachelor's degree in Physics - Milan University. With the adaptation of the Milan-University higher-education programs to the Bologna process, NM was charged to plan the contents of this first-cycle new course. The conceptual conversion of the old *Structure of Matter* into the current *Physics of Condensed Matter* is the result of that evolution. NM's lecture notes covering the reworked material had been printed by local CUSL for several years, until the recent in-depth revision and volume publication with Springer.

2002-2010: appointed teacher of *Vibronic effects in molecules and molecular solids* at SISSA, Trieste.

2001-2003: practicals for *Structure of Matter (Struttura della Materia*, 30 hours/year) for the pre-Bologna-style 4-years M.Sc. diploma (Laurea quadriennale) in Physics - Milan University.

1994, 1995, 2000: trainer of the Italian Physics Olympiads Team.

1991-1992: math and physics at high-school level (students of age 13-19) in Trento and Rovereto, Italy (16 weeks - 18 hours/week).

Administrative Experience

2008: member of the committee for the selection of the Director of the European Theoretical Spectroscopy Facility.

2007-2010: member of the teaching executive committee (Giunta) for the Physics Department at Milan University.

2006-current: proposer and local contact of the Physics and Chemistry of Advanced Materials (PCAM) European Doctorate network.

2006-2008: member of the Science Faculty executive committee (Giunta) of Milan University.

2003-2011 and 2013-current: member of the Council of teachers of the Physics, Astrophysics and Applied Physics PhD School of the Milan University. In years 2003-2007 NM

operated as the Council's Scientific Secretary.

1998-current: Referee of approximately 90 manuscripts for the following journals: Beilstein J. Nanotechnol., Chem. Phys. Lett., Commun. Theor. Phys., Comput. Theor. Chem., Eur. Phys. J. B, Europhys Lett., J. Mol. Struct., J. Nanopart. Res., J. Phys. B, J. Phys. Chem. Solids, J. Supercond. Novel Magnet., Model. Simul. Mater. Sci. Eng., Philos. Mag., Phys. Chem. Chem. Phys., Phys. Lett. A, Phys. Rev. A + B + E + Lett., Phys. Status Solidi B, Tribol. Lett., and Rep. Math. Phys. Referee of research projects for: the German Research Foundation (DFG); the Italian Supercomputing Center Cineca; the Italian Ministry of Research (MIUR).

Organization of Conferences

2016-2017: co-organizer of the *Joint ICTP-COST-MODPHYSFRICT Conference on 'Trends in Nanotribology 2017' (TiN17)*, Trieste, June 26-30, 2017 - <http://indico.ictp.it/event/7971/> .

2013-2015: co-organizer of the *Condensed Matter Highlights* workshop series in Milan, <https://sites.google.com/site/somunimi/>

2010-2011: co-organizer of the *Joint ICTP/FANAS Conference on Trends in Nanotribology*, Trieste, Sep. 12-16, 2011 - <http://indico.ictp.it/event/a10163/> , and co-editor of the proceedings Tribology Letters vol. 48/1 <http://link.springer.com/journal/11249/48/1/> .

2008-2009: co-organizer of the *Joint ICTP/FANAS Conference on Trends in Nanotribology*, Trieste, Oct. 19-24, 2009 - <http://indico.ictp.it/event/a08185/> , and co-editor of the proceedings Tribology Letters vol. 39/3 <http://link.springer.com/journal/11249/39/3/> .

2005-2006: co-organizer of the *International Symposium on the Jahn-Teller Effects: Novel Aspects in Orbital Physics and Vibronic Dynamics of Molecules and Crystals*, Trieste, Aug. 28-31, 2006 - <http://indico.ictp.it/event/a05220/> , and co-editor of the proceedings J. Mol. Struct. vol. 838 <http://www.sciencedirect.com/science/journal/00222860/838> .

2003-2004: co-organizer of the Mini-Colloquium *Theory of Optical and Dielectric Properties of Condensed Matter* at the 20th General Conference Condensed Matter Division European Physical Society, Prague, Czech Republic, July 19-23, 2004.

2003-2004: co-organizer of the *Fullerene - Solid State Symposium, at the 205rd Meeting of The Electrochemical Society*, San Antonio TX, USA, May 9-13, 2004.

Languages

Italian: Mother tongue; English: CEFR-C2; French: Fluent.

Computing Skills

Current OSs: linux, android, MS-Windows; past OS experience: aix, hp-ux, MS-dos, Mac OS, vms.

Programming: c++, python, perl, fortran, Mathematica, unix shell/sed/awk, html, usage of standard numerical libraries (lapack, Numerical Recipes) and parallel-computer environments (mpi).

Editors/utilities: emacs, latex, xmgrace, gimp, rawtherapee, xfig, libreoffice, google drive.

Publications in Peer-Reviewed Journals

92. *Directional and Angular Locking in the Driven Motion of Au Islands on MoS₂*, F. Trilitzsch, R. Guerra, A. Janas, N. Manini, F. Krok, and E. Gnecco, submitted to Phys. Rev. Lett.
91. *'Planetary' silver nanoparticles held in orbit by electric charge*, S. Marom, R. Modi, M. Plessner, N. Manini, and M. Di Vece, submitted to Appl. Phys. Lett.
90. *Analytic understanding and control of dynamical friction*, E. Panizon, G.E. Santoro, E. Tosatti, G. Riva, and N. Manini, in print in Phys. Rev. B., arXiv:1802.04509
89. *Experimental observation of the Aubry transition in two-dimensional colloidal monolayers*, T. Brazda, A. Silva, N. Manini, A. Vanossi, R. Guerra, E. Tosatti, and C. Bechinger, arXiv:1802.09075, in print in Phys. Rev. X.
88. *Lifted graphene nanoribbons on gold: from smooth sliding to multiple stick-slip regimes*, L. Gigli, N. Manini, E. Tosatti, R. Guerra, and A. Vanossi, Nanoscale **10**, 2073 (2018).
87. *Protomene: A new carbon allotrope*, F. Delodovici, N. Manini, R.S. Wittman, D.S. Choi, M. Al Fahim, and L.A. Burchfield, Carbon **126**, 574 (2018).
86. *Atomic scale front propagation at the onset of frictional sliding*, S. Bonfanti, A. Taloni, C. Negri, A.L. Sellerio, N. Manini, and S. Zapperi, J. Phys. Chem. Lett. **8**, 5438 (2017).
85. *Velocity dependence of sliding friction on a crystalline surface*, C. Apostoli, G. Giusti, J. Ciccoianni, G. Riva, R. Capozza, R. L. Woulaché, A. Vanossi, E. Panizon, and N. Manini, Beilstein J. Nanotechnol. **8**, 2186 (2017).
84. *Graphene nanoribbons on gold: Understanding superlubricity and edge effects*, L. Gigli, N. Manini, A. Benassi, E. Tosatti, A. Vanossi, and R. Guerra, 2D Mater. **4**, 045003 (2017).
83. *Finite-temperature phase diagram and critical point of the Aubry pinned-sliding transition in a two-dimensional monolayer*, D. Mandelli, A. Vanossi, N. Manini, and E. Tosatti, Phys. Rev. B **95**, 245403 (2017).
82. *Current trends in the physics of nanoscale friction*, N. Manini, G. Mistura, G. Paolicelli, E. Tosatti, and A. Vanossi, Adv. Phys. X **2**, 569 (2017).
81. *Novamene: A new class of carbon allotropes*, L.A. Burchfield, M. Al Fahim, R.S. Wittman, F. Delodovici, and N. Manini, Heliyon **3**, e00242 (2017).
80. *Friction and Nonlinear Dynamics*, N. Manini, O.M. Braun, E. Tosatti, R. Guerra, and A. Vanossi, J. Phys.: Condens. Matter **28**, 293001 (2016).
79. *Subharmonic Shapiro steps of sliding colloidal monolayers in optical lattices*, S.V. Paronuzzi Ticco, G. Fornasier, N. Manini, G.E. Santoro, E. Tosatti, and A. Vanossi, J. Phys.: Condens. Matter **28**, 134006 (2016).
78. *Superlubric-Pinned Transition in Sliding Incommensurate Colloidal Monolayers*, D. Mandelli, A. Vanossi, M. Invernizzi, S. Paronuzzi, N. Manini, and E. Tosatti, Phys. Rev. B **92**, 134306 (2015).

77. *Friction Boosted by Equilibrium Misalignment of Incommensurate Two-Dimensional Colloid Monolayers*, D. Mandelli, A. Vanossi, N. Manini, E. Tosatti, Phys. Rev. Lett. **114**, 108302 (2015).
76. *Oxidation of carbynes: signatures in infrared spectra*, E. Cinquanta, N. Manini, L. Ravagnan, L. Caramella, G. Onida, P. Milani, and P. Rudolf, J. Chem. Phys. **140**, 244708 (2014).
75. *Thermal formation of carbynes*, T.M. Mazzolari and N. Manini, J. Phys.: Condens. Matter **26**, 215302 (2014).
74. *Soliton dynamics in a solid lubricant during sliding friction*, A. Vigentini, B. Van Hattem, E. Diato, P. Ponzellini, T. Meledina, A. Vanossi, G. Santoro, E. Tosatti, and N. Manini, Phys. Rev. B **89**, 094301 (2014).
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Scientific Books and Contributed Book Chapters

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4. *Introduction to the Physics of Matter - Basic atomic, molecular, and solid-state physics*, N. Manini (Springer, Cham, 2014); available as softcover (ISBN 978-3-319-14381-1) and eBook - (ISBN 978-3-319-14382-8); DOI 10.1007/978-3-319-14382-8.
3. *Jahn-Teller and Coulomb correlations in fullerene ions and compounds. From isolated ions to metal, insulator, and superconductor phases of alkali fulleride solids*, N. Manini and E. Tosatti, (Lambert Acad. Publ., Saarbrücken, 2010), ISBN 978-3-8383-6024-9.
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3. *Off-diagonal geometric phases*, F. Pistolesi and N. Manini, ILL Annual Report 2000, p. 76, http://www.ill.eu/fileadmin/users_files/Annual_Report/AR-00/p-76.htm (2000).
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Conferences, Workshops, and Proceedings Papers

NM delivered a total of 26 invited talks, plus numerous contributed talks and posters at the following conferences and workshops:

- CECAM workshop on Quantum Monte Carlo for atoms, molecules and selected condensed matter systems, Orsay (Paris), France, June 12-20, 1990
- *Roto-vibrational spectroscopy of quadriatomic molecules: an algebraic approach*, S. Oss, N. Manini, and L. Viola published in Proceedings of SASP 92, edited by D. Bassi, M. Scotoni, and P. Tosi, p. 2.120.
poster presented at
SASP - Symposium on Atomic and Surface Physics, Pampeago, Italy, Jan. 19-25, 1992
- XII Congresso Fisica Teorica e Struttura della Materia, Fai della Paganella (Trento), Italy, March 31 - April 3, 1993
- *Electron-vibron interactions and Berry phases in Charged Fullerene*, presented at
1994 March Meeting of the American Physical Society, Pittsburgh, PA, U.S.A., March 21-25, 1994
- *Berry phases and Superconductivity in ionic C_{60} -based materials*, poster presented at
Congresso nazionale di fisica della materia, Brescia, Italy, June 13-16, 1994
- *Electron-Vibron Interaction and Berry Phases in Charged Fullerene*, and *Enhanced Electron Pairing in a Lattice of Berry Phase Molecules*, posters presented at International Conference on Magnetic Correlations, Metal-Insulator-Transitions and Superconductivity in Novel Materials, Wuerzburg, Germany, Sept. 26-30, 1994
- VII International Workshop on Computational Condensed Matter Physics: Total Energy and Force Methods, I.C.T.P., Trieste, Italy, Jan. 11-15, 1995
- *Low lying excitations of the Dynamical Jahn-Teller ions C_{60}^- and C_{60}^{2-}* , N. Manini and E. Tosatti published in Recent Advances in the Chemistry and Physics of Fullerenes and Related Materials: Volume 2, edited by K.M. Kadish and R.S. Ruoff (The Electrochemical Society, Pennington NJ, 1995), p. 1017.
invited talk at
187th Meeting of The Electrochemical Society, Reno, NV, U.S.A., May 21-26, 1995
- Adriatico Research Conference - NATO Advanced Research Workshop on Physics of Sliding Friction, I.C.T.P., Trieste, Italy, June 20-23, 1995
- *Surprises in the Orbital Magnetic Moment and g-Factor of the Dynamic Jahn-Teller Fullerene Ion*, invited talk at
XV Congresso Fisica Teorica e Struttura della Materia, Fai della Paganella (Trento), Italy, March 30 - April 2, 1996
- *Enhanced Electron Pairing in a Lattice of Berry Phase Molecules*, presented at
Euroconference on The role of Dimensionality in the Correlated Electronic Systems, Villa Gualino, Torino, Italy, May 6-25, 1996
- *Surprises in the Orbital Magnetic Moment and g-Factor of the Dynamic Jahn-Teller Ion C_{60}^-* , presented at
XIII International Symposium on Electrons and Vibrations in Solids and Finite Systems (Jahn-Teller Effect), Berlin, Germany, Aug. 24-29, 1996

- *Berry-Phase and Symmetry of the Ground State in Dynamical Jahn-Teller Systems*, P. De Los Rios and N. Manini published in Recent Advances in the Chemistry and Physics of Fullerenes and Related Materials - Volume 5, edited by K.M. Kadish and R.S. Ruoff (The Electrochemical Society, Pennington NJ, 1997), p. 468.

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192nd Meeting of The Electrochemical Society, and the 48th Annual Meeting of the International Society of Electrochemistry, Paris, France, Aug. 31 - Sep. 5, 1997

- Highlights in X-Ray Synchrotron Radiation Research, Grenoble, France, Nov. 17-20, 1997
- *Fullerene ions: many-modes dynamic Jahn-Teller systems at strong coupling*, poster presented at INFMeeting - Congresso Nazionale di Fisica della Materia, Rimini, Italy, June 25-30, 1998
- *Berry Phase and the Symmetry of the Vibronic Ground State in Dynamical Jahn-Teller Systems*, N. Manini and P. De Los Rios published in Proceedings of the XIV International Symposium on Electron-Phonon Dynamics and Jahn-Teller Effect, Erice, Italy 7-13 July 1998, edited by G. Bevilacqua, L. Martinelli, and N. Terzi (World Scientific, Singapore, 1999), p. 37.

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XIV International Symposium on Electron-Phonon Dynamics and Jahn-Teller Effect, Erice, Italy 7-13 July 1998

- SRRTNET Workshop '99 Workshop on Theory and Computation for Synchrotron Radiation, Frascati, Italy, Sep. 23-25, 1999
- Computational Quantum Many-Body Physics, Newton Institute - Cambridge UK Feb. 18-21, 2000
- *Which ground state for C_{60}^+ ?*, poster presented at XIV International Winterschool - Euroconference on Electronic properties of novel materials - molecular nanostructures, Kirchberg/Tirol Austria Mar. 4-11, 2000
- *Electron-vibration couplings in positive C_{60}^+ ions*, poster presented at X International Workshop on Computational Material Science Total Energy and force methods, I.C.T.P., Trieste, Italy, Jan. 11-13, 2001
- *Electron-vibration couplings in positive C_{60} ions*, poster presented at XV International Winterschool on Electronic properties of novel materials - Euroconference, Kirchberg/Tirol Austria Mar. 3-10, 2001
- *Electron-vibration couplings in positively charged fullerene*, presented at INFMeeting - Congresso Nazionale di Fisica della Materia, Roma, Italy, June 18-22, 2001
- *Accoppiamenti elettrone-vibrazione in fullerene caricato positivamente*, invited talk at

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- *Coulomb couplings in positively charged fullerene*, poster presented at XVI International Winterschool on Electronic properties of novel materials - Euroconference, Kirchberg/Tirol Austria Mar. 2-9, 2002
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XVI Jahn-Teller Conference, Catholic University of Leuven-Belgium, Aug. 26 - Sep. 1, 2002

- *Coulomb couplings in positively charged fullerene*, presented at Euroconference CMS2002 - XII Workshop on Computational Materials Science, Villasimius, Italy, Sep. 23-29, 2002
- *Sensitivity of the Mott transition to noncubic splitting of the orbital degeneracy: Application to $NH_3 K_3 C_{60}$* , invited talk at 203rd Meeting of The Electrochemical Society, Paris, France, Apr. 27 - May 2, 2003
- *Hund Rule Magnetism in C_{60} Ions and Calculation of the Photoemission Spectrum of Gas-Phase C_{60}* , posters presented at INFMeeting - National Conference on Physics of Matter, Genova, Italy, June 23-25, 2003
- *Sensitivity of the Mott transition to noncubic splitting of the orbital degeneracy: Application to $NH_3 K_3 C_{60}$* , invited talk at Workshop on Electronic Properties of Organic Semiconductors, Leiden, The Netherlands, Jul. 7-11, 2003
- *Jahn-Teller Spectral Fingerprint in Molecular Photoemission: C_{60}* , presented at Euroconference CMS2003 - XIII Workshop on Computational Materials Science, Geresmeas, Italy, Sep. 13-18, 2003
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- *Hund's Rule Magnetism in C_{60} Ions?*, poster presented at INFMeeting - National Conference on Physics of Matter (CNR-INFM), Genova, Italy, June 8-10, 2003

- Workshop on Novel States and Phase Transitions in Highly Correlated Matter, I.C.T.P., Trieste, Italy, July 12-23, 2004
- 20th General Conference Condensed Matter Division EPS, Prague, Czech Republic, July 19-23, 2004
- *Jahn-Teller Spectral Fingerprint in Molecular Photoemission: C_{60}* , invited talk at International workshop on Jahn-Teller Effect, Beijing, China, Aug. 24-26, 2004
- *Off-diagonal geometric phases*, invited talk at School and Workshop on Quantum Entanglement, Decoherence, Information, and Geometrical Phases in Complex Systems, I.C.T.P., Trieste, Italy Nov. 01-12, 2004
- *Jahn-Teller Spectral Fingerprint in Molecular Photoemission: C_{60}* , invited talk at XII International Workshop on Computational Condensed Matter Physics and Materials Science: Total Energy and Force Methods, I.C.T.P., Trieste, Italy, Jan. 13-15, 2005
- *Many-body Properties of a Jellium Slab*, presented at 40 Years of the GW Approximation for the Electronic Self-Energy: Achievements and Challenges, Bad Honnef, Germany, Sep. 12-15, 2005
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- *Exact velocity quantization phenomena in the lubricated friction of classic periodic sliders*, presented at 12th Workshop On Surface Dynamics, Modena, Italy, June 22-25, 2006
- *Nanotribology and lubrication at the atomic scale*, invited talk at International School of Solid State Physics - 37th workshop: low-dimensional phenomena and simulations, Erice, Italy, July 26-31, 2006
- *Linear Jahn-Teller effect of an orbital quintet in icosahedral symmetry*, presented at International Symposium on the Jahn-Teller Effects: Novel Aspects in Orbital Physics and Vibronic Dynamics of Molecules and Crystals, Trieste, Italy, Aug. 28-31, 2006
- *Hund's Rule Magnetism in C_{60} Ions?*, poster presented at Theoretical Concepts on Magnetism in Solids - Symposium in Memoriam of Paolo Carra, Grenoble, France, Sep. 14-15, 2006
- *Exactly quantized dynamics of classical incommensurate sliders*, presented at XCII Congresso nazionale - Società Italiana di Fisica, Torino, Italy, Sep. 18-23, 2006
- *Static friction on the fly: velocity pinning transitions of lubricants in motion*, poster presented at

Statphys 23, Genova, Italy, July 9-13, 2007

- *Static friction on the fly: velocity pinning transitions of lubricants in motion*, invited talk at Vibrations at Surfaces 12, Erice, Italy, July 20-26, 2007
- 12th Nanoquanta Workshop on Electronic Excitations, Aussois, France, Sep. 18-22, 2007
- *Quantized lubricant velocity in a bi-dimensional sliding model*, invited talk at CECAM workshop: Modelling and simulations of friction at the nanoscale: from understanding to control, Lyon, France, Nov. 08-10, 2007
- *The role of lubricant molecular shape in microscopic friction*, invited talk at International School of Solid State Physics - 44th workshop: Dynamical Phenomena in low-Dimensional Systems, Erice, Italy, July 20-26, 2008
- *Hund's Rule Magnetism in C_{60} Ions?*, poster presented at XIX International Symposium on the Jahn-Teller Effect: Vibronic Interactions and Orbital Physics in Molecules and in the Condensed Phase, Heidelberg, Germany, Aug. 25-29, 2008
- 13th Nanoquanta-ETSF Workshop on Electronic Excitations, Pugnochiuso, Italy, Sep. 22-27, 2008
- *The role of lubricant molecular shape in microscopic friction*, presented at Physics of Tribology - Understanding Friction and Wear processes in technical systems, Bad Honnef, Germany, March 22-25, 2009
- *Computer simulation of 2D mesophases of 1,3-dialkylimidazolium ionic liquid films*, presented at CECAM workshop: Computational models of room temperature ionic liquids, Dublin, Ireland, April 6-8, 2009
- *Theory of AFM frictional dissipation at surface Moire patterns*, presented at 2nd South-East European Conference on Computational Mechanics (SEECCM 2009), Rhodes, Greece, June 22-24, 2009
- *Theory of AFM frictional dissipation at surface Moire patterns*, presented at ECOSS 26, European Conference on Surface Science, Parma, Italy, Aug. 30 - Sep. 04, 2009
- Joint ICTP/FANAS Conference on Trends in Nanotribology, Trieste, Italy, Oct. 19-24, 2009
- *Tribology of the lubricant quantized sliding state*, invited talk at ACAM- SFI SimBioMa-ESF Workshop: Molecular Friction, Dublin, Ireland, Dec. 14-16, 2009

- *Theory of AFM frictional dissipation at surface Moire patterns*,
presented at
Transalp'Nano 2010, The Second Transalpine Conference on Nanoscience and Nanotechnologies, Como, Italy, June 3 - 5, 2010
- *Ab Initio Long-Wavelength Properties of Metallic Systems: Iron and Magnesium*,
M. Cazzaniga, L. Caramella, N. Manini, and G. Onida, published in EPIOPTICS-11 - Proceedings of the 49th course of the International School of Solid State Physics (Erice, Italy, July 2010), edited by A. Crescenti, series editor: A. Zichichi (Word Scientific, Singapore, 2012), p. 30.
- *Theory of AFM frictional dissipation at surface Moire patterns*,
presented at
ECOSS 27, European Conference on Surface Science, Groningen, The Netherlands, Aug. 29 - Sept. 3, 2010
- *Theory of AFM frictional dissipation at surface Moire patterns*,
poster presented at
IOM-CNR Workshop, Trieste, Italy, Sep. 30 - Oct. 1, 2010
- *Molecular Photoemission from C₆₀: The Clear Spectral Fingerprint of Jahn-Teller Effect*,
invited talk at
Fullerene Silver Anniversary Symposium, FSAS-2010, Hersonissos, Crete, Greece, Oct. 4-10, 2010
- *Comment to "Imaging the atomic orbitals of carbon atomic chains with field-emission electron microscopy"*,
poster presented at
15th International Workshop on Computational Physics and Materials Science: Total Energy and Force Methods, I.C.T.P., Trieste, Italy, Jan. 13-15, 2011
- *Theory of AFM frictional dissipation at surface Moire patterns*,
presented at
International Nanotribology Forum: The Hoi An Discussions, Hoi An, Vietnam, May 23-27, 2011
- *Electronic and mechanical properties of sp carbon atomic nanowires*,
presented at
16th ETSF Workshop on Electronic Excitations - Bridging theory and experiment, Torino, Italy, Sept. 27-30, 2011
- 16th International Workshop on Computational Physics and Materials Science: Total Energy and Force Methods, I.C.T.P., Trieste, Italy, Jan. 10-12, 2013
- *Static and dynamic friction in sliding colloidal monolayers*,
presented at
FisMat2013 - Italian National Conference on Condensed Matter Physics, Milano, Italy, Sept. 09-13, 2013
- *Solitons and frictional phenomena in sliding colloidal monolayers*,
invited talk at
XCIX Congresso Nazionale Società Italiana di Fisica, Trieste, Italy, Sep. 23-27, 2013

- *Electronic and mechanical properties of sp carbon atomic nanowires*,
invited talk at
International Workshop on From carbon nanotubes to graphene: the key materials of the future? Brescia, Italy, Sep. 30-Oct. 1, 2013
- *Playing tribology with a layer of colloidal particles: depinning, solitons, epitaxy, and more*,
invited talk at
Conference on Friction and Energy Dissipation in Man-made and Biological Systems, Trieste, Italy, Nov. 5-8, 2013
- *sp chains and sp² carbon: spectroscopy and dynamics properties*,
invited talk at
Conference on Frontiers of Condensed Matter Physics, Trieste, Italy, Nov. 11-15, 2013
- Dagli atomi al cervello, Politecnico di Milano, Italy, Jan 27, 2014
- *Soliton dynamics in sliding friction*,
poster presented at
The First European Workshop on Understanding and Controlling Nano and Mesoscale Friction, Can Picafort, Majorca, Spain, May 26-29, 2014
- *Soliton dynamics in confined solid lubricants*,
invited talk at
Confined Systems Under Shear: New Materials & Mechanisms, Oxford, UK, Sept. 1-2, 2014
- Computer simulations for condensed phase systems: From correlated electrons to novel materials, Roma, Italy, May 4-6, 2015
- *Exploring friction with colloids: misalignment, local epitaxy, pinning-superlubricity, synchronization, and more*,
invited talk at
Novel Developments in Classical and Quantum Systems, Padova, Italy, June 4-5, 2015
- *Exploring friction with colloids: misalignment, local epitaxy, pinning-superlubricity, synchronization, and more*,
invited talk at
The International Conference on Understanding and Controlling Nano and Mesoscale Friction, Istanbul, Turkey, June 22-26, 2015
- *Solid-on-solid sliding: superlubricity, dissipation, and the role of lattice mismatch*,
invited talk at
NanoItaly (www.nanoitaly.it), Rome, Italy, Sep. 21-24, 2015
- International School of Solid State Physics - 68th Course: The Free Electron Laser for Ultrafast Imaging at the Nanoscale Erice, Italy, June 5-10, 2016
- *Friction dynamics of a colloidal metasolid*,
poster presented at
Italian Soft Days 2016, Milano, Italy, June 23-24, 2016
- *Dissipation mechanisms in sliding friction*,
poster presented at
The 2nd European Workshop on Understanding and Controlling Nano and Mesoscale Friction Riga, Latvia, July 4-7, 2016

- *Frictional features in graphene nanoribbons deposited on gold*, poster presented at 17th Workshop on Dynamical Phenomena at Surfaces (WDPS-17) Milano, Italy, Sept. 19-21, 2016
- *Frictional features in graphene nanoribbons deposited on gold*, invited talk at 7th European Nanomanipulation Workshop Jena, Germany, Feb. 20-22, 2017.
- Joint ICTP-COST-MODPHYSFRICT Conference on 'Trends in Nanotribology 2017' (TiN17), Trieste, Italy, June 26-30, 2017.

NOTE: most of NM's publications (including preprints and obscure conference proceedings) are openly accessible at http://arXiv.org/find/cond-mat/1/au:+manini_n/0/1/0/all/0/1