



Riccardo Fantoni

Nationality: Italian **Date of birth:** 30/08/1970

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Home: Via Udine 29, 34135 Trieste (Italy)

WORK EXPERIENCE

Graduate Student at UIUC

University of Illinois at Urbana/Champaign [1995 – 2000]

City: Urbana

Country: United States

Website: <https://physics.illinois.edu/>

Name of unit or department: Physics department - **Business or sector:** Professional, scientific and technical activities

Teaching Assistant, Research Assistant

Postdoc at the University of Limerick

University of Limerick [2000 – 2001]

City: Limerick

Country: Ireland

Website: <https://www.ul.ie/scieng/schools-and-departments/department-mathematics-and-statistics>

Name of unit or department: Department of Mathematics and Statistics - **Business or sector:** Professional, scientific and technical activities

Research

Postdoc at UNIVE

University Ca' Foscari of Venezia [2004 – 2008]

City: Venice

Country: Italy

Website: <https://www.unive.it/pag/16775>

Name of unit or department: Chemical-Physics department - **Business or sector:** Professional, scientific and technical activities

Teaching, Research

Postdoc at NITheP

National Institute for Theoretical Physics [2009 – 2012]

City: Stellenbosch

Country: South Africa



Website: <https://nithecs.ac.za/>

Name of unit or department: National Institute for Theoretical Physics (NITheP) - Business or sector: Professional, scientific and technical activities

Research

School Teacher

Ministero dell'Istruzione [17/07/2015 – Current]

City: Trieste

Country: Italy

Business or sector: Education

Habilitation to teach Mathematics and Physics (classes A049, A048, A047, A038) in Italian high-school obtained at the University of Trieste with mark 87/100. One year course with exams. "Abilitazione all' insegnamento nella scuola secondaria per la classe A049 Matematica e Fisica con punteggio 87/100"

School Teacher

Ministero dell'Istruzione [24/08/2016 – Current]

City: Trieste

Country: Italy

Business or sector: Education

Passed a "Concorso per l' assunzione in ruolo nell' insegnamento di Matematica (classe A026) nella scuola secondaria di secondo grado con punteggio 72.2/100"

School Teacher

Ministero dell'Istruzione [01/09/2017 – Current]

City: Trieste

Country: Italy

Business or sector: Education

Obtained a "Contratto a tempo indeterminato per l' insegnamento di Matematica nella scuola secondaria di secondo grado (confirmed on 1st September 2019)"

University Associate Professor

Ministero della Ricerca [10/05/2019 – Current]

Country: Italy

Business or sector: Professional, scientific and technical activities

Habilitation for Associate Professor in Theoretical Physics of Matter (sector 02/B2) in the Italian University (until 10 May 2028)

School Teacher

Ministero dell'Istruzione [2018 – Current]

City: Trieste

Country: Italy

Website: <https://www.nauticogalvani.edu.it>

Business or sector: Education

Teaching Mathematics at Istituto Tecnico Nautico "Tomaso di Savoia" of Trieste



EDUCATION AND TRAINING

Master in Physics

University of Pisa [1989 – 1994]

Address: Pisa (Italy)

Field(s) of study: Physics

Final grade: 110 cum laude

Thesis: Sum Rules in a Layered Electron Gas

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Dipartimento di Fisica di Pisa  
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GEO Broglia, Fortuna

ANA I Marino

ANA II Marino

EXP I Martinelli

EXP II Tonelli, Bigi

EXP III Pierazzini, Minguzzi

EXP IV Beverini

PHY I Bellettini, Barsella

PHY II Stoppini

PHY III Menotti, D' Emilio

PHY SUP Bemporad

PHY THEO Di Giacomo, Maggiore, Paffuti, Rossi

PHY STAT Guadagnini

PHY SOL Grosso

PHY STR Arimondo

PHY MECH Servadio

MAT METH Cicogna, Morchio

CHEM Palleschi
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Scuola Normale Superiore di Pisa  
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PHY STAT Tosi

PHY MANY BODY Tosi
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### Master in Physics

**University of Illinois at Urbana/Champaign** [ 1994 – 2000 ]

**Address:** Urbana (United States)

**Field(s) of study:** Physics

ESL 401 Introduction to academic writing

PHYCS 302 Atmospheric Science, Walter Robinson

PHYCS 302 Principles of Atoms Dynamics, Richard Martin

PHYCS 398 Computer Simulation Methods of Many Particle Physics, David Ceperley

PHYCS 402 Theoretical Astrophysics, W. Watson and K. Cundiff

PHYCS 411 Boundary Value Problems in Physics, Yoshi Oono

PHYCS 412 Additional Techniques in Mathematical Physics, Yoshi Oono

PHYCS 413 Complex Variables Physics, Michael Stone



PHYCS 414 Advanced Mechanics, Vijay Pandharipande  
PHYCS 417 Lie Groups and Physics Applications,  
PHYCS 419 Physics of Elasticity, Eduardo Fradkin  
Dr. Riccardo Fantoni August 5, 2016  
PHYCS 430 Surface Physics, Ehrlich Gert  
PHYCS 450 Biomolecular Physics, Ulrich Nienhaus  
PHYCS 464 Phase Transitions, Nigel Goldenfeld  
PHYCS 470 Nuclei and Particles, Vijay Pandharipande  
PHYCS 481 Quantum Mechanics II, Paul Goldbart  
PHYCS 498C General Relativity I, Stuart Shapiro  
PHYCS 498C General Relativity II, Stuart Shapiro  
PHYCS 498C Compact Objects, Stuart Shapiro  
PHYCS 498C Non Equilibrium Statistical Mechanics, Klaus Schulten  
PHYCS 498 Spinors in Geometry and Physics, Robert Leigh and Steven B. Bradlow  
PHYCS 498 General Field Theory, Eduardo Fradkin  
PHYCS 498B Topology and Groups, Michael Stone and John P. D' Angelo  
PHYCS 498 Very Degenerate Atomic Gases, Anthony J. Leggett

## Ph.D. in Physics

**University of Trieste** [ 2001 – 2004 ]

**Address:** Trieste (Italy)

**Field(s) of study:** Physics

1. Computational approach to the structural and electronic properties of solids, Maria Peressi
2. Dynamic phenomena on surfaces, Renzo Rosei
3. Introduction to dynamical systems, Fabio Benatti
4. Introduction to statistical thermodynamics of disordered systems, Giorgio Pastore
5. Magnetic properties of low dimensional systems, Giorgio Rossi

## LANGUAGE SKILLS

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Mother tongue(s): **Italian**

**Other language(s):**

**English**

**LISTENING C1 READING C1 WRITING B2**

**SPOKEN PRODUCTION B2 SPOKEN INTERACTION B2**

## DIGITAL SKILLS

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### wordprocessing

LATEX

### languages

HTML / CSS / FORTRAN

### operating systems

WINDOWS / MACOS / LINUX / ANDROID

### mathematics software

MATHEMATICA / GEOGEBRA



## PUBLICATIONS

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### BOOKS

- (1) Fantoni R. "Regole di somma in un gas di elettroni stratificato", ISBN 978-889-101-539-6
- (2) Fantoni R. "Classical liquids: exact results, integral equations theory, and Monte Carlo simulations", ISBN 978-889-101-543-3
- (3) Fantoni R. "The Janus fluid, from a theoretical perspective", SpringerBriefs in Physics, (2013), ISBN 978-3-319-00406-8 (Print) 978-3-319-00407-5 (Online), [dx.doi.org/10.1007/978-3-319-00407-5](https://doi.org/10.1007/978-3-319-00407-5)
- (4) Fantoni R. "Discoveries due to the observation of mathematics", Kindle Direct Publishing

### PAPERS

- (1) Fantoni R. and Tosi M.P., Nuovo Cimento 17D, 155 (1995)  
[dx.doi.org/10.1007/BF02451594](https://doi.org/10.1007/BF02451594)  
WOS:A1995QW87300005  
2-s2.0-51649140258
- (2) Fantoni R. and Tosi M.P., Nuovo Cimento 17D, 1165 (1995)  
[dx.doi.org/10.1007/BF02454131](https://doi.org/10.1007/BF02454131)  
WOS:A1995TM36400009  
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- (3) Fantoni R. and Tosi M.P., Physica B 217, 35 (1996)  
[dx.doi.org/10.1016/0921-4526\(95\)00451-3](https://doi.org/10.1016/0921-4526(95)00451-3)  
WOS:A1996TR03900005  
2-s2.0-0030561994
- (4) Fantoni R., Jancovici B., and T'eliez G., J. Stat. Phys. 112, 27 (2003)  
[dx.doi.org/10.1023/A:1023671419021](https://doi.org/10.1023/A:1023671419021)  
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- (5) Fantoni R. and Pastore G., J. Chem. Phys. 119, 3810 (2003)  
[dx.doi.org/10.1063/1.1590642](https://doi.org/10.1063/1.1590642)  
WOS:000184474100028  
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- (6) Fantoni R. and Pastore G., Phys. Rev. E 68, 046104 (2003)  
[dx.doi.org/10.1103/PhysRevE.68.046104](https://doi.org/10.1103/PhysRevE.68.046104)  
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- (7) Fantoni R. and Pastore G., Physica A 332, 349 (2004)  
[dx.doi.org/10.1016/j.physa.2003.10.012](https://doi.org/10.1016/j.physa.2003.10.012)  
WOS:000188086200022  
2-s2.0-0346215805
- (8) Fantoni R. and Pastore G., J. Chem. Phys. 120, 10681 (2004)



[dx.doi.org/10.1063/1.1739392](https://dx.doi.org/10.1063/1.1739392)

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(9) Fantoni R., Gazzillo D., Giacometti A., J. Chem. Phys. 122, 034901 (2005)

[dx.doi.org/10.1063/1.1831275](https://dx.doi.org/10.1063/1.1831275)

WOS:000226748800038

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(10) Fantoni R., Gazzillo D., Giacometti A., Phys. Rev. E 72, 011503 (2005)

[dx.doi.org/10.1103/PhysRevE.72.011503](https://dx.doi.org/10.1103/PhysRevE.72.011503)

WOS:000230886900043

2-s2.0-27244434158

(11) Fantoni R., Gazzillo D., Giacometti A., and Sollich P. J. Chem. Phys. 125, 164504 (2006)

[dx.doi.org/10.1063/1.2358136](https://dx.doi.org/10.1063/1.2358136)

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[dx.doi.org/10.1103/PhysRevE.74.051407](https://dx.doi.org/10.1103/PhysRevE.74.051407)

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(13) Gazzillo D., Fantoni R., and Giacometti A., Mol. Phys. 104, 3451 (2006)

[dx.doi.org/10.1080/00268970601050892](https://dx.doi.org/10.1080/00268970601050892)

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[dx.doi.org/10.1103/PhysRevE.77.051206](https://dx.doi.org/10.1103/PhysRevE.77.051206)

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[dx.doi.org/10.1007/s10955-008-9616-x](https://dx.doi.org/10.1007/s10955-008-9616-x)

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(18) Fantoni R., Giacometti A., Malijevský A., and Santos A., J. Chem. Phys. 131, 124106 (2009)

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## PAPERS

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[dx.doi.org/10.1103/PhysRevE.84.011808](https://doi.org/10.1103/PhysRevE.84.011808)

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2-s2.0-79961114703

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[dx.doi.org/10.1088/1742-5468/2012/04/P04015](https://doi.org/10.1088/1742-5468/2012/04/P04015)

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(30) Fantoni R., Salari J. W. O., Klumperman B., Phys. Rev. E 85, 061404 (2012)

[dx.doi.org/10.1103/PhysRevE.85.061404](https://doi.org/10.1103/PhysRevE.85.061404)

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2-s2.0-84862224594

(31) Fantoni R., Phys. Rev. B 86, 144304 (2012)

[dx.doi.org/10.1103/PhysRevB.86.144304](https://doi.org/10.1103/PhysRevB.86.144304)

WOS:000309578100003

2-s2.0-84867308368

(32) Fantoni R., J. Stat. Mech. P10024 (2012)

[dx.doi.org/10.1088/1742-5468/2012/10/P10024](https://doi.org/10.1088/1742-5468/2012/10/P10024)

WOS:000310585500027

2-s2.0-84868286397

(33) Fantoni R., Physica B 412, 112 (2013)

[dx.doi.org/10.1016/j.physb.2012.12.032](https://doi.org/10.1016/j.physb.2012.12.032)

WOS:000314764900023

2-s2.0-84873386313

(34) Fantoni R., Solid State Communications 159, 106 (2013)

[dx.doi.org/10.1016/j.ssc.2013.01.028](https://doi.org/10.1016/j.ssc.2013.01.028)

WOS:000317800900025

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(35) Fantoni R. and Pastore G., Europhys. Lett. 101, 46003 (2013)

[dx.doi.org/10.1209/0295-5075/101/46003](https://doi.org/10.1209/0295-5075/101/46003)

WOS:000315999100021

2-s2.0-84874834405

(36) Maestre M. A. G., Fantoni R., Giacometti A. and Santos A., J. Chem. Phys. 138, 094904 (2013)

[dx.doi.org/10.1063/1.4793626](https://doi.org/10.1063/1.4793626)

WOS:000315874200054

2-s2.0-84874926774

(37) Fantoni R. and Santos A., Phys. Rev. E 87, 042102 (2013)





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(38) Fantoni R. and Pastore G., Phys. Rev. E 87, 052303 (2013)

[dx.doi.org/10.1103/PhysRevE.87.052303](https://doi.org/10.1103/PhysRevE.87.052303)

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WOS:000321446200046

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(40) Fantoni R., Giacometti A., Maestre M. A. G., and Santos A., J. Chem. Phys. 139, 174902 (2013)

[dx.doi.org/10.1063/1.4827861](https://doi.org/10.1063/1.4827861)

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## PAPERS

(41) Fantoni R. and Santos A., J. Chem. Phys. 140, 244513 (2014)

[dx.doi.org/10.1063/1.4884353](https://doi.org/10.1063/1.4884353)

WOS:000338634200051

2-s2.0-84903710390

(42) Fantoni R. and Pastore G., J. Chem. Phys 141, 074108 (2014)

[dx.doi.org/10.1063/1.4892878](https://doi.org/10.1063/1.4892878)

WOS:000340714600011

2-s2.0-84906544798

(43) Fantoni R., Phys. Rev. E 90, 020102(R) (2014)

[dx.doi.org/10.1103/PhysRevE.90.020102](https://doi.org/10.1103/PhysRevE.90.020102)

WOS:000341289600001

2-s2.0-84907237529

(44) Fantoni R. and Moroni S., J. Chem. Phys 141, 114110 (2014)

[dx.doi.org/10.1063/1.4895974](https://doi.org/10.1063/1.4895974)

WOS:000342843200014

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(45) Fantoni R. and Pastore G., Mol. Phys. 113, 2593 (2015)

[dx.doi.org/10.1080/00268976.2015.1061150](https://doi.org/10.1080/00268976.2015.1061150)

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(46) Fantoni R. Giacometti A. and Santos A., J. Chem. Phys 142, 224905 (2015)

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(47) Fantoni R., Phys. Rev. E, 92, 012133 (2015)

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(49) Alastuey A. and Fantoni R., J. Stat. Phys. 163, 887 (2016)

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(51) Fantoni R., J. Stat. Phys. 163, 1247 (2016)

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(53) Fantoni R., Physica A 477C, 187 (2017)

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(54) Fantoni R., J. Stat. Phys. 168, 652 (2017)

[http://dx.doi.org/10.1007/s10955-017-1810-2](https://doi.org/10.1007/s10955-017-1810-2)

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2-s2.0-85019677800

(55) Fantoni R. and Santos A., J. Stat. Phys. 169, 1171 (2017)

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<http://dx.doi.org/10.1088/1742-5468/aab690>

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(58) Fantoni R., Int. J. Mod. Phys. C 29, 1850028 (2018)

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<https://doi.org/10.1016/j.physa.2018.09.107>

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<https://doi.org/10.1016/j.physa.2019.04.222>

WOS:000476966100018

2-s2.0-85064919235

(62) Fantoni R., Indian J. Phys. 95, 1027 (2021)

<https://doi.org/10.1007/s12648-020-01750-2>

WOS:000543007600002

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<https://doi.org/10.1007/s10909-020-02532-0>

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(64) Fantoni R., Eur. Phys. J. B 94, 63 (2021)

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2-s2.0-85103348101

(65) Fantoni R. and Klauder J. R., Phys. Rev. D 103, 076013 (2021)

<https://doi.org/10.1103/PhysRevD.103.076013>

WOS:000648579600007



2-s2.0-85105542365

(66) Fantoni R., J. Stat. Mech P083102 (2021)

<https://doi.org/10.1088/1742-5468/ac0f69>

WOS:000680165100001

2-s2.0-85111176604

(67) Fantoni R. and Klauder J. R., J. Stat. Phys. 184, 28 (2021)

<https://doi.org/10.1007/s10955-021-02818-x>

WOS:000692401500001

2-s2.0-85111176723

(68) Fantoni R. and Klauder J. R., Phys. Rev. D 104, 054514 (2021)

<https://doi.org/10.1103/PhysRevD.104.054514>

WOS:000704629900005

2-s2.0-85114892586

(69) Fantoni R., Maestre M. A. G., and Santos A., J. Stat. Mech P103210 (2021)

<https://doi.org/10.1088/1742-5468/ac2897>

WOS:000711175900001

2-s2.0-85118939833

(70) Fantoni R., Mol. Phys. 120, 4 (2021)

<https://doi.org/10.1080/00268976.2021.1996648>

WOS:000712258400001

2-s2.0-85118339895

(71) Fantoni R. and Klauder J. R., Int. J. Mod. Phys. A 37, 2250029 (2022)

<https://doi.org/10.1142/S0217751X22500294>

WOS:000769229500003

2-s2.0-85126738235

(72) Fantoni R. and Klauder J. R., Int. J. Mod. Phys. A 37, 2250094 (2022)

<https://doi.org/10.1142/S0217751X22500944>

WOS:000811562100003

2-s2.0-85132227773

(73) Fantoni R., Eur. Phys. J. C 82, 843 (2022)

<https://doi.org/10.1140/epjc/s10052-022-10807-x>

WOS:000861486700003

2-s2.0-85135756093

(74) Fantoni R. and Klauder J. R., Phys. Rev. D 106, 114508 (2022)

<https://doi.org/10.1103/PhysRevD.106.114508>

WOS:000906363700004

2-s2.0-85144770879

(75) Fantoni R., J. Stat. Phys. submitted (2022)

<https://doi.org/>



WOS:

## NETWORKS AND MEMBERSHIPS

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### Physics societies

[ Current ]

SIF (Societa' Italiana di Fisica), EPS (European Physical Society)

## DRIVING LICENCE

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**Driving Licence:** A

**Driving Licence:** B

## CONFERENCES AND SEMINARS

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### SEMINARS

[ 1994 – 2011 ]

1994 Napoli CNR meeting. Poster on publication (1).

2002 National school of Matter Physics on "Fisica di base delle Nanostrutture e Calcolo ed Informazione Quantistica" (Torino Villa Gualino 9/9/2002-20/9/2002).

2002 School on "Fisica Statistica, Teoria della Probabilit´a e Complessit´a computazionale" (ICTP Trieste 26/8/2002-7/9/2002).

2003 XXII Fai della Paganella meeting: "Fisica Teorica e Struttura della Materia". Posters on publication (4) and on publication (5).

2004 XXIII Fai della Paganella meeting: "Fisica Teorica e Struttura della Materia". Poster on publication (6).

2004 "IX Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi" (Parma 22-24 June). Talk on publication (8).

2004 IV Giovanni Paladin Memorial: "Statistical Mechanics, Chaos and Condensed Matter Theory" (Rome 22-24 September). Poster on publication (9).

2005 "X Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi" (Parma 29-1 July). Poster on publications (9) and (10).

2005 "6th Liquid Matter Conference" (Utrecht, the Netherlands 2-6 July). Poster on publications (9) and (10).

2006 "31st Conference of the Middle European Cooperation in Statistical Physics" (Primorski, Croatia 23-26 April). Poster on publication (10).

2007 "Fluid phase behaviour and critical phenomena from liquid state theories and simulations" (CECAM, Lyon, France 12 July). Invited speaker on publications (14) and (15).

2007 "Statphys23" (Genova, Italy 9-13 July). Poster on publications (14) and (15).

2008 "7th Liquid Matter Conference" (Lund, Sweden 27 June-1 July). Poster on publications (14) and (15).

2009 "Long-range Interactions in Classical and Quantum Physics" (Stellenbosch, South Africa 16-27 November). Invited talk on publication (17).

2010 "21st Chris Engelbrecht Summer School in Theoretical Physics" (Stellenbosch, South



Africa 18-27 January).

2010 "35th Conference of the Middle European Cooperation in Statistical Physics" (Abbaye des Prémontrés, Pont-à-Mousson, France 15-19 March). Poster on publication (16), (18), and (20).

2010 "Statphys24" (Cairns, Australia 19-23 July). Oral presentation on publication (17).

2010 Invited talk at the University of Extremadura in Badajoz on publications (16), (18), (20), (21), and (24).

2011 "22st Chris Engelbrecht Summer School in Theoretical Physics" (Stellenbosch, South Africa 19-30 January).

2011 "Equilibration and Equilibrium 2nd Stellenbosch Workshop on Statistical Physics" (Stellenbosch, South Africa 7-18 March). Invited talk on publication (24).

2011 "Workshop on Frontiers in Ultracold Fermi Gases" (Trieste, ICTP, Italy 6-10 June). Poster on publications (33) and (39).

## SEMINARS

[ 2011 – 2018 ]

2011 "8th Liquid Matter Conference" (Vienna, Austria, 6-10 September). Poster on publications (23) and (24).

2011 "National Institute for Theoretical Physics of South Africa (NITheP)" (Stellenbosch, South Africa, 21 September). Invited talk on publication (23).

2011 "International Workshop on Ultracold Molecules" (Stellenbosch, South Africa, 7-11 November).

2012 "XCVIII Congresso Nazionale SIF" (Napoli, Italy, 17-21 September). Abstract on publication (30).

2013 "38st Conference of the Middle European Cooperation in Statistical Physics" (Trieste, Italy, 25-27 March). Poster on publications (34) and (39).

2013 "Italian National Conference on Condensed Matter Physics" (Milano, Italy, 9-13 September). Invited talk on publication (41).

2013 "XCIX Congresso Nazionale SIF" (Trieste, Italy, 23-27 September). Abstract on Publication (36) and (40).

2013 Invited talk at the University of Extremadura in Badajoz on publications (41).

2014 "Sigma-Phi-2014" (Rhodes, Greece, 7-11 July). Talk on publication (43) and (44).

2015 "Italian National Conference on Condensed Matter Physics (FisMat 2015)" (Palermo, Italy, 28 September-2 October). Invited talk on publication (46).

2017 Invited talk at the University of Extremadura in Badajoz on publications ....

2017 "Workshop on Understanding Quantum Phenomena with Path Integrals: From Chemical Systems to Quantum fluids and Solids — (smr 3131)" (Trieste, ICTP, 3-7 July).

Participant.

2017 "10th Liquid Matter Conference" (Ljubljana, Slovenia, 17-21 July). Poster on publications (55)



2017 "Italian National Conference on Condensed Matter Physics (FisMat 2017)" (Trieste, Italy, 1-5 October). Invited talk on publication (55)

2018 "6th World Congress and Expo on Nanotechnology and Material Science" (Valencia, Spain, 16-18 April). Invited Talk on publication (59)

## CREATIVE WORKS

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### SCIENTIFIC SOFTWARE AVAILABLE TO THE INTERNATIONAL SCIENTIFIC COMMUNITY

[ Current ]

- Development of a Mathematica notebook which evaluates the radial distribution functions for binary mixtures of nonadditive hard spheres, according to the method described in R. Fantoni and A. Santos, "Nonadditive hard-sphere fluid mixtures. A simple analytical theory", Phys. Rev. E 84, 041201 (2011).
- Development of a Gibbs Ensemble Monte Carlo algorithm to determine the phase properties of a ionic fluid of non-additive hard spheres, according to the method described in R. Fantoni and G. Pastore "Monte Carlo simulation of the nonadditive restricted primitive model of ionic fluids: Phase diagram and clustering", Phys. Rev. E 87, 052303 (2013).
- Development of a new Quantum Monte Carlo algorithm to determine the phase properties of a quantum fluid of bosons, according to the method described in R. Fantoni and S. Moroni, "Quantum Gibbs ensemble Monte Carlo", J. Chem. Phys. 141, 114110 (2014).

## RESEARCH STATEMENT:

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### RESEARCH STATEMENT:

[ Current ]

*Aim of the research is to develop analytical and computational methods for condensed and soft matter starting from the fundamental many-body equations. Apart from the few analytically exactly solvable models our principal instruments, guided by the various sum-rules, are Integral Equation Theory, Density Functional Theory, Thermodynamic Perturbation Theory, Association Theory, and Monte Carlo simulations which can find exact properties of many-body systems. We are combining these approaches to create new methods and to test the accuracy of calculations on materials. Current studied materials include colloidal suspensions, ionic liquids, polymer mixtures, the electron fluid, the polaron, and boson fluids (like  $^4\text{He}$ ,  $^4\text{He-H}_2$  mixtures, ...). We investigate the structure and thermodynamic properties of the materials including their phase transitions like the gas-liquid-(glass)-solid first order ones and the superfluid-superconducting second order ones, the percolation threshold, the clustering, the localization, the demixing, the polydispersity, and surface properties.*

## RESEARCH INTERESTS:

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### RESEARCH INTERESTS:

[ Current ]

Non-Equilibrium Statistical Mechanics:

From the Liouvillian dynamics to the Fokker-Planck equation. From the Fokker-Planck equation to the Smoluchowski equation. The Langevin equation. Monte Carlo solution of the Smoluchowski equation.



#### Statistical Mechanics:

Sum rules in many body systems, many body models soluble exactly analytically, integral equation theories for fluids (Percus-Yevick, hypernetted chain, mean spherical approximation, rational function approximation, . . .), thermodynamic perturbation theories, Monte Carlo methods, stochastic processes.

#### Condensed and Soft Matter Physics:

Coulomb liquids, the polaron, Bosons fluids, colloidal suspensions, polymers.

#### Quantum fluid models:

The Jellium in one, two, and three spatial dimensions and the polaron problem. The Jellium on parallel planes and on a sphere.

Square-well Bosons as a model of cold atoms. The  $^4\text{He}$  in three and two dimensions.  $^4\text{He}$ - $\text{H}_2$  mixtures.

#### Classical fluid models:

The one-dimensional nearest-neighbor fluids, the one- and twocomponent plasma living in one-, two-, and three-dimensions, the one- and two-component plasma living on curved surfaces, the hardsphere fluid, the penetrable square-well fluid in one-, two-, and three-dimensions, the non-additive hard-sphere mixture, the Widom-Rowlinson model, the sticky-hard-sphere one- and two-component fluid, the restricted primitive model for charged hard spheres, patchy spheres fluids (the Janus fluid, etc . . .).

#### Quantum field theory:

Path integral Monte Carlo of lattice field theory subject to different kinds of quantization procedures.

#### Numerical methods (NM) of interest:

The solution of integral equation theories and the Monte Carlo methods to perform computer experiments.

#### NM for the solution of integral equation theories:

The Newton Raphson algorithm (with conjugated gradient method) and the Picard algorithm.

#### NM for Monte Carlo simulations:

Ground state Monte Carlo simulations (variational and diffusion), path integral Monte Carlo simulations (conventional and worm algorithm), classical Monte Carlo simulations (NVT, NPT, grand canonical, Gibbs ensemble).





## REVIEWER

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### Reviewer of Physics Journals

[ 1995 – Current ]

1. reviewer for the American Mathematical Society (AMS)
2. reviewer for the American Physical Society (APS)
3. reviewer for the American Institute of Physics (AIP)
4. reviewer for the Institute of Physics (IOP)
5. reviewer for the Royal Society of Chemistry (RSC)
6. reviewer for the European Physical Society (EPS)
7. reviewer for the J. High Energy Phys., Gravitat. Cosmol.

## EDITORIAL BOARD

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### Member of Editorial Boards of Scientific Journals

[ 2023 – Current ]

Editorial Board Member of American Journal of Modern Physics (AJMP) from 18 April 2023 to 18 April 2025

Editorial Board Member of Journal of Information Analysis from 25 April 2023

## RESPONSIBILITY IN PROJECTS OF SUPERCOMPUTING

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### Responsibility in projects of supercomputing

[ 1995 – Current ]

1995-2000 Use of the facilities of NCSA at Urbana/Champaign, Illinois, U.S.A.

2010-2012 Use of the facilities of CHPC at Cape Town, South Africa

2011-now Use of the facilities of CINECA at Bologna, ItalyWrite here the description...

## SUPERVISION OF STUDENTS

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### Supervision of Ph.D. Students

Cosupervision of the Ph.D. thesis of Joris W. O. Salari in the department of polymer chemistry of the University of Technology of Eindhoven in the Netherlands. Supervisor: Prof. Bert Klumperman. Title: "Pickering emulsions, colloidosomes & micro-encapsulation"

Cosupervision of the Ph.D. thesis of Miguel A. G. Maestre in the physics department of the University of Extremadura in Spain. Supervisor: Prof. Andres Santos. Title: "Structural and thermophysical properties of models of Janus particles with fixed orientation"

## SHORT VISITS AND SCIENTIFIC COLLABORATIONS

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### SHORT VISITS AND SCIENTIFIC COLLABORATIONS

[ 1995 – 2018 ]

1995-2000 Collaboration in the Physics Department at the University of Illinois at Urbana-Champaign, USA with the research group of Prof. David Ceperley and Prof. Richard Martin.



2000-2001 Collaboration with the Research group of Prof. S. B. G. O'Brien at the Department of Mathematics and Statistics, University of Limerick, Ireland.

2001-2004 Collaboration with the research group of Prof. Giorgio Pastore at the Theoretical Physics Department of the University of Trieste, Italy.

2003 January: Visiting Scientist (1 month) at the University of Paris-Sud at Orsay. Scientific collaboration with the research group of Prof. Bernard Jancovici at the Laboratory of Theoretical Physics of the University of Paris-Sud at Orsay, France.

2004-2006 Title of the project: "Analysis of proteins in solutions using statistical thermodynamic techniques". Project PRIN-COFIN2003025755-044. University "Ca' Foscari" of Venice, Italy. National coordinator Prof. Amos Maritan. Local coordinator Prof. Achille Giacometti.

2006-2008 Title of the project: "Colloidal mixtures, globular proteins and liquid crystal-like phases of biopolymers". Project PRIN-COFIN2005027330. University "Ca' Foscari" of Venice, Italy. National coordinator Prof. Amos Maritan. Local coordinator Prof. Achille Giacometti.

2009 Research group of Prof. Michael Kastner at the National Institute of Theoretical Physics of the University of Stellenbosch, South Africa.

2009-2011 Research group of Prof. K. K. Müller-Nedebock in the Physics Department at the University of Stellenbosch, South Africa.

2010 October 10th: Visiting scientist (three months) at the University of Extremadura in Badajoz, Spain. Scientific collaboration with the research group of Prof. Andrés Santos in the Physics Department at the University of Extremadura in Badajoz, Spain.

2011 Research group of Prof. Bert Klumperman in the Polymer Physics Department at the University of Stellenbosch, South Africa.

2013 October 20th: Visiting Scientist (one month) at the University of Extremadura in Badajoz, Spain. Scientific collaboration with the research group of Prof. Andrés Santos in the Physics Department at the University of Extremadura in Badajoz, Spain.

2014 Research group of Prof. Saverio Moroni in Scuola Internazionale Superiore di Studi Avanzati (SISSA), Italy.

2014 June 15th: Visiting Scientist (one week) at the "Laboratoire de Physique ENS de Lyon", France. Scientific collaboration with the research group of Prof. Angel Alastuey.

2017 January 8th: Visiting Scientist (two months) at the University of Extremadura in Badajoz, Spain. Scientific collaboration with the research group of Prof. Andrés Santos in the Physics Department at the University of Extremadura in Badajoz, Spain.

2018 March 26th: Visiting Scientist (one week) at the "Laboratoire de Physique ENS de Lyon", France. Scientific collaboration with the research group of Prof. Angel Alastuey.



## **PARTICIPATION TO NATIONAL AND INTERNATIONAL RESEARCH GROUPS**

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### **PARTICIPATION TO NATIONAL AND INTERNATIONAL RESEARCH GROUPS**

[ 1995 – 2018 ]

1995-2000 Research Assistant in the Physics Department at the University of Illinois at Urbana-Champaign, USA. Coordinators: Prof. David Ceperley and Prof. Richard Martin.

2000-2001 Research group of Prof. S. B. G. O'Brien at the Department of Mathematics and Statistics, University of Limerick, Ireland.

2001-2004 Research group of Prof. Giorgio Pastore at the Theoretical Physics Department of the University of Trieste, Italy.

2003 Research group of Prof. Bernard Jancovici at the Laboratory of Theoretical Physics of the University of Paris-Sud at Orsay, France.

2004-2006 Title of the project: "Analysis of proteins in solutions using statistical thermodynamic techniques". Project PRIN-COFIN2003025755-044. University "Ca' Foscari" of Venice, Italy. National coordinator Prof. Amos Maritan. Local coordinator Prof. Achille Giacometti.

2006-2008 Title of the project: "Colloidal mixtures, globular proteins and liquid crystal-like phases of biopolymers". Project PRIN-COFIN2005027330. University "Ca' Foscari" of Venice, Italy. National coordinator Prof. Amos Maritan. Local coordinator Prof. Achille Giacometti.

2009 Research group of Prof. Michael Kastner at the National Institute of Theoretical Physics of the University of Stellenbosch, South Africa.

2009-2011 Research group of Prof. K. K. Müller-Nedebock in the Physics Department at the University of Stellenbosch, South Africa.

2010 Research group of Prof. Andrés Santos in the Physics Department at the University of Extremadura in Badajoz, Spain.

2011 Research group of Prof. Bert Klumperman in the Polymer Physics Department at the University of Stellenbosch, South Africa.

2013 Research group of Prof. Andrés Santos in the Physics Department at the University of Extremadura in Badajoz, Spain.

2014 Research group of Prof. Saverio Moroni in Scuola Internazionale Superiore di Studi Avanzati (SISSA), Italy.

2014 Research group of Prof. Angel Alastuey in the "Laboratoire de Physique ENS de Lyon", France.

2017 Research group of Prof. Andrés Santos in the Physics Department at the University of Extremadura in Badajoz, Spain.

2018 Research group of Prof. Angel Alastuey. in the "Laboratoire de Physique ENS de Lyon", France.

## **POSITIONS HELD**

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### **POSITIONS HELD**

[ 1996 – 2006 ]

1996 summer: Research Assistant in the Physics department at the University of Illinois at Urbana-Champaign. Coordinators David Ceperley and Richard Martin.

1997 summer: Research Assistant in the Physics department at the University of Illinois at Urbana-Champaign. Coordinators David Ceperley and Richard Martin.



1997 fall: Research Assistant in the Physics department at the University of Illinois at Urbana-Champaign. Coordinators David Ceperley and Richard Martin.

2000 Won a Ph.D. position (BAT-O IIa/2) at the Max-Planck-Institute für Plasmaphysik, Teilinstitut Greifswald, Bereich Stellaratortheorie at the 5th of January 2000 which I declined.

2000 Research Assistant (1 year) at the Department of Mathematics and Statistics, University of Limerick, Ireland in the group of S. B. G. O'Brien.

2003 January, Visiting Scientist at the University of Paris-Sud at Orsay. Scientific collaboration with the research group of Prof. Bernard Jancovici.

2004 April 15th, "Assegno di ricerca" (Postdoctoral Fellowship 24 months) at the Department of Chemical Physics, University "Ca' Foscari" of Venice. Title of the project: "Analysis of proteins in solutions using statistical thermodynamic techniques". Project PRINCOFIN2003025755-044. National coordinator Prof. Amos Maritan. Local coordinator Prof. Achille Giacometti.

2006 March 17th, "Assegno di ricerca" (Postdoctoral Fellowship 24 months) at the Department of Chemical Physics, University "Ca' Foscari" of Venice. Title of the project: "Colloidal mixtures, globular proteins and liquid crystal-like phases of biopolymers". Project PRINCOFIN2005027330. National coordinator Prof. Amos Maritan. Local coordinator Prof. Achille Giacometti.

## **POSITIONS HELD**

[ 2009 – 2019 ]

2009 October 15th, Postdoctoral Fellowship (36 months) at the National Institute of Theoretical Physics (NITheP), Stellenbosch Institute for Advanced Study, Matieland 7602, South Africa.

2010 October 10th, Visiting scientist (three months) at the University of Extremadura in Badajoz, Spain. Scientific collaboration with the research group of Prof. Andrés Santos.

2012 January 1st, Guest (three years) at S.I.S.S.A., via Bonomea 265, 34136 Trieste, Italy.

2012 January 1st, Honorary Fellow at the Department of Molecular Science and Nanosystems, University "Ca' Foscari" of Venice, Calle Larga S. Marta DD2137, I-30123 Venezia, Italy.

2015 July 17th: Habilitation to teach Mathematics and Physics (classes A049, A048, A047, A038) in Italian high-school obtained at the University of Trieste with mark 87/100. One year course with exams. "Abilitazione all' insegnamento nella scuola secondaria per la classe A049 Matematica e Fisica con punteggio 87/100".

2016 August 24th: Passed a "Concorso per l' assunzione in ruolo nell' insegnamento di Matematica (classe A026) nella scuola secondaria di secondo grado con punteggio 72.2/100".

2017 September 1st: "Contratto a tempo indeterminato per l' insegnamento di Matematica nella scuola secondaria di secondo grado (confirmed on 1st September 2019)".

2019 May 10th: Habilitation for Associate Professor in Theoretical Physics of Matter (sector 02/B2) in the Italian University.



## TEACHING

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### TEACHING

[ 1995 – Current ]

1995/2000 Teaching Assistant in the Physics department at the University of Illinois at Urbana-Champaign (Electricity and Magnetism I and II, Biomolecular Physics, Waves in Physics, Thermal Physics and Fluids, Classical Mechanics, Electricity, Magnetism, and Optics, Waves and Quantum mechanics/Thermal Physics and Fluids).

2004/2006 Teaching at University Ca' Foscari of Venice (Mathematical Methods for Science and Technology of Materials, Analysis II).

2008/2009 Teaching at University of Trieste (General Physics I for Industrial Engineering).

2012/2013 Teaching Assistant at University of Trieste (Laboratory of Optics).

2013/2014 Teaching Assistant at University of Trieste (Laboratory of Calculus).

2015/2017 Teaching in Italian High-School.

2018/ Teaching at Istituto Tecnico Nautico "Tomaso di Savoia" (<https://www.nauticogalvani.edu.it/>) as a confirmed mathematics professor.

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*Trieste, 26/04/2023*

Riccardo Fantoni