
ABBREVIATED CURRICULUM VITAE

Vicente Garzó – Full Professor of Theoretical Physics

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Born: July 26th 1960 (Castelló de la Ribera, Valencia, Spain)

Nationality: Spanish

Education

University of Valencia, Spain (October 1986)
Ph.D. in Physics, *Sobresaliente Cum Laude*
University of Valencia, Spain (October 1984)
BS., M.S. in Physics

Employment

Professor, University of Extremadura, Spain, Department of Physics (Nov 2000–present)
Associate Professor, University of Extremadura, Spain, Department of Physics (Aug 1989 – Nov 2000)
Teaching Assistant, University of Sevilla, Spain, Department of Theoretical Physics (February 1988–July 1989)
Research Assistant, University of Valencia, Spain, Department of Thermodynamics (January 1985–December 1987)

Visiting appointments

Visiting Faculty, Departamento de Física, Universidad de Chile, Santiago, Chile (Mach 2017)
Visiting Faculty, LPTMS, Université Paris-Sud, France (May-June 2015)
Visiting Faculty, Department of Chemical and Biological Engineering, University of Colorado, USA (August 2014)
Visiting Faculty, LPTMS, Université Paris-Sud, France (June 2012)
Visiting Faculty, Department of Chemical and Biological Engineering, University of Colorado, USA (June 2011)
Visiting Faculty, LPTMS, Université Paris-Sud, France (June 2010)
Visiting Faculty, LPTMS, Université Paris-Sud, France (May 2009)
Visiting Faculty, Department of Physics, University of Florida, USA (May 2006)
Visiting Faculty, Department of Physics, University of Florida, USA (Aug 1998–June 1999)
Visiting Faculty, IIM-UNAM, México (May 1994–June 1994)
Visiting Faculty, IIM-UNAM, México (Sept 1990–June 1991)

Awards

Quality Research Prize (shared with Andrés Santos) for the book *Kinetic Theory of Gases in Shear Flows. Nonlinear Transport* (Kluwer Academic Publishers, Dordrecht, 2003), University of Extremadura, 2004.
University of Extremadura, Best PhD in Physics Award to advisee, J.M. Montanero (1996), C. Marín (1997), A. Astillero (2007)

Current Research Interests

- **Kinetic Theory of dilute gases in far from equilibrium states:** Boltzmann kinetic equation; Kinetic models; Non linear transport; Monte Carlo simulations.
- **Granular fluids:** Boltzmann and Enskog kinetic equations for inelastic hard spheres; Transport coefficients for monodisperse and multicomponent granular fluids; Exact results for inelastic Maxwell models; Computer simulations.
- **Gas-solid flows:** Kinetic equations for suspensions; Viscous drag force; Navier-Stokes transport coefficients; Vortex instabilities.

PUBLICATIONS

Monographs

1. Vicente Garzó and Andrés Santos, *Kinetic Theory of Gases in Shear Flow, Nonlinear Transport* (Kluwer Academic Publishers, Dordrecht, 2003).
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Original papers in Regular Journals

1. V. Garzó and J. de la Rubia, *Coupling between shear flow and temperature gradient for the very hard particle interaction*, Chem. Phys. Lett. **132**, 526-530 (1986).
2. A. Santos, J. J. Brey, and V. Garzó, *A kinetic model for steady heat flow*, Phys. Rev. A **34**, 5047-5050 (1986).
3. V. Garzó, *Generalized transport coefficients in a gas with large shear rate*, Mol. Phys. **61**, 421-432 (1987).
4. V. Garzó and J. de la Rubia, *The Hilbert expansion of the BGK equation*, Chem. Phys. Lett. **135**, 143-146 (1987).
5. V. Garzó, *Transport properties in disparate-mass binary gases*, Chem. Phys. Lett. **141**, 255-260 (1987).
6. V. Garzó and J. de la Rubia, *Solution of the BGK model kinetic to study a system with a constant temperature gradient*, Anales de Física A **84**, 25-30 (1988).
7. V. Garzó, *On the derivation of the Burnett hydrodynamic equations from the Hilbert expansion*, Physica A **149**, 551-560 (1988).
8. V. Garzó, *Perturbative solution of the BGK equation for very hard particle interaction*, Mol. Phys. **63**, 517-521 (1988).
9. V. Garzó, A. Santos, and J. J. Brey, *A kinetic model for a multicomponent gas*, Phys. Fluids A **1**, 380-383 (1989).
10. V. Garzó, A. Santos, and J. J. Brey, *Influence of nonconservative external forces on self-diffusion in dilute gases*, Physica A **163**, 651-671 (1990).

11. V. Garzó and A. Santos, *Divergence of the nonlinear thermal conductivity in the homogeneous heat flow*, Chem. Phys. Lett. **177**, 79-83 (1991).
12. V. Garzó and M. López de Haro, *Tracer diffusion in shear flow*, Phys. Rev. A **44**, 1397-1400 (1991).
13. V. Garzó and A. Santos, *Exact solution of the Boltzmann equation in the homogeneous color conductivity problem*, J. Stat. Phys. **65**, 747-760 (1991).
14. V. Garzó, *Transport equations from the Liu model*, Phys. Fluids A **3**, 1980-1982 (1991).
15. A. Santos and V. Garzó, *An exact solution of the Boltzmann equation for a binary mixture*, Transp. Theory and Stat. Phys. **21**, 403-416 (1992).
16. V. Garzó and M. López de Haro, *Kinetic models for diffusion in shear flow*, Phys. Fluids A **4**, 1057-1069 (1992).
17. V. Garzó and A. Santos, *Nonlinear mass and momentum transport in a dilute gas*, J. Chem. Phys. **97**, 2039-2045 (1992).
18. A. Santos and V. Garzó, *Self-diffusion in a dilute gas under heat and momentum transport*, Phys. Rev. A **46**, 3276-3287 (1992).
19. A. Santos, V. Garzó, and J. J. Brey, *Comparison between the homogeneous-shear and the sliding-boundary methods to produce shear flow*, Phys. Rev. A **46**, 8018-8020 (1992).
20. V. Garzó and A. Santos, *Color conductivity induced by a shear-rate dependent color field*, J. Chem. Phys. **98**, 6569-6570 (1993).
21. V. Garzó, *Kinetic model for transport around uniform shear flow*, Mol. Phys. **78**, 1129-1141 (1993).
22. V. Garzó and M. López de Haro, *Effect of mass-ratio dependence of the force law for tracer diffusion in shear flow*, Phys. Fluids A **5**, 1059-1061 (1993).
23. M. López de Haro and V. Garzó, *On the Burnett equations for a dense monatomic hard-sphere gas*, Physica A **197**, 98-112 (1993).
24. J. J. Brey, A. Santos, and V. Garzó, *Analysis of the Evans and Baranyai variational principle in dilute gases*, Phys. Rev. Lett. **70**, 2730-2733 (1993).
25. V. Garzó and A. Santos, *Heat and momentum transport in a gaseous dilute solution*, Phys. Rev. E **48**, 256-262 (1993).
26. V. Garzó, *Thermal conductivity of a dilute gas in a thermostatted shear-flow state*, Phys. Rev. E **48**, 3589-3593 (1993).
27. A. Santos, V. Garzó, J. J. Brey, and J. W. Dufty, *Singular behavior of shear flow far from equilibrium*, Phys. Rev. Lett. **71**, 3971-3974 (1993).
28. J. M. Montanero, M. Alaoui, A. Santos, and V. Garzó, *Monte Carlo simulation of the Boltzmann equation for steady Fourier flow*, Phys. Rev. E **49**, 367-375 (1994).
29. C. Marín, V. Garzó, and A. Santos, *Nonlinear transport in a dilute binary mixture of mechanically different particles*, J. Stat. Phys. **75**, 797-816 (1994).

30. V. Garzó, *Heat flux induced by an external force in a strongly shearing dilute gas*, J. Chem. Phys. **101**, 1423-1430 (1994).
31. V. Garzó and M. López de Haro, *Kinetic model for heat and momentum transport*, Phys. Fluids **6**, 3787-3794 (1994).
32. A. Santos and V. Garzó, *Exact moment solution of the Boltzmann equation for uniform shear flow*, Physica A **213**, 409-425 (1995).
33. V. Garzó and A. Santos, *Comparison between the Boltzmann and Bhatnagar-Gross-Krook equations for uniform shear flow*, Physica A **213**, 426-434 (1995).
34. A. Santos, V. Garzó, and J. J. Brey, *On the validity of a variational principle for far-from-equilibrium steady states*, Europhys. Lett. **29**, 693-698 (1995).
35. V. Garzó and M. López de Haro, *Tracer diffusion under shear flow for general repulsive interactions*, Phys. Fluids **7**, 478-486 (1995).
36. V. Garzó, *Heat transport in a dilute gas under uniform shear flow*, Phys. Rev. E **51**, 3156-3163 (1995).
37. J. M. Montanero, A. Santos, and V. Garzó, *Analysis of the stability of the uniform shear flow from a Monte Carlo simulation of the Boltzmann equation*, Phys. Lett. A **203**, 73-76 (1995).
38. V. Garzó, *Thermal transport generated by an external force in a sheared dilute gas*, J. Chem. Phys. **103**, 4626-4631 (1995).
39. J. M. Montanero, A. Santos, and V. Garzó, *Does the Gaussian thermostat maximize the phase-space compression factor?*, J. Stat. Phys. **81**, 989-1005 (1995).
40. C. Marín, V. Garzó, and A. Santos, *Transport properties in a binary mixture under shear flow*, Phys. Rev. E **52**, 3812-3819 (1995).
41. V. Garzó and A. Santos, *Diffusion in a gaseous dilute solution under heat and momentum transport*, Phys. Rev. E **52**, 4942-4951 (1995).
42. M. López de Haro and V. Garzó, *Shock waves in a dense gas*, Phys. Rev. E **52**, 5688-5691 (1995).
43. J. M. Montanero, A. Santos, and V. Garzó, *Singular behavior of the velocity moments of a dilute gas under uniform shear flow*, Phys. Rev. E **53**, 1269-1272 (1996).
44. C. Marín, A. Santos, and V. Garzó, *Non-equilibrium phase transition in a binary mixture*, Europhys. Lett. **33**, 599-604 (1996).
45. C. Marín, J. M. Montanero, and V. Garzó, *Kinetic models for diffusion generated by an external force*, Physica A **225**, 235-253 (1996).
46. J. M. Montanero, A. Santos, and V. Garzó, *Monte Carlo simulation of the Boltzmann equation for uniform shear flow*, Phys. Fluids **8**, 1981-1983 (1996).
47. C. Marín and V. Garzó, *Uniform shear flow in a binary mixture with general repulsive interactions*, Phys. Fluids **8**, 2756-2765 (1996).

48. C. Marín, J. M. Montanero, and V. Garzó, *Monte Carlo simulation of the Boltzmann equation in the colour conductivity problem for general repulsive interactions*, *Mol. Phys.* **78**, 1249-1261 (1996).
49. V. Garzó, *Tracer diffusion under heat and momentum transport for general repulsive potentials*, *Physica A* **234**, 108-128 (1996).
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52. V. Garzó, *Kinetic model for uniform shear flow*, *Physica A* **243**, 113-128 (1997).
53. C. Marín and V. Garzó, *On the validity of a variational principle for multicomponent systems*, *J. Chem. Phys.* **107**, 2573-2579 (1997).
54. C. Marín, V. Garzó, and A. Santos, *Tracer limit in a gas mixture under shear flow with repulsive interactions*, *Phys. Rev. E* **56**, 2291-2294 (1997).
55. M. Tij, V. Garzó, and A. Santos, *Nonlinear heat transport in a dilute gas in the presence of gravitation*, *Phys. Rev. E* **56**, 6729-6734 (1997).
56. C. Marín and V. Garzó, *Mutual diffusion in a binary mixture under shear flow*, *Phys. Rev. E* **57**, 507-513 (1998).
57. V. Garzó, *Electrical conductivity in a dilute gas far from equilibrium*, *Phys. Rev. E* **57**, 4186-4197 (1998).
58. J. M. Montanero and V. Garzó, *Nonlinear Couette flow in a dilute gas: Comparison between theory and molecular dynamics simulation*, *Phys. Rev. E* **58**, 1836-1842 (1998).
59. J. M. Montanero, M. López de Haro, V. Garzó, and A. Santos, *Strong shock waves in a dense gas: Burnett theory versus Monte Carlo simulation*, *Phys. Rev. E* **58**, 7319-7324 (1998).
60. M. Tij, V. Garzó, and A. Santos, *Influence of gravity on nonlinear transport in the planar Couette flow*, *Phys. Fluids* **11**, 893-904 (1999).
61. C. Marín and V. Garzó, *Electrical current density in a sheared dilute gas*, *Physica A* **265**, 508-519 (1999).
62. V. Garzó and J. W. Dufty, *Dense fluid transport for inelastic hard spheres*, *Phys. Rev. E* **59**, 5895-5911 (1999).
63. J. M. Montanero, V. Garzó, A. Santos, and J. J. Brey, *Kinetic theory of simple granular shear flows of smooth hard spheres*, *J. Fluid Mech.* **389**, 391-411 (1999).
64. V. Garzó and J. W. Dufty, *Homogeneous cooling state for a granular mixture*, *Phys. Rev. E* **60**, 5706-5713 (1999).
65. J. M. Montanero, M. López de Haro, A. Santos, and V. Garzó, *Simple and accurate theory for strong shock waves in a dense hard-sphere fluid*, *Phys. Rev. E* **60**, 7592-7595 (1999).

66. C. Marín, V. Garzó, and M. López de Haro, *Shear-rate dependent transport coefficients in a binary mixture of Maxwell molecules*, *Phys. Fluids* **12**, 717-726 (2000).
67. J. M. Montanero, A. Santos, and V. V. Garzó, *Monte Carlo simulation of nonlinear Couette flow in a dilute gas*, *Phys. Fluids* **12**, 3060-3073 (2000).
68. V. Garzó, *Heat and momentum transport in a multicomponent mixture far from equilibrium*, *Physica A* **289**, 37-56 (2001).
69. M. Tij, E. E. Tahiri, J. M. Montanero, V. Garzó, A. Santos, and J. W. Dufty, *Nonlinear Couette flow in a low density granular gas*, *J. Stat. Phys.* **103**, 1035-1068 (2001).
70. E. E. Tahiri, M. Tij, and V. Garzó, *Nonlinear transport in a binary mixture in the presence of gravitation*, *Physica A* **297**, 97-114 (2001).
71. J. W. Dufty and V. Garzó, *Mobility and diffusion in granular fluids*, *J. Stat. Phys.* **105**, 723-744 (2001).
72. J. M. Montanero and V. Garzó, *Monte Carlo simulation of the homogeneous cooling state for a granular mixture*, *Granular Matter* **4**, 17-24 (2002).
73. V. Garzó and J. W. Dufty, *Hydrodynamics for a granular mixture at low density*, *Phys. Fluids* **14**, 1476-1490 (2002).
74. J. M. Montanero and V. Garzó, *Rheological properties in a low-density granular mixture*, *Physica A* **310**, 17-38 (2002).
75. C. Marín and V. Garzó, *Exact solution of the Gross-Krook kinetic model for a multicomponent gas in steady Couette flow*, *Physica A* **312**, 315-3341 (2002).
76. V. Garzó, *Tracer diffusion in granular shear flows*, *Phys. Rev. E* **66**, 0210308 (2002).
77. V. Garzó and J. M. Montanero, *Transport coefficients of a heated granular gas*, *Physica A* **313**, 336-356 (2002).
78. S. R. Dahl, C. M. Hrenya, V. Garzó, and J. W. Dufty, *Kinetic temperatures for a granular mixture*, *Phys. Rev. E* **66**, 041301 (2002).
79. J. M. Montanero and V. Garzó, *Shear viscosity for a heated granular mixture at low-density*, *Phys. Rev. E* **67**, 021308 (2003).
80. J. M. Montanero and V. Garzó, *Energy nonequipartition in a sheared granular mixture*, *Mol. Sim.* **29**, 357-362 (2003).
81. V. Garzó, *Nonlinear transport in inelastic Maxwell mixtures under simple shear flow*, *J. Stat. Phys.* **112**, 657-683 (2003).
82. V. Garzó and J. M. Montanero, *Shear viscosity for a moderately dense granular binary mixture*, *Phys. Rev. E* **68**, 041302 (2003).
83. V. Garzó and J. M. Montanero, *Effect of energy nonequipartition on the transport properties in a granular mixture*, *Granular Matter* **5**, 165-168 (2003).

84. V. Garzó and J. M. Montanero, *Diffusion of impurities in a granular gas*, Phys. Rev. E **68**, 021301 (2004).
85. A. Santos, V. Garzó and J. W. Dufty, *Inherent rheology of a granular fluid in uniform shear flow*, Phys. Rev. E **69**, 061303 (2004).
86. V. Garzó, *On the Einstein relation in a heated granular gas*, Physica A **343**, 105-126 (2004).
87. V. Garzó and A. Astillero, *Transport coefficients for inelastic Maxwell mixtures*, J. Stat. Phys. **118**, 935-971 (2005).
88. V. Garzó, *Instabilities in a free granular fluid described by the Enskog equation*, Phys. Rev. E **72**, 021106 (2005).
89. J. M. Montanero, V. Garzó, M. Alam, and S. Luding, *Rheology of two- and three-dimensional granular mixtures under uniform shear flow: Enskog kinetic theory versus molecular dynamics simulation*, Granular Matter **8**, 103-115 (2006).
90. V. Garzó, *Transport coefficients for an inelastic gas around uniform shear flow: Linear stability analysis*, Phys. Rev. E **73**, 021304 (2006).
91. V. Garzó, *Segregation in granular binary mixtures: Thermal diffusion*, Europhys. Lett. **75**, 521-527 (2006).
92. V. Garzó, J. M. Montanero, and J. W. Dufty *Mass and heat fluxes for a binary granular mixture at low density*, Phys. Fluids **18**, 083305 (2006).
93. J.M. Montanero, A. Santos, and V. Garzó, *First-order Chapman-Enskog velocity distribution function in a granular gas*, Physica A **376**, 75-93 (2007).
94. V. Garzó, A. Santos, and J.M. Montanero, *Modified Sonine approximation for the Navier-Stokes transport coefficients of a granular gas*, Physica A **376**, 94-107 (2007).
95. V. Garzó, *Mass transport of an impurity in a strongly sheared granular gas*, J. Stat. Mech. P02012 (2007).
96. V. Garzó and J. M. Montanero, *Hydrodynamics for inelastic Maxwell mixtures: Some applications*, Bulletin of the Institute of Mathematics, Academica Sinica (New Series) **2**, 155-177 (2007).
97. F. Vega Reyes, V. Garzó and A. Santos, *Granular mixtures modeled as elastic hard spheres subject to a drag force*, Phys. Rev. E **75**, 061306 (2007).
98. V. Garzó and J. M. Montanero, *Navier-Stokes transport coefficients of d-dimensional granular binary mixtures at low density*, J. Stat. Phys. **129**, 27-58 (2007).
99. V. Garzó, J. W. Dufty, and C. M. Hrenya, *Enskog theory for polydisperse granular mixtures. I. Navier-Stokes order transport*, Phys. Rev. E **76**, 031303 (2007).
100. V. Garzó, C. M. Hrenya, and J. W. Dufty, *Enskog theory for polydisperse granular mixtures. II. Sonine polynomial approximation*, Phys. Rev. E **76**, 031304 (2007).
101. V. Garzó, *Shear-rate dependent transport coefficients for inelastic Maxwell models*, J. Phys. A: Math. Theor. **40**, 10729-10757 (2007).

102. A. Santos and V. Garzó, *Simple shear flow in inelastic Maxwell models*, J. Stat. Mech. P08021 (2007).
103. V. Garzó and A. Santos, *Third and fourth degree collisional moments for inelastic Maxwell models*, J. Phys. A: Math. Theor. **40**, 14927-14943 (2007).
104. V. Garzó, *Mass flux of a binary mixture of Maxwell molecules under shear flow*, Physica A **387**, 3423-3431 (2008).
105. V. Garzó, *A note on the violation of the Einstein relation in a driven moderately dense granular gas*, J. Stat. Mech. P05007 (2008).
106. V. Garzó, *Brazil-nut effect versus reverse Brazil-nut effect in a moderately granular dense gas*, Phys. Rev. E **78**, 020301 (Rapid Communications) (2008).
107. F. Vega Reyes, V. Garzó and A. Santos, *Impurity in a granular gas under nonlinear Couette flow*, J. Stat. Mech. P09003 (2008).
108. V. Garzó, F. Vega Reyes and J. M. Montanero, *Modified Sonine approximation for granular binary mixtures*, J. Fluid Mech. **623**, 387-411 (2009).
109. V. Garzó and F. Vega Reyes, *Mass transport of impurities in a moderately dense granular gas*, Phys. Rev. E **79**, 041303 (2009).
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111. A. Santos, V. Garzó and F. Vega Reyes, *An exact solution of the inelastic Boltzmann equation for the Couette flow with uniform heat flux*, Eur. Phys. J. Special Topics **179**, 141-156 (2009).
112. F. Vega Reyes, A. Santos and V. Garzó, *Non-Newtonian granular hydrodynamics. What do the inelastic simple shear flow and the elastic Fourier flow have in common?*, Phys. Rev. Lett. **104**, 028001 (2010).
113. A. Santos, G. M. Kremer and V. Garzó, *Energy production rates in fluid mixtures of inelastic rough spheres*, Progress of Theoretical Physics Supplement **184**, 31-48 (2010).
114. V. Garzó and F. Vega Reyes, *Segregation by thermal diffusion in granular shear flows*, J. Stat. Mech. P07024 (2010).
115. V. Garzó and E. Trizac, *Rheological properties for inelastic Maxwell mixtures under shear flow*, J. Non-Newtonian Fluid Mech. **165**, 932-940 (2010).
116. F. Vega Reyes, V. Garzó and A. Santos, *Class of dilute granular Couette flows with uniform heat flux*, Phys. Rev. E **83**, 021302 (2011).
117. V. Garzó and E. Trizac, *Non-equilibrium phase transition in a sheared granular mixture*, Europhys. Lett. **94**, 50009 (2011).
118. V. Garzó, *Thermal diffusion segregation in granular binary mixtures described by the Enskog equation*, New J. Phys. **13**, 055020 (2011).
119. F. Vega Reyes, A. Santos and V. Garzó, *Computer simulations of an impurity in a granular gas under planar Couette flow*, J. Stat. Mech. P07005 (2011).

120. V. Garzó, *Transport coefficients of driven granular fluids at moderate volume fractions*, Phys. Rev. E **84**, 012301 (2011).
121. V. Garzó and A. Santos, *Hydrodynamics of inelastic Maxwell models*, Math. Model. Nat. Phenom **6** (4), 37-76 (2011).
122. V. Garzó and E. Trizac, *Impurity in a sheared inelastic Maxwell gas*, Phys. Rev. E **85**, 011302 (2012).
123. J. A. Murray, V. Garzó and C. M. Hrenya, *Enskog kinetic theory for polydisperse granular mixtures. III. Comparison of dense and dilute transport coefficients and equations of state for a binary mixture*, Powder Technology **220**, 24-36 (2012).
124. V. Garzó and F. Vega Reyes, *Segregation of an intruder in a heated granular gas*, Phys. Rev. E **85**, 021308 (2012).
125. P. P. Mitrano, V. Garzó, A. H. Hilger, C. J. Ewasko, and C. M. Hrenya, *Assessing a modified-Sonine kinetic theory for instabilities in highly dissipative, cooling granular gases*, Phys. Rev. E **85**, 041303 (2012).
126. V. Garzó and E. Trizac, *Dissipative homogeneous Maxwell mixtures: ordering transition in the tracer limit*, Granular Matter **14**, 99-104 (2012).
127. A. Santos and V. Garzó, *Collisional rates for the inelastic Maxwell model: applications to the divergence of anisotropic high-order velocity moments in the homogeneous cooling state*, Granular Matter **14**, 105-110 (2012).
128. V. Garzó, S. Tenneti, S. Subramaniam, and C. M. Hrenya, *Enskog kinetic theory for monodisperse gas-solid flows*, J. Fluid Mech. **712**, 129-168 (2012).
129. F. Vega Reyes, A. Santos, and V. Garzó, *Steady base states for non-Newtonian granular hydrodynamics*, J. Fluid Mech. **719**, 431-464 (2013).
130. V. Garzó, M. G. Chamorro, and F. Vega Reyes, *Transport properties for driven granular fluids in situations close to homogeneous steady states*, Phys. Rev. E **87**, 032201 (2013).
131. V. Garzó, *Grad's moment method for a granular fluid at moderate densities. Navier-Stokes transport coefficients*, Phys. Fluids **25**, 043301 (2013).
132. V. Garzó, J. A. Murray, and F. Vega Reyes, *Diffusion transport coefficients for granular binary mixtures at low-density. Second Sonine approximation*, Phys. Fluids **25**, 043302 (2013).
133. L. Almazán, J. A. Carrillo, C. Salueña, V. Garzó and T. Pöschel, *A numerical study of the Navier-Stokes transport coefficients for two-dimensional granular hydrodynamics*, New J. Phys. **15**, 043044 (2013).
134. M. G. Chamorro, F. Vega Reyes, and V. Garzó, *Homogeneous steady states in a granular fluid driven by a stochastic bath with friction*, J. Stat. Mech. P07013 (2013).
135. N. Khalil and V. Garzó, *Transport coefficients for driven granular mixtures at low-density*, Phys. Rev. E **88**, 052201 (2013).
136. P. P. Mitrano, V. Garzó, and C. M. Hrenya, *Instabilities in granular binary mixtures at moderate densities*, Phys. Rev. E **89** (Rapid Communications), 020201 (2014).

137. N. Khalil and V. Garzó, *Homogeneous states in driven granular mixtures: Enskog kinetic theory versus molecular dynamics simulations*, J.Chem. Phys. **140**, 164901 (2014).
138. N. Khalil, V. Garzó and A. Santos, *Hydrodynamic Burnett equations for inelastic Maxwell models for granular gases*, Phys. Rev. E **89**, 052201 (2014).
139. F. Vega Reyes, V. Garzó, and N. Khalil, *Hydrodynamic granular segregation induced by boundary heating and shear*, Phys. Rev. E **89**, 052206 (2014).
140. J. C. Pérez-Fuentes and V. Garzó, *Influence of a drag force on linear transport in low-density gases. Stability analysis*, Physica A **410**, 428 (2014).
141. M. G. Chamorro, V. Garzó and F. Vega Reyes, *Navier-Stokes transport coefficients for driven inelastic Maxwell models*, J. Stat. Mech. P06008 (2014).
142. G. M. Kremer, A. Santos and V. Garzó, *Transport coefficients of a granular gas of inelastic rough spheres*, Phys. Rev. E **90**, 022205 (2014).
143. V. Garzó, N. Khalil and E. Trizac, *Anomalous transport of impurities in inelastic Maxwell gases*, Eur. Phys. J. E **38**, 16 (2015).
144. A. Kubicki and V. Garzó, *Inelastic Maxwell models for monodisperse gas-solid flows*, J. Stat. Mech. P03015 (2015).
145. V. Garzó, *Stability of freely cooling granular mixtures at moderate densities*, Chaos, Solitons and Fractals **81**, 497 (2015).
146. V. Garzó and E. Trizac, *Generalized transport coefficients for inelastic Maxwell mixtures under shear flow*, Phys. Rev. E **92**, 052202 (2015).
147. M. G. Chamorro, F. Vega Reyes and V. Garzó, *Non-Newtonian hydrodynamics for a dilute granular suspension under uniform shear flow*, Phys. Rev. E **92**, 052205 (2015).
148. V. Garzó, W. D. Fullmer, C. M. Hrenya and X. Yin, *Transport coefficients of solid particles immersed in a viscous gas*, Phys. Rev. E **93**, 012905 (2016).
149. V. Garzó and E. Trizac, *Tracer diffusion coefficients in a sheared inelastic Maxwell gas*, J. Stat. Mech. 073206 (2016).
150. R. Gómez González and V. Garzó, *Instabilities in granular gas-solid flows*, J. Phys. A: Math. Theor. **50**, 155502 (2017).

Review Articles and Book Chapters

1. V. Garzó and C. Marín, *Nonlinear transport in a dilute binary mixture*, in Recent Research Developments in Physics of Fluids **1**, 45-60 (1998).
2. J. M. Montanero and V. Garzó, *Strong shock waves in a dense gas*, in Recent Research Developments in Fluid Dynamics **3**, 113-123 (2000).
3. J. M. Montanero and V. Garzó, *Nonlinear Couette flow in dilute gases*, in Trends in Statistical Physics **3**, 105-115 (2000).

4. C. Marín and V. Garzó, *Transport of mass and energy in a mixture far from equilibrium*, in Trends in Statistical Physics **3**, 127-136 (2000).
5. V. Garzó, *Kinetic theory for binary granular mixtures at low-density*, Lecture Notes in Physics **753**, Theory and Simulation of Hard-Sphere Fluids and Related Systems, 493-540 (2008).

Conference papers

1. V. Garzó, *Self-diffusion in steady Couette flow*, in Rarefied Gas Dynamics 17, A.E. Beylich ed. (VCH, Weinheim), 207-213 (1991).
2. A. Santos and V. Garzó, *Exact non-linear transport from the Boltzmann equation*, in Rarefied Gas Dynamics 19, J. Harvey and G. Lord, eds. (Oxford University Press, Oxford), 13-22 (1995).
3. V. Garzó and M. López de Haro, *Mutual diffusion tensor of a dilute gas in a thermostatted shear flow state*, in Rarefied Gas Dynamics 19, J. Harvey and G. Lord, eds. (Oxford University Press, Oxford), 50-56 (1995).
4. C. Marín and V. Garzó, *Momentum transport in a dilute binary mixture*, in Rarefied Gas Dynamics 19, J. Harvey and G. Lord, eds. (Oxford University Press, Oxford), 244-249 (1995).
5. M. López de Haro and V. Garzó, *Tracer diffusion far from equilibrium*, in CAM 94 Physics Meeting, A. Zepeda ed. (American Institute of Physics Press, N.Y.), 737-742 (1995).
6. J. M. Montanero, V. Garzó, and A. Santos, *High velocity tail in a dilute gas under shear*, in Rarefied Gas Dynamics 20, C. Shen ed. (Peking University Press, Beijing), 113-117 (1997).
7. C. Marín and V. Garzó, *Kinetic model for momentum transport in a binary mixture*, in Rarefied Gas Dynamics 20, C. Shen ed. (Peking University Press, Beijing), 91-96 (1997).
8. V. Garzó, *Electrical conductivity tensor in a dilute gas under Couette flow*, in Proceedings of the VIII Spanish Meeting on Statistical Physics, FisEs '97, J. A. Cuesta and A. Sánchez, eds. Anales de Física Monografías número 4, 225-226 (1998).
9. C. Marín and V. Garzó, *Mutual diffusion under shear flow*, in Proceedings of the VIII Spanish Meeting on Statistical Physics, FisEs '97, J. A. Cuesta and A. Sánchez, eds. Anales de Física Monografías número 4, 267-268 (1998).
10. M. Tij, V. Garzó, and A. Santos, *Influence of gravity on the thermal conductivity*, in Rarefied Gas Dynamics 21, R. Brun, R. Campargue, R. Gatignol, and J.-C. Lengrand, eds. (Cepadues Editions, Toulouse) 239-246 (1999).
11. J. M. Montanero, A. Santos, and V. Garzó, *DSMC evaluation of the Navier-Stokes shear viscosity of a granular fluid*, AIP Conference Proceedings, Vol. 762, 797-802 (2005).
12. V. Garzó, *Impurities in inelastic Maxwell models*, in Rarefied Gas Dynamics 24, M. Capitelli, editor (AIP Conference Proceedings, Vol. 762) 803-808 (2005).
13. V. Garzó, *Segregation in moderately dense granular binary mixtures*, in The XV International Congress on Rheology, A. Co, L. G. Leal, R. H. Colby, and A. J. Giacomin, eds. (AIP Conference Proceedings, vol. 1027, Melville, NY, 2008), pp. 917—919.
14. F. Vega Reyes, V. Garzó, and A. Santos, *Rheological properties of a granular impurity in the Couette flow*, in The XV International Congress on Rheology, A. Co, L. G. Leal, R. H. Colby,

and A. J. Giacomin, eds. (AIP Conference Proceedings, vol. 1027, Melville, NY, 2008), pp. 953—955.

15. L. Almazán, C. Salueña, V. Garzó, J. A. Carrillo, and T. Pöschel, *Hydrodynamics at the Navier-Stokes level applied to fast, transient, supersonic granular flows*, AIP Conference Proceedings, Vol. 1051, 993-1000 (2012).
16. F. Vega Reyes and V. Garzó, *Energy non-equipartition in a system with a granular impurity under Couette-Fourier flow*, AIP Conference Proceedings, Vol. 1051, 1017-1023 (2012).
17. M. G. Chamorro, F. Vega Reyes, and V. Garzó, *Homogeneous states in granular fluids driven by thermostats*, AIP Conference Proceedings, Vol. 1051, 1024-1030 (2012).
18. V. Garzó, *Grad's moment method for a low-density granular gas. Navier-Stokes transport coefficients*, AIP Conference Proceedings, Vol. 1051, 1031-1037 (2012).
19. F. Vega Reyes and V. Garzó, *Thermal diffusion segregation of an impurity in a driven granular fluid*, AIP Conference Proceedings Vol. 1628, 488.493 (2014).

Invited Lectures: Academia

1. *Diffusion under shear flow*. Instituto de Investigaciones en Materiales, UNAM, México (May 1991).
2. *Absence of normal solution in far from equilibrium states*. Instituto de Investigaciones en Materiales, UNAM, México (June 1994).
3. *Boltzmann kinetic theory for inelastic Maxwell mixtures*. Department of Chemistry, Kyoto University, Japan (September 2004).
4. *Kinetic Theory of granular mixtures: Thermal diffusion segregation*. Centro de Investigación en Energía, UNAM, México (August 2009).
5. *Non-equilibrium phase transition in a granular binary mixture*. Departamento de Matemáticas, UAB, Barcelona, Spain (January 2011).
6. *Continuum Description of Gas-Solid Flows with LBM-based Drag Model*. Department of Chemical and Biological Engineering, University of Colorado, Boulder (June 2011).
7. *Instabilities in granular fluids at moderate densities*. LPTMS, Université Paris-Sud (May 2015).
8. *Thermal diffusion segregation in granular mixtures*. Departamento de Física, Universidad de Chile, Santiago de Chile (March, 2017).

Invited Lectures: Conferences and Workshops (speaker underlined)

1. *An exact solution of the Boltzmann equation for a binary mixture*. A. Santos and V. Garzó, Fourth International Workshop on Mathematical Aspects of Fluid and Plasma Dynamics, Kyoto, Japan (October 1991).
2. *Exact non-linear transport from the Boltzmann equation*. A. Santos and V. Garzó, 19th International Symposium on Rarefied Gas Dynamics, Oxford, UK (July 1994).
3. *Tracer diffusion far from equilibrium*. M. López de Haro and V. Garzó, CAM 94 Physics Meeting, Cancún, México (September 1994).
4. *High-velocity tail in a dilute gas under uniform shear flow*. J.M. Montanero, V. Garzó and A. Santos, European Workshop on Kinetic Equations, Granada, Spain (April 1996).
5. *Diffusion in a granular mixture at low density*. V. Garzó and J. W. Dufty, CECAM Workshop on Statistical Physics for Dynamic Granular Media, Lyon, France (July 2000).

6. *Shear viscosity of a granular fluid.* J. M. Montanero, V. Garzó, A. Santos and J.W. Dufty, CECAM Workshop on Computational Kinetic Theory: Mesoscale Applications, Lyon, France (May 2001).
7. *Rheological properties in a granular mixture.* V. Garzó and J.M. Montanero, Euroconference on Asymptotic Methods and applications in Kinetic and Quantum-Kinetic Theory, Granada, Spain (September 2001).
8. *Diffusion in granular shear flows.* V. Garzó, CECAM Workshop on Granular Gases: Theory-Experiments-Simulations, Lyon, France (September 2001).
9. *Transport coefficients for granular mixtures at low density.* V. Garzó and J. W. Dufty, Florida-Paris Workshop on Granular Fluids, Paris, France (November 2003).
10. *Hydrodynamics for inelastic Maxwell mixtures.* V. Garzó, Sixth International Workshop on Mathematical Aspects of Fluid and Plasma Dynamics, Kyoto, Japan (September 2004).
11. *Transport coefficients for a granular gas under simple shear flow.* V. Garzó, CECAM Workshop on "From gases to glasses in granular matter: Thermodynamic and hydrodynamic aspects," Lyon, France (June 2005).
12. *Navier-Stokes velocity distribution of a granular gas in the heat flux problem.* A. Santos, J. M. Montanero and V. Garzó, CECAM Workshop on "From gases to glasses in granular matter: Thermodynamic and hydrodynamic aspects," Lyon, France (June 2005).
13. *Shear Flow of Inelastic Maxwell particles.* A. Santos and V. Garzó, DuftyFest, Gainesville, Florida (September 2005).
14. *Dense fluid transport for granular mixtures of inelastic hard spheres.* V. Garzó, J. W. Dufty, and C. M. Hrenya, Granular Fluids- A Proving Ground for Nonequilibrium Statistical Mechanics, Sevilla, Spain (September 2007).
15. *Segregation by thermal diffusion of an intruder in a granular dense gas.* V. Garzó, Granular Gas 2008: Beyond the dilute limit, Thurnau, Germany (September 2008).
16. *Kinetic theory of granular gas mixtures.* V. Garzó, Temperature in non-equilibrium systems, Barcelona, Spain (September 2008).
17. *Kinetic theory for binary granular gas mixtures: Some applications.* V. Garzó, 5th International Workshop on Nonequilibrium Thermodynamics, Cuernavaca, México (August 2009).
18. *Incorporation of Fluid Phase into Hydrodynamic Description of Granular Flows.* C.M. Hrenya, V. Garzó, S. Subramaniam, R. Garg, and S. Tennetti, Southern Workshop on Granular Materials SWGM09, Viña del Mar, Chile (November 2009).
19. *Non-equilibrium phase transition in a sheared inelastic granular mixture.* V. Garzó and E. Trizac, Fluctuation Phenomena in Interdisciplinary Science, Barcelona, Spain (April 2011).
20. *Non-Newtonian properties in granular Couette flows.* V. Garzó, F. Vega Reyes, and A. Santos, Granular and Active Fluids, Zaragoza, Spain (September 2011).
21. *Kinetic theory for granular mixtures at moderate densities: Some applications,* V. Garzó, 2nd IMA Conference on dense granular flows, **Keynote Speaker**, Cambridge, UK (July, 2013).

Contributed conference presentations (speaker underlined)

1. *Self-diffusion in steady Couette flows.* V. Garzó, 17th International Symposium on Rarefied Gas Dynamics, Aachen, Germany (July 1990).
2. *Tracer diffusion in shear flows.* V. Garzó, FISES'91, Gijón, Spain (October 1991).
3. *Diffusion in far from equilibrium states.* V. Garzó and A. Santos, 18th IUPAP International Conference on Statistical Physics, Berlin, Germany (August 1992).
4. *Mutual diffusion tensor of a dilute gas in a thermostatted shear flow state.* V. Garzó and M. López de Haro, 19th International Symposium on Rarefied Gas Dynamics, , Oxford, UK (July 1994).
5. *Nonlinear viscosity in a binary mixture at low-density.* C. Marín and V. Garzó, FISES'94, Sevilla, Spain (October 1994).
6. *Heat and momentum transport in the ellipsoidal statistical model.* M. López de Haro and V. Garzó, European Workshop on Kinetic Equations, Granada, Spain (April 1996).

7. *Non-equilibrium phase transition in a sheared dilute binary mixture.* C. Marín, **V. Garzó** and A. Santos, FISES'96, Zaragoza, Spain (May 1996).
8. *High-velocity tail in a dilute gas under shear.* **A. Santos**, J. M. Montanero, and V. Garzó, 20th International Symposium on Rarefied Gas Dynamics, Beijing, China (August 1996).
9. *Electrical current density in a dilute gas under Couette flow.* **V. Garzó**, First European Symposium on Applied Kinetic Theory, Toulouse, France (May 1998).
10. *Influence of gravity on the thermal conductivity.* M. Tij, V. Garzó and **A. Santos**, 21th International Symposium on Rarefied Gas Dynamics, Marseille, France (July 1998).
11. *Nonlinear transport in a sheared binary mixture.* **C. Marín** and V. Garzó, No Lineal 2000, Almagro, Spain (May 2000).
12. *Diffusion in a sheared granular gas.* **V. Garzó**, FISES'02, Tarragona, Spain (May 2002).
13. *Impurities in inelastic Maxwell models.* **V. Garzó**, 24th International Symposium on Rarefied Gas Dynamics, Bari, Italy (July 2004).
14. *DSMC evaluation of the Navier-Stokes shear viscosity of a granular fluid.* J. M. Montanero, **A. Santos**, and V. Garzó, 24th International Symposium on Rarefied Gas Dynamics, Bari, Italy (July 2004).
15. *Segregation in granular mixtures: Thermal diffusion.* **V. Garzó**, DYGRAM 2006 granular dynamics, jamming, rheology and instabilities, Rennes, France (June 2006).
16. *Segregation in a dense granular gas under gravity.* **V. Garzó**, FISES'08, Salamanca, Spain (March 2008).
17. *Segregation in moderately dense granular binary mixtures.* **V. Garzó**, The XV International Congress on Rheology, Monterey, CA, USA (August 2008).
18. *Energy production rates in fluid mixtures of inelastic rough hard spheres.* **A. Santos**, G. K. Kremer, and V. Garzó, Southern Workshop on Granular Materials SWGM09, Viña del Mar, Chile (November 2009).
19. *What do the inelastic uniform shear flow and the elastic Fourier flow have in common?.* **F. Vega Reyes**, A. Santos, and V. Garzó, Southern Workshop on Granular Materials SWGM09, Viña del Mar, Chile (November 2009).
20. *The role of kinetic transport coefficients in the hydrodynamic simulations of granular flow.* **L. Almazán**, J. A. Carrillo, C. Salueña, V. Garzó and T. Pöschel, 248th International Symposium on Rarefied Gas Dynamics, Zaragoza, Spain (July 2012).
21. *Energy non-equipartition in a granular impurity under Couette-Fourier flow.* **F. Vega Reyes** and V. Garzó, 248th International Symposium on Rarefied Gas Dynamics, Zaragoza, Spain (July 2012).
22. *Diffusion and segregation of a granular impurity in a dense inelastic fluid,* **F. Vega Reyes** and V. Garzó, 2nd IMA Conference on dense granular flows, Cambridge, UK (July, 2013).
22. *Characteristic length and time scales for granular dynamics,* **F. Vega Reyes**, A. Santos, V. Garzó, M. García Chamorro and N. Khalil, Physics of glassy and granular materials, Yukawa Institute, Kyoto, Japan (July 2013).
23. *Molecular dynamics simulations of driven granular mixtures,* **N. Khalil** and V. Garzó, Workshop on Numerical Modelling of Grains/Fluids Flows, ENS Lyon, France (November 2013).
24. *Instabilities in granular fluids at moderate densities,* **V. Garzó**, P. Mitrano and C. Hrenya, International Conference on Statistical Physics (SigmaPhi 2014), Rhodes, Greece (July 2014).
25. *Flow instabilities in undriven granular fluids at moderate densities,* **V. Garzó**, P. Mitrano and C. Hrenya, Flowing Matter 2014, Lisbon, Portugal (December 2014).
26. *Non-Newtonian granular suspensions under simple shear flow,* **V. Garzó**, M. G. Chamorro and F. Vega Reyes, Flowing Matter 2016, Porto, Portugal (January 2016).

Graduate (PhD) students supervised

1. José María Montanero Fernández, Ph. D. Physics (June 1996), co-advised with A. Santos.

2. Concepción Marín Porgueres, Ph. D. Physics (February 1997), co-advised with A. Santos.
 3. Antonio Astillero Vivas, Ph. D. Physics (June 2007), co-advised with A. Santos.
 4. Moisés García Chamorro (Ph. D. candidate in Physics).
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Postdoctoral Researchers Supervised

Professor Mariano López de Haro (1994-1995)
Dr. Francisco Vega Reyes (2006-2008)
Dr. Nagi Khalil Rodríguez (2013-2014)

Journal reviews

- Physics of Fluids
 - Physical Review E
 - Physical Review Letters
 - Journal of Chemical Physics
 - Journal of Physics B
 - Journal of Fluid Mechanics
 - Physica A
 - Transp. Theory and Stat. Phys.
 - Nonlinearity
 - Phys. Lett. A
 - J. Statistical Mechanics
 - J. Statistical Physics
 - Mathematical Reviews
 - Physica Scripta
 - Journal of Molecular Liquids
 - Journal Non-Newtonian Fluid Mechanics
 - European Physics Journal Special Topics
 - Información Tecnológica (Chile)
 - International Journal of Physical Sciences
 - Mathematical Models of Natural Phenomena
 - Powder Technology
 - Granular Matter
 - Europhysics Letters
 - New Journal of Physics
 - Chemical Engineering Science
 - Advances in Condensed Matter Physics
 - Journal of Computational Physics
 - Chemical Physics
 - Results in Physics
 - Journal of Physics A: Mathematical and Theoretical
 - International Journal of Multiphase Flows
-

Proposal reviews

- ANEP (Spanish Government)
 - AGAUR (Regional Government of Cataluña)
 - ACSUCYL (Regional Government of Castilla y León)
 - NOW (Netherlands Organisation for Scientific Research)
 - FONDECYT (Chile)
 - ANPCT (Argentina)
 - FWO (The Research Foundation Flanders)
 - UHE (Moscow)
 - SNSF (Swiss National Science Foundation)
-

Synergistic Activities

- Member of the Board that worked out the book ``Título de Grado en Física'' (ANECA, Spanish agency).
- Member of the Editorial Board of the international journal *Granular Matter*.
- University of Extremadura. Vicedean of the Faculty of Sciences (2003-2011).
- Coordinator of ANECA (Spanish National Agency) for FPU Grants of the 2012 and 2013 calls in the field "Physics and Space Sciences".