

Alberto Vailati

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orcid.org/0000-0002-3119-6021



- 2006- present: Associate Professor of condensed matter physics, Università degli Studi di Milano
- 2007: Coordinated the scientific ground support activity of the GRADFLEX space experiment of ESA aboard FOTON M3
- 2003-2008: Technical Manager of the phase A/B-C/D study of the GRADFLEX contract of INFN with the European Space Agency.
- 1999-2006: Researcher at INFN (Istituto Nazionale per la Fisica della Materia, Genova, Italy)
- 1997-1998: winner of a Post-Doc grant from the Italian Ministry of University and Research
- 1996: PhD in Physics, Università degli Studi di Milano
- 1992: Laurea degree in Physics, 110/110 cum laude, Università degli Studi di Milano

Research

International research activity documented by publications in high impact factor journals (Nature, Physical Review Letters, Nature Communications, Physical Review E Rapid Communications, Applied Physics Letters).

The main research topics include: Colloidal aggregation, Non equilibrium fluctuations in diffusion processes in microgravity, Non equilibrium surface tension at the interface between miscible liquid phases, Pattern formation in nanofluids out of equilibrium, Development of innovative optical techniques for the investigation of complex fluids, including “Near Field Scattering”, quantitative static and dynamic Shadowgraphy, wavelet transform spectrum analyzer, small angle depolarized dynamic light scattering, development of spatial instrumentation for the European Space Agency.

Impact of research witnessed by a wide coverage by the media including: BBC Science News, Spektrum der Wissenschaft, Scientific American, The Times, Suddeutsche Zeitung, Nature, Le Monde, la Repubblica, il Mondo, Corriere della Sera, The New York Times, El Mundo, Radio 24, BBC radio, Korea Times, International Herald Tribune, Sette, Avvenire, Wired

Awards, mentoring and reviewer activity

- Team Achievement Award of the European Space Agency (ESA) for the outstanding contribution to the Space Mission FOTON M3 (2007).
- Advisor of 30 BSc and 25 MSc Thesis.
- Advisor/Tutor of 9 PhD and Post-Doc students.
- Member of the Faculty of the PhD School in Physics, Astrophysics and Applied Physics, Università degli Studi di Milano.
- Member of the committee for the admission to the PhD school in Physics, Astrophysics and Applied Physics Università degli Studi di Milano, XX cycle and XXIX cycle.
- 2009-2012: Member of the pool of Reviewers of the European Science Foundation
- Reviewer of research projects for: Canadian Space Agency, European Space Agency, European Science Foundation, Graduate Woman in Science Society.

- Certified Reviewer of scholarly articles for international journals, Publons: <https://publons.com/author/315061/alberto-vailati#profile>; Journals include Physical Review Letters, Physical Review E, European Physical Journal E, Optics Letters, Journal of Engineering Mathematics, International Journal of Thermophysics, Journal of Chemical Physics, Applied Optics, Optics Express, Nanoscale Research Letters, Ultrasonics, Zoology, Physics Letters A, Physical Chemistry- Chemical Physics, Optics Communications.

Teaching

- 2007- present : “Physics” for BSc students in Natural Sciences (70 students on average). Grading of the course by the students: [2008-2009](#), [2009-2010](#), [2010-2011](#), [2011-2012](#), [2012-2013](#), [2013-2014](#)
- 2008- present: “Waves and Oscillations” for BSc students in Physics (90 students on average). Grading of the course by the students: [2008-2009](#), [2009-2010](#), [2010-2011](#), [2011-2012](#), [2012-2013](#), [2013-2014](#)
- 2010- present: Coordinator of the PhD Course “Experimental methods for the investigation of systems at the nanoscale”.

Organization of conferences and Outreach activities

- 2015: Organizer of the second Workshop on Complex Systems, Università degli Studi di Milano
- 2013: Organizer of the first Workshop on Complex Systems, Università degli Studi di Milano
- 2011, 2012 2014: co-organizer of the exhibit “Un mare di diversità”, Università degli Studi di Milano, Acquario Civico di Milano
- 2011: Co-organizer, “Festival Internazionale dell’Ambiente”, co-organizer of the exhibit “Limpido come l’acqua, profondo come il mare”.

Research projects

- 1995: Italian Space Agency, Project “Fractal aggregation of colloids in microgravity”, in collaboration with Mars center (Naples) and with CISE S.p.A(Milan).
- 1997-2002: Italian Space Agency, international project “Nonequilibrium fluctuations in microgravity”, in collaboration with University of California at Santa Barbara (UCSB).
- 2001: funding of the Italian Ministry of University and Research for the PRIN project “Investigation on the nature of the Soret effect and its relevance in hydrodynamic instabilities”, in collaboration with Politecnico di Milano.
- 2003-2007: European Space Agency (ESA), contract for the Phase A/B and phase C/D study of the GRADFLEX project, in collaboration with University of California at Santa Barbara.
- 2009: British Royal Society International Joint Project “Soft Matter Models Underpinning Biological Physics”
- 2009: Seed project, Istituto Italiano di Tecnologia, “Smart Heat Exchange with Nanofluids”, score: 77.5/100, Project not financed.
- 2012: CARIPLO Foundation, “Bistable Heat Trasfer with Smart Nanofluids”, score 87.40/100, threshold for admission 89.0/100 (8%). Project not financed
- 2013: CARIPLO Foundation, “Bistable Heat Trasfer with Smart Nanofluids”, score 87.1/100, threshold for admission: 88.6/100 (9.5%). Project not financed
- 2013: PRIN 2012 “Fluctuations an Instabilities in Ternary Systems”, score: 12.67/15. Project not financed
- 2014: Transition grant UNIMI.
- 2014: Instrumentation grant UNIMI.

Selected Publications: (full list: orcid.org/0000-0002-3119-6021)

- Inclined layer convection in a colloidal suspension with negative Soret coefficient at large solutal Rayleigh numbers, M. Italia, F. Croccolo, F. Scheffold and A. Vailati, *Eur. Phys. J. E* 37, 101 (2014).
- F. Giavazzi, and A. Vailati, Geometry for a penguin-albatross rookery, *Phys. Rev E* 89, 052706 (2014).
- F. Croccolo, F. Scheffold, and A. Vailati, Effect of a marginal inclination on pattern formation in a binary liquid mixture under thermal stress, *Phys. Rev. Lett.* 111, 014502 (2013).
- How Archer Fish Achieve a Powerful Impact: Hydrodynamic Instability of a Pulsed Jet in *Toxotes jaculatrix*. A. Vailati, L. Zinnato, and R. Cerbino, *PLoS ONE* 7(10): e47867. doi:10.1371/journal.pone.0047867 (2012).
- M. Bernardin, F. Comitani, and A. Vailati, Tunable heat transfer with smart nanofluids, *Physical Review E*, 85, 066321 (2012).
- A. Vailati, R. Cerbino, S. Mazzoni, M. Giglio, C. J. Takacs and D. S. Cannell, Gradient-driven fluctuations in microgravity, *Journal of Physics: Condensed Matter* 24, 284134 (2012).
- S. Wongsuwarn, D. Vigolo, R. Cerbino, A. M. Howe, A. Vailati, R. Piazza and P. Cicuta, Giant thermophoresis of poly(N-isopropylacrylamide) microgel particles, *Soft Matter* 8, 5857-5863 (2012).
- A. Vailati, R. Cerbino, S. Mazzoni, C. J. Takacs, D.S. Cannell, M. Giglio, Fractal fronts of diffusion in microgravity, *Nature Communications* 2:290 (2011). doi: 10.1038/ncomms1290
- C. J. Takacs, A. Vailati, R. Cerbino, S. Mazzoni, M. Giglio, and D. S. Cannell, Thermal fluctuations in a layer of liquid Cs₂ subjected to temperature gradients with and without the influence of gravity, *Phys. Rev. Lett.* 106, 244502 (2011).
- G. Donzelli, R. Cerbino, and A. Vailati, Bistable heat transfer in a nanofluid, *Phys. Rev. Lett* 102, 104503 (2009).
- F. Giavazzi and A. Vailati, Scaling of the spatial power spectrum of excitations at the onset of solutal convection in a nanofluid far from equilibrium, *Phys. Rev. E* 015303(R) (2009).
- S. Mazzoni, F. Giavazzi, R. Cerbino, M. Giglio, A. Vailati, Mutual Voronoi tessellation in spoke pattern convection, *Phys. Rev. Lett.* 100, 188104 (2008).
- A. Vailati, R. Cerbino, S. Mazzoni, M. Giglio, G. Nikolaenko, C. J. Takacs, D. S. Cannell, W. V. Meyer, and A. E. Smart, Gradient-driven fluctuations experiment: fluid fluctuations in microgravity, *Applied Optics* 45, 2155 (2006) (Cover Paper).
- R. Cerbino, S. Mazzoni, A. Vailati and M. Giglio, Scaling behavior for the onset of convection in a colloidal suspension, *Phys. Rev. Lett.* 94, 064501 (2005).
- A. Vailati and M. Giglio, Giant fluctuations in a free diffusion process, *Nature* 390, 262 (1997).
- A. Vailati and M. Giglio, q divergence of nonequilibrium fluctuations and its gravity induced frustration in a temperature stressed liquid mixture, *Phys. Rev. Lett.* 77, 1484 (1996).