

# CURRICULUM VITAE

ALESSANDRO SARRACINO

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## ADDRESS

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## PERSONAL DETAILS

Gender: Male  
Date of birth: 22nd of December, 1981  
Place of birth: Naples, Italy  
Present Citizenship: Italian  
Civil Status: Unmarried, one child

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## EDUCATION AND ACADEMIC CAREER

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|-----------------|---|
| 12/2015–        | Researcher at the Institute for Complex systems of CNR, Rome.   |
| 12/2013–11/2015 | Research fellowship in the group of O. Bénichou at the LPTMC, Université Pierre et Marie Curie, Paris.  |
| 12/2009–11/2013 | Research fellowship (from the GRANULARCHAOS project funded by MIUR) in the group of A. Puglisi and A. Vulpiani at the CNR-ISC and Department of Physics, University of Rome “Sapienza”, Italy.  |
| 05/2009–11/2009 | Research fellowship (from PRIN) at the Department of Mathematics and Informatics, University of Salerno, Italy.   |
| 01/2009         | Ph.D. in Physics from the University of Salerno, Italy, with a Thesis on “Nonlinear fluctuation-dissipation relations: analytical derivation and numerical applications”. Thesis Advisor Professor Marco Zannetti.                            |
| 10/2005         | Laurea Degree in Physics from the University Federico II of Naples, Italy, with a Thesis on “Segregation and dynamic instabilities in granular mixtures”, with the mark 110/110 <i>cum laude</i> . Thesis Advisor Professor Antonio Coniglio. |

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## RESEARCH INTERESTS

### **Nonequilibrium statistical mechanics**

Fluctuation-Dissipation Relations, Entropy Production and Fluctuation Theorems. Applications to disordered systems and granular media.

### **Driven granular systems**

Nonequilibrium dynamics and fluctuating hydrodynamics.

### **Models of Brownian motors**

Applications to granular systems and role of nonlinear frictional forces.

### **Anomalous transport**

Anomalous diffusion and Einstein relation in comb models and Lévy walks. Negative differential mobility in driven fluid models.

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## SCIENTIFIC ACTIVITY

H-index: 12 (ISI WoS), 13 (Google Scholar)

Citations: 361 (ISI WoS), 495 (Google Scholar)

32 publications in peer-reviewed journals (5 PRLs)

2 book chapters

5 publications in peer-reviewed conference proceedings

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## PUBLICATIONS IN PEER-REVIEWED JOURNALS

1. *Unified rheology of vibro-fluidized dry granular media: From slow dense flows to fast gas-like regimes*  
A. Gnoli, A. Lasanta, A. Sarracino, A. Puglisi  
Sci. Rep. **6**, 38604 (2016)
2. *Nonlinear response of inertial tracers in steady laminar flows: differential and absolute negative mobility*  
A. Sarracino, F. Cecconi, A. Puglisi, A. Vulpiani  
Phys. Rev. Lett. **117**, 174501 (2016)
3. *Nonlinear response and emerging nonequilibrium microstructures for biased diffusion in confined crowded environments*  
O. Bénichou, P. Illien, G. Oshanin, A. Sarracino, R. Voituriez  
Phys. Rev. E **93**, 032128 (2016)

4. *Diffusion and Subdiffusion of Interacting Particles on Comblike Structures*  
O. Bénichou, P. Illien, G. Oshanin, A. Sarracino, R. Voituriez  
Phys. Rev. Lett. **115**, 220601 (2015)
5. *Coarsening in granular systems*  
A. Baldassarri, A. Puglisi, A. Sarracino  
Comptes Rendus Physique **16**, 291 (2015)
6. *Microscopic theory for negative differential mobility in crowded environments*  
O. Bénichou, P. Illien, G. Oshanin, A. Sarracino, R. Voituriez  
Phys. Rev. Lett. **113**, 268002 (2014)
7. *Nonequilibrium fluctuation-dissipation theorem and heat production*  
E. Lippiello, M. Baiesi and A. Sarracino  
Phys. Rev. Lett. **112**, 140602 (2014)
8. *Nonequilibrium Brownian motion beyond the effective temperature*  
A. Gnoli, A. Puglisi, A. Sarracino, A. Vulpiani  
PLoS ONE **9**, e93720 (2014)
9. *Fluctuations in partitioning systems with few degrees of freedom*  
L. Cerino, G. Gradenigo, A. Sarracino, D. Villamaina, A. Vulpiani  
Phys. Rev. E **89**, 042105 (2014)
10. *Time asymmetry of the Kramers equation with nonlinear friction: fluctuation-dissipation relation and ratchet effect*  
A. Sarracino  
Phys. Rev. E **88**, 052124 (2013)
11. *Rare events and scaling properties in field-induced anomalous dynamics*  
R. Burioni, G. Gradenigo, A. Sarracino, A. Vezzani, A. Vulpiani  
J. Stat. Mech. (2013) P09022
12. *Fluctuation relations without uniform large deviations*  
G. Gradenigo, A. Sarracino, A. Puglisi and H. Touchette  
J. Phys. A: Math. Theor. **46**, 335002 (2013)
13. *Non-equilibrium fluctuations in frictional granular motor: experiments and kinetic theory*  
A. Gnoli, A. Sarracino, A. Petri, and A. Puglisi  
Phys. Rev. E **89**, 052209 (2013)
14. *Ratchet effect driven by Coulomb friction: the asymmetric Rayleigh piston*  
A. Sarracino, A. Gnoli, and A. Puglisi  
Phys. Rev. E **87**, 040101(R) (2013)
15. *Brownian ratchet in a thermal bath driven by Coulomb friction*  
A. Gnoli, A. Petri, F. Dalton, G. Gradenigo, G. Pontuale, A. Sarracino, and A. Puglisi  
Phys. Rev. Lett. **110**, 120601 (2013)
16. *Entropy production in non-equilibrium fluctuating hydrodynamics*  
G. Gradenigo, A. Sarracino, and A. Puglisi  
J. Chem. Phys. **137**, 014509 (2012)

17. *Einstein relation in superdiffusive systems*  
G. Gradenigo, A. Sarracino, D. Villamaina, and A. Vulpiani  
J. Stat. Mech. L06001 (2012)
18. *Non-equilibrium fluctuations in a driven stochastic Lorentz gas*  
G. Gradenigo, U. Marini Bettolo Marconi, A. Puglisi, and A. Sarracino  
Phys. Rev. E **85**, 031112 (2012)
19. *Dynamics of a massive intruder in a homogeneously driven granular fluid*  
A. Puglisi, A. Sarracino, G. Gradenigo, and D. Villamaina  
Granular Matter **14**, 235 (2012)
20. *Structure factors in granular experiments with homogeneous fluidization*  
A. Puglisi, A. Gnoli, G. Gradenigo, A. Sarracino, and D. Villamaina  
J. Chem. Phys. **136**, 014704 (2012)
21. *Non-equilibrium length in granular fluids: From experiment to fluctuating hydrodynamics*  
G. Gradenigo, A. Sarracino, D. Villamaina, and A. Puglisi  
Europhysics Letters **96**, 14004 (2011)
22. *Fluctuating hydrodynamics and correlation lengths in a driven granular fluid*  
G. Gradenigo, A. Sarracino, D. Villamaina, and A. Puglisi  
J. Stat. Mech. P08017 (2011)
23. *Estimate of temperature and its uncertainty in small systems*  
M. Falcioni, D. Villamaina, A. Vulpiani, A. Puglisi, and A. Sarracino  
Am. J. Phys. **79**, 777 (2011)
24. *On anomalous diffusion and the out of equilibrium response function in one-dimensional models*  
D. Villamaina, A. Sarracino, G. Gradenigo, A. Puglisi, and A. Vulpiani  
J. Stat. Mech. L01002 (2011)
25. *The ratchet effect in an ageing glass*  
G. Gradenigo, A. Sarracino, D. Villamaina, T. S. Grigera and A. Puglisi  
J. Stat. Mech. L12002 (2010)
26. *Irreversible dynamics of a massive intruder in dense granular fluids*  
A. Sarracino, D. Villamaina, G. Gradenigo and A. Puglisi  
Europhysics Letters **92**, 34001 (2010)
27. *Identification of the critical temperature from non-equilibrium time-dependent quantities*  
E. Lippiello and A. Sarracino  
Europhysics Letters **90**, 60001 (2010)
28. *Granular Brownian motion*  
A. Sarracino, D. Villamaina, G. Costantini, and A. Puglisi  
J. Stat. Mech. P04012 (2010)
29. *Fluctuations of two-time quantities and non-linear response functions*  
F. Corberi, E. Lippiello, A. Sarracino, and M. Zannetti  
J. Stat. Mech. P04003 (2010)

30. *Fluctuation-dissipation relations and field-free algorithms for the computation of response functions*  
F. Corberi, E. Lippiello, A. Sarracino, and M. Zannetti  
Phys. Rev. E **81**, 011124 (2010)
31. *Nonlinear response and fluctuation dissipation relations*  
E. Lippiello, F. Corberi, A. Sarracino, and Marco Zannetti  
Phys. Rev. E **78**, 041120 (2008)
32. *Nonlinear susceptibilities and the measurement of a cooperative length*  
E. Lippiello, F. Corberi, A. Sarracino, and M. Zannetti  
Phys. Rev. B **77**, 212201 (2008)

### Publications in peer-reviewed conference proceedings

1. *Coulomb friction driving Brownian motors*  
A. Manacorda, A. Puglisi, A. Sarracino  
Commun. Theor. Phys. **62**, 505 (2014)
2. *Scaling properties of field-induced superdiffusion in Continuous Time Random Walks*  
R. Burioni, G. Gradenigo, A. Sarracino, A. Vezzani, A. Vulpiani  
Commun. Theor. Phys. **62**, 514 (2014)
3. *Einstein relation in systems with anomalous diffusion*  
G. Gradenigo, A. Sarracino, D. Villamaina, and A. Vulpiani  
Acta Physica Polonica B **44**, 899 (2013)
4. *The out of equilibrium response function in sub-diffusive systems*  
G. Gradenigo, A. Puglisi, A. Sarracino, A. Vulpiani and D. Villamaina  
Physica Scripta **86**, 058516 (2012)
5. *Species segregation and dynamical instability of horizontally vibrated granular mixtures*  
M. Pica Ciamarra, A. Sarracino, M. Nicodemi, and A. Coniglio  
In Traffic and Granular Flow 2005, A. Schadschneider, T. Poschel, T.; Kühne, R.; Schreckenberg, M.; Wolf, D.E. (Eds.) (2007)

### Book chapters

1. *Out-of-equilibrium generalized fluctuation-dissipation relations*  
G. Gradenigo, A. Puglisi, A. Sarracino, D. Villamaina, and A. Vulpiani  
in “Nonequilibrium Statistical Physics of Small Systems: Fluctuation Relations and Beyond” (Wiley-VCH, Weinheim, 2013) R. Klages, W. Just, C. Jarzynski (Eds.)
2. *Large deviations of Brownian motors*  
A. Sarracino and D. Villamaina  
in “Large deviations in physics” Series: Lecture Notes in Physics (Springer, 2014) F. Cecconi, M. Cencini, A. Puglisi, D. Vergni and A. Vulpiani (Eds.)

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## ORGANIZATION OF INTERNATIONAL WORKSHOP

June 2012 “Non-equilibrium fluctuation-response relations”, Isola del Giglio (Gr), Italy

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## CONFERENCES, TALKS & SUMMER SCHOOLS

- November 2016 **Talk** at “Journées rhéologie des suspensions denses: du micron au millimètre”, Marseille, France.
- September 2016 **Talk** at “Meeting tematico ISC sulla diffusione”, Firenze, Italy.
- June 2016 **Talk (invited)** at “XXI Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi”, Parma, Italy.
- July 2015 “Non standard transport”, L’Aquila, Italy.
- May 2015 **Talk** at “IV Workshop on Dynamics in Viscous Liquids”, Montpellier, France.
- Avril 2015 **Seminar** at Physics Department of University of Rome Sapienza, Italy.
- February 2015 **Seminar** at Physics Department of University of Leuven, Belgium.
- January 2015 **Talk** at “Workshop on recent Developments In Non-Equilibrium Physics: Luxembourg out of Equilibrium”, Luxembourg.
- September 2014 “Strolling on Chaos, Turbulence and Statistical Mechanics”, Rome, Italy.
- September 2014 The Beg Rohu Summer School, “Nonequilibrium Statistical Mechanics and Active Matter”, France.
- November 2013 Poster at “Conference on Friction and Energy Dissipation in Man-made and Biological Systems”, The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy.
- September 2013 Poster at “Large deviations and rare events in physics and biology”, University of Rome Sapienza, Italy.
- July 2013 **Talk (invited)** at 7th IDMRCS, Barcelona, Spain.
- July 2013 **Talk** at “Small system nonequilibrium fluctuations, dynamics and stochastics, and anomalous behavior”, KITPC, Beijing, China.
- April 2013 **Seminar** at Dipartimento di Fisica, University of Padua, Italy.

- March 2013      Poster (**Best poster session award**) at “38th Conference of the Middle European Cooperation in Statistical Physics”, Trieste, Italy.
- March 2013      **Seminar** at LPTMC, Université Pierre et Marie Curie Paris VI, France.
- November 2012    “Grandes déviations et systèmes de particules en interaction, états stationnaires hors équilibre”, IHP Paris, France.
- June 2012        **Talk (invited)** at “XVII Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi”, Parma, Italy.
- June 2012        “Non-equilibrium fluctuation-response relations”, Isola del Giglio (Gr), Italy.
- June 2012        “Frontiers in Statistical Physics and Complex Systems”, Catania, Italy.
- January 2012     **Seminar** at LPTHE, Université Pierre et Marie Curie Paris VI, France.
- January 2012     **Talk** at “Journées de Physique Statistique”, Paris, France.
- October 2011     “Foundations and Applications of Non-Equilibrium Statistical Mechanics”, Stockholm, Sweden.
- September 2011   **Talk** at the “ZCAM conference on Granular and Active Fluids”, Zaragoza, Spain.
- March 2011        Poster at “Workshop on Dynamics in Viscous Liquids III”, Roma, Italy.
- September 2010   Poster at “Anomalous Transport: from Billiards to Nanosystems”, Sperlonga, Italy.
- July 2010         **Talk** at the “XXIV IUPAP International Conference on Statistical Physics”, Cairns, Australia.
- June 2010         **Talk (invited)** at the “XV Convegno di Fisica Statistica”, Parma, Italy.
- September 2009   Poster at the International Summer School “Fundamental Problems in Statistical Physics XII”, Leuven, Belgium.
- May 2009         **Seminar** at ISC-CNR, University Sapienza Roma, Italy
- August–September 2007 “Les Houches Predoctoral School in Statistical Physics”
- September 2006   “IV Workshop on non equilibrium phenomena in supercooled fluids, glasses and amorphous materials”, Pisa, Italy.

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## TEACHING AND PROFESSIONAL EXPERIENCE

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| 2017            | <b>Guest editor</b> for the journal Entropy, special issue: “Thermodynamics and Statistical Mechanics of Small Systems”  |
| 2010–           | <b>Referee</b> of journal papers submitted to: Physical Review Letters; New Journal of Physics; Physical Review E; Physical Review A; Europhysics Letters; Journal of Statistical Physics; Physica A; Journal of Statistical Mechanics; Journal of Physics A: Math. Theor. |
| 2015–2016       | Co-supervision of one master thesis at University of Rome Sapienza.  |
| 2012–2013       | Co-supervision of two master theses at University of Rome Sapienza.  |
| 02/2009–07/2009 | Assistance in the course of “Physics” for the 1st year graduating students, in the Department Mathematics and Informatics of the University of Salerno.  |
| Spring 2008     | Integrative lessons of Physics held in the University of Salerno for the 1st year graduating students.   |

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## COMPUTER SKILLS

C programming language  
Linux, Unix  
MATHEMATICA<sup>®</sup>  
L<sup>A</sup>T<sub>E</sub>X typesetting package

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## LANGUAGE KNOWLEDGE

|                |                                |
|----------------|--------------------------------|
| <b>Italian</b> | native                         |
| <b>English</b> | good (both written and spoken) |
| <b>French</b>  | good (both written and spoken) |