

Rossana Marra. Curriculum vitae

Born in Napoli (Italy); date: November 8, 1952.

Laurea in Physics at the Università di Napoli; date: June 13, 1975.

• Present position

Professor of Mathematical Physics

Dipartimento di Fisica Università di Roma Tor Vergata

• Previous positions

- 1977–1978: Fellowship Ministero della Pubblica Istruzione
- 1978–1983: Researcher in Theoretical Physics in the Istituto di Fisica, Università di Salerno
- 1983–1985: Researcher in the Dipartimento di Matematica, Università of Roma "La Sapienza"
- 1985–2001: Associate Professor of Statistical Mechanics Dipartimento di Fisica, Università di Roma Tor Vergata

• Organizing activity

- Member of Senato Accademico since 2015
- Head of the Physics Department 2012-2018
- Vice- Director of the Physics Department 2009-2012
- Vice-President of Consiglio di Corso di Studio in Fisica, years 2006-2009
- Member of the Scientific board of Centro di Matematica e Fisica Teorica "Tullio Levi-Civita".
- member of M& MOCS, Centro Internazionale di Ricerca per la Matematica & Meccanica dei Sistemi Complessi
- Former member of the editorial board of Journal of Statistical Physics.
- Member of the European Community network "Asymptotic Methods in Kinetic Theory".
- Member of the European Community network 2002 "HYperbolic and Kinetic Equations : Asymptotics, Numerics, Analysis"
- Local coordinator of the research project cof 98–99, 2000-02, 2002-04 di G. Parisi "Problemi Complessi in Meccanica Statistica e Teoria dei Campi: uno Studio Teorico, Analitico e Computazionale",
- Member of the organizing committee for the following international Congresses:
 - Vulcano, Sept. 1998 "Macroscopic stochastic fluctuations: Equilibrium and non Equilibrium",
 - Siena, May 2000, "New Trends in Statistical Mechanics"
 - Rome, Accademia dei Lincei, May 2003 "Large systems: Some Mathematical Problems and Perspectives"

Rome, Sept. 2003 "Statistical Mechanics and Applications"
 Montecatini, Sept. 2004 "Advances in Mathematical Physics"
 2006 Rome, "Statistical Mechanics and Applications"

- Member of the scientific committee for the following international Conferences:

2009 Roma "Seminal Interactions between Mathematics and Physics"

2010 Parigi "Boltzmann equation: mathematics, modeling and simulations"

2014 CIRM, Marseille, "Kinetic Equations"

Rome, October, 2006 "Workshop on Microscopic Approaches to Elastic and Surface Tension Functionals"

- **Visiting professor at (recent years)**

Rutgers University: 1995, 1997, 1998, 2001, 2004, 2007

New York University, Courant Institute: 1994, 1995

IHES, Paris: 1994, 1997, 2000, 2005, 2010

Université de Rouen, (France): 1998, 1999

IHP, Paris: 2001, 2008

Brown University, USA: 2004

Hong Kong University: 2005

Schrodinger Institute, Wien: 2006

Kyoto University, Japan: 2006

Marseille University: 2007, 2008

I. Newton Institute, Cambridge: 2010

Singapore University: 2010

Lisbon University: 2011

Icerm, Providence: 2011

Kyoto University, Japan: 2012

Brown University, USA: 2015

IHP, Paris: 2017

Brown University, USA: 2018

- **Research activity**

- * 1977-1982: Gauge Field Theories and Equilibrium Statistical Mechanics (spin systems)

- * 1982-1986: Stochastic Mechanics and Quantum Mechanics.

- * 1987-1990: Fluidodynamics and Stochastic Processes.

- * 1990-2000 Hydrodynamic limits for interacting particle systems. Behaviour of the solutions of the Boltzmann equations for small Knudsen number without and with boundary effects. Navier- Stokes equation for stochastic cellular automata, also in the case of thermal automata, and fluctuation-dissipation theorem. In collaboration with researchers of the Rutgers University (USA), New York University (USA), University of Rome 1 and Rome 2. (USA) and University of Rome 1 and Rome 2.

- * 2000-2006 Segregation phenomena and interface motion. Kinetic and hydrodynamic equations

for binary fluids, which are suitable to describe the dynamics of the phase separation. In collaboration with researchers of the Universities: Atlanta , Rutgers, L'Aquila and Livermore Laboratory.

* 2006-2010 Kinetic models of phase transition and stability properties

* 2010-2013 Variational problems for non convex functionals and stability problems for mesoscopic models of phase transition. In collaboration with researchers of the Universities: Rutgers, Brown, Goteborg, L'Aquila and Marseille.

* 2014-2017 Boltzmann equation in a bounded domain. Existence and regularity.

* Present research: Hydrodynamic limit for the Boltzmann equation in a bounded domain and for the exterior problem (flux past an obstacle)

Author of 74 papers on international Journals

• **Publications (* proceedings)**

[1] G.Immirzi, F.Guerra and R.Marra,

Strong- coupling Expansion for Lattice Yang-Mills Fields,
Lettere al Nuovo Cimento **23**, 237–240 (1978).

[2] S.De Martino, S.De Siena and R.Marra,

A Note on Some Confinement Criteria,
Il Nuovo Cimento **48**, 279 (1978).

* [3] G.F.De Angelis, D.de Falco,F.Guerra and R.Marra,

Gauge Fields on the Lattice (Selected Topics),
Acta Physica Austriaca, Suppl.XIX, 205–247 (1978).

* [4] G.F.De Angelis, D.de Falco,F.Guerra and R.Marra,

Confinement as a Problem in Statistical Mechanics,
Acta Universitatis Wratislaviensis **519**, 117–144 (1979).

[5] R.Marra and S.Miracle Sole,

On the Statistical Mechanics of the Gauge Invariant ising Model,
Commun.Math.Phys. **67**, 233–240 (1979).

[6] R.Marra,

On a Relation between Percolation and Phase Transition in the Gauge Invariant Ising Model,
J.Math.Phys.**24**, 913–916 (1983).

[7] F.Guerra and R.Marra,

Configuration Spaces for Quantum Spinning particles
Phys. Rev. Lett. **50**, 1715–1718 (1983).

[8] F.Guerra and R.Marra,

Origin of the quantum observator operator algebra in the frame of stochastic mechanics,
Phys.Rev.D **28** 1916–1921 (1983).

[9] F.Guerra and R.Marra,

Discrete stochastic variational principles and quantum mechanics,
Phys.Rev.D **29**, 1647 (1984).

[10] F.Guerra and R.Marra,

A remark on a possible form of spin-statistics theorem in non relativistic quantum mechanics,
Phys.Lett.B **141**, 93 (1984).

[11] F.Guerra and R.Marra,

- Stochastic mechanics of spin 1/2 particles*,
Phys.Rev.**30**, 2579–2584 (1984).
- [12] G.Del Grosso and R.Marra,
Girsanov and Feynmann-Kac Formulas in the discrete Stochastic Mechanics,
Lect.Notes Control Inf.Sci **78**, 162–169(1986).
- [13] R.Marra,
Variational principles for conservative and dissipative diffusions,
Phys. Rev. D **36**, 1724-1730 (1987).
- [14] R.Esposito, R.Marra, M.Pulvirenti and C.Sciarretta,
A Stochastic Lagrangian Picture for the 3-d Navier-Stokes Equation,
Commun. in P.D.E. **13**, 1601-1610 (1988).
- * [15] R.Marra,
Hydrodynamical Stochastic Formalism and Representation formulas,
564-575 in Stochastic Processes, Physics and geometry S.Albeverio, G.Casati, U.Cattaneo,
D.Merlini, R.Moresi ed.s,
World Scientific Singapore (1990).
- [16] R.Marra and M.Serva,
Variational principles for a stochastic Relativistic Mechanics ,
Annales de l'Institut Henri Poincaré **53** 97–108(1990).
- [17] E.Marinari and R.Marra,
Cluster Algorithms gfor the Generalized 3d,3q Potts Model,
Nuclear Phys.B **342**, 737-752 (1990).
- [18] R.Marra,
Probabilistic approach to the Navier-Stokes Equation,
Phys.Lett. A **148**, 41-44 (1990).
- [19] C.Costantini and R.Marra,
Hydrodynamic Limits for the Boltzmann process,
J.Stat.Phys. **67**, 229-249 (1992).
- [20] R.Marra,
* *Hydrodynamical behavior of a Boltzmann test particle*,
298–308 in Probabilistic Methods in Matematical Physics M.I.Loffredo, F.Guerra, C.Marchioro
ed.s,
World Scientific addr Singapore (1992).
- [21] S.Caprino, R.Esposito, R.Marra and M.Pulvirenti,
Hydrodynamic limits of the Vlasov equation,
Commun. in P.D.E. **18**, 805–820 (1993).
- [22] R.Esposito, J.L.Lebowitz and R.Marra,
* *Navier-Stokes limit of the Boltzmann Equation*,
233–246, in Stochastic Processes, Geometry and Physics S.Albeverio, U.Cattaneo, D.Merlini ed.s
World Scientific, Singapore, (1995).
- [23] R.Esposito, J.L.Lebowitz and R.Marra,
Hydrodynamic Limit of the Stationary Boltzmann Equation in a Slab
Commun. Math. Phys. **160**, 49–80 (1994).

- [24] R.Esposito, R.Marra and H.T. Yau,
Diffusive limit of asymmetric simple exclusion,
Rev. Math. Phys. **6**, 1233–1267 (1994).
- [25] R.Esposito, R.Marra and H.T. Yau,
* *Erratum " Diffusive limit of asymmetric simple exclusion"*,
Rev. Math. Phys. **8**, 905 (1996).
- [26] R.Esposito and R.Marra,
On the derivation of the incompressible Navier-Stokes equation for hamiltonian particle systems
J.Stat. Phys. **74**, 981–1004 (1993).
- *[27] R.Esposito, R.Marra and H.T. Yau,
Diffusive limit of asymmetric simple exclusion: the Navier-Stokes correction,
Nato ASI Series B:Physics **324**, 43–53 in *On three levels: Micro-Meso and Macro- Approaches in Physics*, M. Fannes, C. Maes, A. Verbeure ed.s (1994).
- [28] R.Esposito and R.Marra,
* *Incompressible fluids on three levels: hydrodynamic, kinetic, microscopic*,
Mathematical Analysis of Phenomena in Fluid and Plasma Dynamics , RIMS, Kyoto (1993).
- [29] R.Esposito, J.L.Lebowitz and R.Marra,
The Navier-Stokes limit of stationary solutions of the nonlinear Boltzmann equation,
J. Stat. Phys. **78**, 389–412 (1995).
- [30] M. Cassandro, R. Marra and E. Presutti,
Corrections to the Critical Temperature in 2D Ising Systems with Kac Potential,
J. Stat. Phys. **78**, 1131–1138 (1995).
- [31] E. Carlen, R.Esposito, J.L.Lebowitz, R.Marra and A. Rokhlenko,
Nonunique Stationary States in Driven Collisional Systems with Application to Plasmas,
Phys. Rev E **52**, 40–43 (1995).
- [32] R.Esposito, R.Marra and T. H. Yau,
Navier-Stokes equations for stochastic lattice gases,
Phys. Rev. E **53**, 4486– (1996).
- [33] R.Esposito, R.Marra and T. H. Yau,
Navier-Stokes equations for stochastic particle systems on the lattice,
Commun. Math. Phys., **182**, 395–456 (1996).
- [34] M. Cassandro, R. Marra and E. Presutti,
Upper bounds on the critical temperature for Kac potentials,
J. Stat. Phys. **88**, 537–566 (1997).
- [35] C. Cercignani, R.Esposito and R.Marra,
The Milne problem with a force term,
Transport Theory Stat. Phys. **27**, 1-33 (1998)
- [36] R.Esposito, J.L.Lebowitz and R.Marra,
Solutions to the Boltzmann equation in the Boussinesq approximation
J. Stat. Phys. **90**, 1129–1178(1998)
- [37] E. Carlen, R.Esposito, J.L.Lebowitz, R.Marra and A. Rokhlenko,
Kinetics of a Model Weakly Ionized Plasma in the Presence of Multiple Equilibria,
Arch. Rat. Mech. Anal., **142**, 193–218 (1998).

- [38] O. Benois, R. Esposito and R. Marra
Navier-Stokes limit for a thermal stochastic lattice gas.
J. Stat Phys. **90** 653–713 (1999)
- [39] J.L. Lebowitz, R. Esposito and R. Marra
On the Derivation of Hydrodynamics from the Boltzmann equation
Phys. of Fluids, **11**, 2354–2366 (1999)
- [40] R. Marra and M. Mourragui
Phase segregation dynamics for the Blume-Capel model with Kac interaction.
Stochastic Processes and Applications **88**(1), 79–124 (2000)
- [41] S. Bastea, R. Esposito, J.L. Lebowitz and R. Marra
Binary Fluids with Long Range Segregating Interaction I: Derivation of Kinetic and Hydrodynamic Equation.
J. Stat. Phys. **101**, 1087–1136 (2000).
- [42] R. Esposito and R. Marra
Hydrodynamics as scaling limit of kinetic systems and stochastic particle systems.
Trends in Statistical Physics, Vol. 3, 1-43 (2000).
- [43] G.B. Giacomin, J.L. Lebowitz and R. Marra
Macroscopic Evolution of Particle Systems with Short and Long Range Interactions.
Nonlinearity **13**, 2143–2162 (2000).
- [44] S. Bastea, R. Esposito, J.L. Lebowitz and R. Marra
Hydrodynamics of binary fluid phase segregation.
Phys. Rev. Letters **89** 235701-04 (2002)
- [45] O. Benois, R. Esposito and R. Marra
Equilibrium fluctuations for lattice gases.
Annales de l'Institut Henri Poincaré (B) Probability and Statistics **39**, 743-777 (2003).
- [46] C. Carvahlo, E. Carlen, R. Esposito, J.L. Lebowitz and R. Marra
Free Energy Minimizers for a Two-Species Model with Segregation and Liquid-Vapor Transition.
Nonlinearity **16**, 1075–1105 (2003).
- [47] O. Benois, R. Esposito, R. Marra and M. Mourragui
Hydrodynamics of a driven lattice gas with open boundaries: the asymmetric simple exclusion.
Markov Processes and Related Fields, **10**, 89-112 (2004)
- [48] G. Manzi and R. Marra
A kinetic model of interface motion.
International Journal of Modern Physics B **18**, 1–10 (2004).
- [49] C. Carvahlo, E. Carlen, R. Esposito, J.L. Lebowitz and R. Marra
Phase Transitions in Equilibrium Systems: Microscopic Models and Mesoscopic Free Energies
Molecular Physics **103**, 3141–3151 (2005).
- [50] G. Manzi and R. Marra
Phase segregation and interface dynamics in kinetic systems.
Nonlinearity **19**, 115-147 (2006).
- [51] C. Carvahlo, E. Carlen, R. Esposito, J.L. Lebowitz and R. Marra
Droplet minimizers for the Cahn–Hilliard free energy functional
Journal of Geometric Analysis, **16** N.2 (2006).

- [52] S. Bastea, R. Esposito, J.L. Lebowitz, R. Marra
Sharp interface motion of a fluid binary mixture.
124, 445–483, Journal of Statistical Physics (2006).
- * [53] G. Manzi and R. Marra
Kinetic Modeling of Late Stages of Phase Separation
in "Transport Phenomena and Kinetic Theory. Applications to Gases, Semiconductors, Photons, and Biological Systems", C. Cercignani and E. Gabetta Ed.s, Birkhauser, 195–214 (2006)
- [54] L. Arkeryd, R. Esposito, R. Marra and A. Nouri
Stability of the laminar solution of the Boltzmann equation for the Benard problem.
Bull. Inst. Math. Academia Sinica, **3**, 51–97 (2008).
- [55] M. C. Carvalho, E. Carlen, R. Esposito, J. L. Lebowitz and R. Marra,
Displacement convexity and minimal fronts at phase boundaries,
Archive for Rational Mechanics, 194 823–847(2009) DOI: 10.1007/s00205-008-0190-9
- [56] R. Esposito, Y. Guo and R. Marra,
Stability of the Front under a Vlasov-Fokker-Planck Dynamics,
Archive for Rational Mechanics, 195 (2009) 75–116. DOI: 10.1007/s00205-008-0184-7
ISSN: 00039527 Published online: December 16, 2008,
- [57] L. Arkeryd, R. Esposito, R. Marra and A. Nouri
Stability for Rayleigh-Benard convective solutions of the Boltzmann equation.
Archive for Rational Mechanics, **198**, 125–187, (2010), DOI: 10.1007/s00205-010-0292-z
- [58] M. C. Carvalho, E. Carlen, R. Esposito, J. L. Lebowitz and R. Marra,
Droplet minimizers for the Gates-Lebowitz-Penrose free energy functional,
Nonlinearity 22 2919–2952 doi: 10.1088/0951-7715/22/12/007 (2009)
- [59] R. Esposito, Y. Guo and R. Marra,
Phase Transition in a Vlasov-Boltzmann Binary Mixture
Commun.Math.Phys., **296**, 1–33, (2010) (DOI) 10.1007/s00220-010-1009-8.
- [60] L. Arkeryd, R. Esposito, R. Marra and A. Nouri
Ghost effect by curvature in planar Couette flow.
Kinetic and Related Models, **4**, 109–138, (2011)
- [61] E. Esposito, Y. Guo and M. Marra
Validity of the Boltzmann equation with an external force
Kinetic and Related Models **4**, 499–515, (2011)
- [62] E. A. Carlen, R. Esposito, J. L. Lebowitz and R. Marra
Mesoscopic Analysis of Droplets in Lattice Systems with Long-range Kac Potentials
Acta Applicandae Mathematicae, p. 221–237, ISSN: 0167-8019, doi: 10.1007/s10440-012-9763-6
(2013)
- [63] L. Arkeryd, R. Esposito, R. Marra and A. Nouri
Exponential stability of the solutions to the Boltzmann equation for the Benard problem.
Kinetic and Related Models, **5**, 673–695, (2012)
- [64] P. Buttá, R. Esposito, A. Giuliani, R. Marra
Froth-like minimizers of a non local free energy functional with competing interactions
Communications in Mathematical Physics **322**, 593–632, ISSN 0010-3616 DOI 10.1007/s00220-013-1740-z (2013)

- [65] Esposito R, Guo Y, Kim C, Marra R
Non-Isothermal Boundary in the Boltzmann Theory and Fourier Law
 Communications in Mathematical Physics, **323**, 177–239, ISSN: 0010-3616 (2013)
- [66] Esposito R, Guo Y, Marra R
Stability of a Vlasov-Boltzmann binary mixture at the phase transition on an interval
 Kinetic and Related Models, **6** 761–787 (2013)
- [67] Belardinelli D, Marra R.
On the Navier-Stokes limit of the Boltzmann equation.
 Nonlinearity, **27**, 209–225, (2014)
 ISSN: 0951-7715, doi: 1088/0951-7715/27/2/209
- [68] Bonetto F, Carlen E, Esposito R, Lebowitz JL and Marra R
Propagation of Chaos for a Thermostated Kinetic Model
 Journal of Statistical Physics, **154**, 265285 (2014)
 DOI 10.1007/s10955-013-0861-2
- [69] Esposito R, Guo Y, Kim C, Marra R
Stationary Solutions to the Boltzmann Equation in the Hydrodynamic Limit.
 ANNALS OF PDE, vol 4p. 1-119, ISSN: 2199-2576,
 DOI: 10.1007/s40818-017-0037-5 (2018)
- [70] Esposito R, Guo Y, Marra R
Hydrodynamic Limit of a Kinetic Gas Flow past an obstacle.
 Commun. Math Phys, online first issn: 0010-3616
 doi.org/ 10.1007/s00220-018-3173-1(2018)
- [71] E. A. Carlen, R. Esposito, J. L. Lebowitz, R. Marra, C. Mouhot,
Approach to the Steady State in Kinetic Models with Thermal Reservoirs at Different Temperatures
 J. Stat. Phys. **172**, 522–543, 2018
 DOI: 10.1007/s10955-018-2074-1
- [72] Esposito, Raffaele; Garrido, Pedro; Lebowitz, Joel; Marra, Rossana
Diffusive limit for a Boltzmann-like equation with non-conserved momentum
 Nonlinearity 32 (2019) 48344852, <https://doi.org/10.1088/1361-6544/ab395a>
- [73] E. A. Carlen, R. Esposito, J. L. Lebowitz, R. Marra, C. Mouhot,
Uniqueness of the Non-Equilibrium Steady State for a 1d BGK model in kinetic theory
 Acta Applicandae Mathematicae, online October 2019
 //doi.org/10.1007/s10440-019-00290-0
- [74] Esposito, R., Marra
Stationary Non equilibrium States in Kinetic Theory.
 J Stat Phys, online March (2020).
<https://doi.org/10.1007/s10955-020-02528-w>