Agnese Seminara

Chargé de Recherche de première classe
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italian citizen
date of birth: january 16th 1980
languages: english, french, italian

Employment

2013 –	**CNRS, Université Côte d'Azur, Institut de Physique de Nice, France.** Chargé de recherche lère classe.
2012	**Harvard University, School of Engineering and Applied Sciences, USA.** *Lecturer of Applied Mathematics.*
2010 – 2011	**Institut Pasteur, Physics of Biological Systems, Paris, France.** *Marie Curie postdoctoral fellow* (return phase).
2008 – 2010	**Harvard University, School of Engineering and Applied Sciences, USA.** *Marie Curie postdoctoral fellow* (outgoing phase).

Education

2017	Université Côte d'Azur, France. Habilitation à diriger des recherches: *The fluid dynamics of biological systems*
2004 – 2007	University of Nice-Sophia Antipolis, France and University of Genova, Italy. PhD in physics
1999 – 2003	University of Genova, Department of Physics, Italy. Bachelor and master degree in physics, final mark 110/110 *cum laude*

Awards and fellowships

2018	Research and PhD Supervision Award CNRS (PEDR)
2017	Bronze Medal CNRS
2012	Rita Levi Montalcini young investigator award (declined)
2008	Marie Curie International Outgoing Fellowship
2010	Poster award, International Mycological Society Conference, Edinburgh UK
2006	L'Oréal Italia – Unesco fellowship for women in science
2005	HPC-europa transnational access fellowship, super computing center CINECA (IT)
2005	Fellowship for double-badged PhD, Italian-French University
2004	Fellowship for education of young researchers in excellence centers, University of Genova

Keywords

biomechanics; fungal spores; biofilms; olfaction; out of equilibrium statistical mechanics; turbulent transport; turbulence; cloud microphysics; passive scalar; fluid dynamics

Publications

(A) "Bacterial biofilm expansion on osmotic gradients"
M. Iapichino, C. Claudet, P. Thomen and A. Seminara in preparation

(1) "Precise relationships among Buller's drop, ballistospore and gill morphology result in both maximum ejection velocity and optimal packing of spores within gilled mushrooms"
M Iapichino, YW Wang, S Gentry, A Pringle, A Seminara (arxiv)

(2) "Timing of fungal spore release dictates survival during atmospheric transport"
D. Lagomarsino-Oneto, J. Golan, A. Mazzino, A. Pringle and A. Seminara (arxiv)

(3) "A dynamic secretory vesicle cluster forms upon resetting cell polarity"
P.M. Silva, C. Puerner, A. Seminara, M Bassilana and R.A. Arkowitz. (in revision)

(4) "Myco-Fluidics: the fluid mechanics of fungal adaptation"
M. Roper and A. Seminara. *Annual Review of Fluid Mechanics* **51**:511–538 (2019)

(5) "A Universal Growth Limit for Circular Lichens"
A. Seminara, J. Fritz, MP. Brenner, A. Pringle. *J. Roy. Soc. Interface* **15**:20180063 (2018)

(6) "Reaching the wind: Boundary layer escape as a constraint on ascomycete spore dispersal"
A. Pringle, MP. Brenner, J. Fritz, M. Roper, A. Seminara. Book chapter in *The Fungal Community: its Organization and Role in the Ecosystem*, Fourth Edition (2017)

(7) "Mice develop efficient strategies for foraging and navigation using complex natural stimuli"
DH. Gire, V. Kapoor, A. Arrighi-Allisan, A. Seminara, VN. Murthy. *Curr. Biol.* **26**:1261-1273 (2016).

(8) "Search strategies in complex olfactory environments"
BJ. Jackson, S. Oh, V. Gopal, A. Seminara, DH. Gire. 17th International Symposium on Olfaction and Taste (ISOT), *Chem. Senses* **41**:P3-002 (2016)

(9) Probing Phenotypic growth in expanding *Bacillus subtilis* biofilms
X. Wang, SA. Koehler, JN. Wilking, NN. Sinha, MT. Cabeen, S. Srinivasan, A. Seminara, S. Rubinstein, Q. Sun, MP. Brenner, DA. Weitz. *Appl Microb Biotecn* DOI 10.1007/s00253-016-7461-4 (2016).

(10) "Phosphatidylinositol-4-phosphate-dependent membrane traffic is critical for fungal filamentous growth"
V. Ghugtyal, R. Garcia-Rodas, A. Seminara, S. Schaub, M. Bassilana, R. Arkowitz. *PNAS* **112**:8644-8649 (2015)

(11) "The mechanism of ascus firing – Merging biophysical and mycological viewpoints"
F. Trail and A. Seminara *Fungal Biol. Rev.* **28**:70–76 (2014)

(12) "Nutrient depletion in *Bacillus subtilis* biofilms triggers matrix production"
W. Zhang, A. Seminara, M. Suaris, MP. Brenner, DA. Weitz, TE. Angelini *New Journ. Phys.* **16**:015028 (2014)

(13) "A natural O-ring optimizes the dispersal of fungal spores"
J. Fritz, A. Seminara, M. Roper, A. Pringle and MP. Brenner *J. Roy. Soc. Interface* **10**:20130187 (2013)

(14) "Osmotic spreading of *Bacillus Subtilis* biofilms driven by an extracellular matrix"
A. Seminara, TE. Angelini, JN. Wilking, H. Vlamakis, S. Ebrahim, DA. Weitz and MP. Brenner. *PNAS* **109**:1116-1121 (2012)

(15) "Mechanism of nanostructure movement under electron beam and its application in patterning"
A. Seminara, B. Pokroy, SH. Kang, MP. Brenner and J. Aizenberg *Phys. Rev. B* **83**:235438 (2011)

(16) "Biofilms as complex fluids"
JN. Wilking, TE. Angelini, A. Seminara, MP. Brenner and DA. Weitz, MRS Bull, **36**:1 (2011)

(17) "Bacterial biofilm shows persistent resistance to liquid wetting and gas penetration"
A. Epstein, B. Pokroy, A. Seminara, J. Aizenberg, PNAS **108**:995 (2011)

(18) "Dispersal of fungal spores on a cooperatively generated wind"
M. Roper*, A. Seminara*, MM. Bandi, A. Cobb, HR. Dillard, A. Pringle, PNAS **107**:17474 (2010)

(19) "Cloud droplet growth by condensation in homogeneous isotropic turbulence"◇
A. Lanotte, A. Seminara and F. Toschi, *J. Atmos. Sci.* **66**:1685 (2009)

(20) "How winding is the coast of Britain? Conformal invariance of rocky shorelines"◇
G. Boffetta, A. Celani, D. Dezzani and A. Seminara, *Geophys. Res. Lett.*, **35**:L03615 (2008)

(21) "Role of Turbulence for Droplet Condensation"◇
A. Celani, A. Mazzino, A. Seminara, M. Tizzi, *Advances in Turbulence XI, Springer Proceeding in Physics* **117**:465 (2007).

(22) "Droplet condensation in two-dimensional Bolgiano turbulence"◇
A. Celani, A. Mazzino, A. Seminara and M. Tizzi, *J. Turbul.*, **8**:1 (2007)

(23) "Large-scale anisotropy in scalar turbulence"◇
A. Celani and A. Seminara, *Phys. Rev. Lett.* **96**:184501 (2006)

(24) "Large-scale structure of passive scalar turbulence"◇
A. Celani and A. Seminara, *Phys. Rev. Lett.* **94**:214503 (2005)

(25) "Droplet condensation in turbulent flows"◇
A. Celani, G. Falkovich, A. Mazzino and A. Seminara, *Europhys. Lett.* **70**:775 (2005)

(a) "Transport and Diffusion in Complex Flows"◇
A Seminara, PhD thesis, Université de Nice-Sophia Antipolis and University of Genova (2007)

(b) "Inside clouds (keeping feet on earth)"
B. Paltrinieri, popularization article on the research of A. Seminara, *quark* (2006)

(c) "Study of the role of turbulence in cloud microphysics"
A. Seminara, master's thesis, University of Genova (2004)

* equal contributions, ◇ alphabetic order

Mentoring

Université Côte d'Azur, Institut de Physique de Nice.

current D. He (master and PhD), Olfactory navigation in mice with C. Rycroft (Harvard)
M. Iapichino (PhD), Bacterial biofilm biophysics.
D. Lagomarsino (postdoc), The fundamental drivers of fungal spore liberation.
N. Rigolli (master and PhD), The role of geometry in lipid transport.
J. Golan (PhD), Physically constrained spore dispersal kernel, with A. Pringle (Madison)
C. Puerner (PhD), Physics of invasion in *C. albicans*" w R Arkowitz, M Bassilana, X Noblin.
N. Kulaelashvili (PhD), Physics of invasion, with R Arkowitz, M Bassilana, X Noblin.

2015 V. Ravera (master), Bacterial biofilm biomechanics.
D. Thomson (postdoc), Physics of invasion, with R Arkowitz, M Bassilana, X Noblin.

2014 M. Rau (master), Bacterial biofilm biomechanics.

2014 – 17 D Lagomarsino (PhD), Large-scale dispersion in geophysical flows, with A Mazzino (Genova)
PhD thesis committee: P. da SIlva (IBV, Nice); E. Martineau (LCB, Marseille); F. Bansept (LJP, Sorbonne Univ); M. Ardoisio (SISSA, Trieste).

2018-... **Université Côte d'Azur**
Mentoring program for gender equality.

2014 **G.D. Cassini high school specialization science, Genova.**
Mentoring last year high school students.

2008 – 09 **Harvard University, Cambridge MA USA.**
J. Fritz (master and PhD), "Fluid Dynamics for Fungi"

2004 – 05 **University of Genova, Italy.**
M. Tizzi (master), "Lagrangian effects on condensation processes in a model of convective turbulence"

Selected Invited Presentations

Gave over 50 invited and 25 contributed presentations.

2019 Boulder, Colorado, USA. Advanced course "Theoretical Biophysics"
Fungal Genetics Conference, Asilomar, USA
2018 KITP, UCSB, USA. Quantitative Biology School "Systems Neurophysics"
Institut Curie, Paris. Advanced course "Multiscale Integration in Biological Systems"
Gif Yvette, PALM Summer School "Physical approaches to understanding microbial life"
2017 Institut d'études Scientifiques de Cargese, FR. Summer School "Physics of living systems".
ICTP, Trieste, Conference on "Frontiers in Olfaction".
2016 ENS-ESPCI, Paris, Séminaire biophysique
2015 Northwestern University, Chicago, USA, Winter Colloquium Series.
Venice, IT, Workshop "Living systems: from interaction patterns to critical behavior"
ICTP, Trieste, IT, Conference "Sensing, Information and Decision at the Cellular Level"
KITP, University California Santa Barbara, USA, Program "Deconstructing the sense of smell"
2014 International Mycological Society, Bangkok, Th
Rockefeller University, Center for studies in Physics and Biology Seminar Series, NYC, USA
2013 University of California at San Diego (USA)
2010 Widely Applied Mathematics seminar series - Harvard University, USA

Teaching

2014 – ... **Université Côte d'Azur.**
Course "Soft matter and biophysics", part of master "P3M, Physique des matériaux, mécanique et modelisation numerique". Lectures on the subject: biomechanics of fungal spore ejection and bacterial biofilm expansion.

2015 **Université Côte d'Azur.**
Gave presentation at researchers/students meeting, part of the activities organized within the Licence en physique (Laurea triennale), Institut de Physique de Nice. Subject: biomechanics of fungal spore ejection and dispersal.

2014 **Harvard University, Cambridge MA USA.**
Teaching fellow of Applied Mathematics AM105, Graduate School of Arts and Sciences.

2012 **Harvard University, Cambridge MA USA.**
Instructor of Applied Mathematics AM201, Graduate School of Arts and Sciences.

2007 **University of Genova, Italy.**
Gave lectures on *fluid dynamics and turbulence* for "Corso di Studi di Fisica (vecchio ordinamento)".

2006 **University of Genova, Italy.**
Gave lectures on *turbulent transport theory* for PhD students in Physics.

Invited lecturer international summer schools:
2019 Boulder, Colorado, USA. Advanced course "Theoretical Biophysics"
2018 KITP, UCSB, USA. Quantitative Biology School "Systems Neurophysics"
Institut Curie, Paris. Advanced course "Multiscale Integration in Biological Systems"
Gif Yvette, PALM Summer School "Physical approaches to understanding microbial life"
2017 Institut d'études Scientifiques de Cargese, FR. Summer School "Physics of living systems"

Long term visits

2010, 2015, 2018	Kavli Institute for theoretical physics, University of California Santa Barbara, USA
fall 2013 – 2017	Harvard University, School of Engineering and Applied Sciences, USA
fall 2006	University of Rome La Sapienza, IT

Funding

2019	co-PI, CNRS MITI (with G Drin)
2018 - 2021	PI, CNRS PICS (with UW Madison)
2018 -2019	PI, UCA^{JEDI} coup de coeur Excellence.
2017 - 2018	PI, UCA^{JEDI} academie 4, "Complexité et diversité des systèmes vivants"
2017 - 2018	PI, UCA^{JEDI} international Summer Schools (with Harvard IACS).
2017 - 2018	PI UCA^{JEDI} and CNRS "action de site".
2017 - 2019	PI Thomas Jefferson Fund (with UW, Seattle).
2015 - 2019	Participant ANR FORFUNIGO (PI R. Arkowitz, IBV, Nice) .
2014	PI, Fédération de Recherche Wolfgang Doeblin research grant
2013 – 2014	PI, PEPS Physique théorique et ses Interfaces, CNRS research grant
2010	Participant BASF Advanced Research Initiative at Harvard
2009	Participant Advanced Photon Source grant, Argonne National Laboratory

Responsibilities

2018 - ...	Steering Committee MODELIFE Core Program Université Côte d'Azur
2018 - ...	Scientific Committee GDRI "Prediction, Adaptation and Navigation"
2018 - ...	Scientific Advisory Board Institut d'études scientifiques de Cargese.
Sep 2016 - ...	"Conseil Scientific" Académie 4 de l'Université de la Côte d'Azur, "Living Systems Complexity and Diversity".
Sep 2015 - 2017	"Conseil Academique de l'Université de la Côte d'Azur".
May 2016 - ...	"Comité permanent des ressources humaines (CPRH)" sec 28-29-30 Univ Nice.
Dec 2014 - ...	Scientific board "Axe interdisciplinaire Physique du vivant", University of Nice, FR

Organization of Scientific Meetings

Jun 2020	Adherent microbial communities: Quantitative approaches from single cell to natural ecosystems IESC, Cargese, FR
Jun 2020	60 years of Institut d'Etudes scientifiques de Cargese IESC, Cargese, FR

2019 - ...	Series of Colloquia, Workshop, Events, Retreat, Core program MODELIFE Université Côte d'Azur, Nice
2017 - 2018	UCA-Harvard Summer School on "Computational principles to organize complexity : success stories in quantitative biology".
2014 - 2017	"Physics of living matter" workshop series within the "Axe interdisciplinaire physique du vivant", University of Nice, FR
Sep 2016	"Non-equilibrium dynamics of thin films - solids, liquids and bioactive materials" CECAM Workshop, EPFL, Lausanne, CH
Jan 2016	"FLOW: Fungal Long Distance Dispersal on Wind" workshop, University of Nice and University of Genova
Dec 2014	Symposium "Physics of living matter", University of Nice, FR
Dec 2013	BioPhysMath2 conference, University of Nice, FR
Jun 2014	Interdiciplinary summer school "Bacterial biofilms: biological, physical and mathematical perspectives", Le Saint Paul, Nice, FR

Editorial commitments:

2016 – ... Editor for *Fungal Ecology*.

2013 – ... Reviewer for the following journals : *Nature Communications; Proceedings of the National Academy of Science; Physical Review; Scientific Reports; Fungal Ecology; PLOS Computational Biology; Mycologia; Proceedings of the Royal Society; Fungal Ecology; Ecology; SciPost*.

External referee

Human Frontiers in Science Program; German Science Foundation; CNRS (PEPS, Momentum, MECANOBIO); IDEX UCA^{JEDI}; Institut Pasteur ACIP.

Presentations

Invited

Jul 2019	Boulder, Colorado, USA. Advanced course "Theoretical Biophysics"
Mar 2019	Fungal genetics Conference, Asilomar, USA
Dec 2018	seminar ESPCI, Paris.
Nov 2018	Institut Curie, Paris. Advanced course "Multiscale Integration in Biological Systems"
Oct 2018	Workshop on statistical and molecular biophysics, SISSA, Triste
Sep 2018	Gif Yvette, PALM Summer School "Physical approaches to understanding microbial life"
Aug 2018	KITP, UCSB, USA. Quantitative Biology School "Systems Neurophysics"
Apr 2018	Physics of Living Matter, APS Workshop Series Physics Next, Long Island, NY, USA
Mar 2018	21st Rencontres du non linéaire, Paris
Jan 2018	Conférence Grand Public, Société française de Physique
Jan 2018	Complex Days, Université Côte d'Azur
Dec 2017	Ceremonie des laureats des prix d'excellence d'Université Côte d'Azur
Dec 2017	Nice nonlinearities conference in Nice, Saint Paul, Nice
Nov 2017	Workshop Paris Biological Physics Community Day, Centre Culturel Irlandais, Paris
Oct 2017	Kavli seminar, School of Engineering and Applied Sciences, Harvard Cambridge MA USA
Jul 2017	Conference on "Frontiers in Olfaction", ICTP, Trieste
Jun 2017	Summer School "Physics of living systems"m, Institut d'études Scientifiques de Cargese, FR
Jan 2016	Séminaire biophysique, ENS-ESPCI, Paris
Oct 2015	Winter Colloquium Series, Northwestern University, Chicago, USA
Oct 2015	Seminar at University of Washington, Seattle, USA

Sep 2015 Séminaire interface physique/bio, Université Paris Sud, Orsay, FR
Sep 2015 Seminar PMMH Lab, ESPCI, Paris, FR
Sep 2015 Workshop "Living systems: from interaction patterns to critical behavior", Venice, IT
Jul 2015 Conference "Sensing, Information and Decision at the Cellular Level", ICTP, Trieste, IT
Jun 2015 Program "Deconstructing the sense of smell" KITP, University California Santa Barbara, USA
Apr 2015 Workshop "Micro-Flow and Survival", Leiden, NE
Feb 2015 Laboratoire de chimie bactérienne, Marseille, Fr
Nov 2014 Colloque Physique théorique et ses interfaces, Institut Henri Poincaré, Paris, Fr
Oct 2014 Rockefeller University, Center for studies in Physics and Biology, Seminar Series, NYC, USA
Aug 2014 IMC10 – International Mycological Society, Bangkok, Th
Jun 2014 4me Journée de la physique niçoise, Nice (FR)
Nov 2013 University of California at San Diego (USA): *Osmotic spreading in Bacillus subtilis biofilms*
Oct 2013 Michigan State University (USA) : *Biomechanics of fungal spore ejection*
May 2013 Rencontres de mécanique des fluides, Observatoire de Nice (France)
May 2013 Workshop Quantitative Laws of Genome Evolution, Como (Italy)
Apr 2013 seminar at IRPHE, Marseille (France)
Feb 2013 seminar at UPMC, Paris (France)
May 2012 Materials days Rostock (Germany) lecture
Jan 2012 seminar at Laboratoire de physique de la matière condensée, Nice (France)
Oct 2011 seminar at Laboratoire de physique statistique, ENS – Paris (France)
Jan 2011 seminar at Institut Pierre et Marie Curie, CNRS – Paris (France)
Nov 2010 Journées départementales, Institut Pasteur, CNRS – Paris (France)
Oct 2010 Widely Applied Mathematics seminar series - Harvard University, Cambridge - MA (USA)
Oct 2010 Center for systems biology seminar series - Harvard University, Cambridge - MA (USA)
Jun 2010 seminar at Université Paris Sud, Orsay (France)
Jul 2009 seminar at Department of Physics, University of Turin (Italy)
May 2009 Applied Mathematics seminar series, Dep Mathematics, UC Berkeley (USA)
May 2008 seminar at Institut Pierre et Marie Curie, CNRS – Paris (France)
Jul 2007 seminars at the University "La Sapienza" – Rome (Italy)
Nov 2006 workshop on "Stochastic models for turbulent suspensions of inertial particles", Nice
Nov 2006 open interview with S. Coyaud at the science festival – Genova (Italy)
Mar 2006 "Rencontres niçoises de mécanique des fluides"– Nice (France)
Apr 2005 School of mechanical and aerospace engineering seminar, Cornell University, NY (USA)
Jan 2005 seminar at the University "La Sapienza" – Rome (Italy)

Contributed

Mar 2015 GDR REID, Lyon, FR
Nov 2013 APS Division of Fluid Mehanics, Pittsburgh, (USA)
Nov 2013 Poster Society for Neuroscience Conference, San Diego, USA
Mar 2013 "Soft Matter: From Biology to Physics", Geilo, (Norway)
Nov 2012 DFD - APS San Diego
Jul 2012 ICAM "Emergent order in biology" Cargese, Corse (France)
Dec 2011 poster, Heraeus Seminar "Physics of Biological Function", Physikzentrum, Bad Honnef (Germany)
Aug 2011 Mycological Society of America, Fairbanks Alaska (USA)
Aug 2010 poster, IMC9 The Biology of Fungi, Edinburgh (UK)
Nov 2009 APS 62nd Annual Meeting, Minneapolis (USA)
Nov 2008 retreat BASF Initiative on biofilms at Harvard, Sandwich (USA)
Nov 2008 APS 61th Annual Meeting - Division of Fluid Dynamics, S. Antonio (USA)
May 2008 Frontiers of Climate Science, KITP (UCSB) S. Barbara (USA)
Jul 2007 Statphys23, XXIII IUPAP International Conference on Statistical Physics, Genova (Italy)
Nov 2006 workshop on "stochastic models for turbulent suspensions of inertial particles", Nice (France)
Jul 2006 workshop on "non-equilibrium statistical mechanics and turbulence" Warwick (UK)
Feb 2006 "8th Minerva winter school" the Weizmann Institute of Science, Rehovot (Israel)
Sep 2005 ESF exploratory workshop on "challanging lagrangian turbulent dynamics", Castel Gandolfo (Italy)
Feb 2005 PICS meeting on "transport dans les fluides complexes", Acceglio (Italy)
Oct 2004 Weizmann Institut of Science workshop on "turbulence and mixing", Eilat (Israel)
Oct 2004 European network meeting on "stirring and mixing", Nice (France)
Sep 2004 poster "non-equilibrium systems: turbulence in fluids and plasmas", Villa Gualino, Turin, IT

Sep 2003 conference on "Kolmogorov's legacy in physics: one century of chaos, turbulence and complexity", Trieste (Italy)

Attendance to Advanced Schools and Courses

Mar 2013	"Soft matter confinement: from biology to physics" Geilo (Norway)
Jul 2012	ICAM "Emergent order in biology" Cargese, Corse (France)
Jan 2010	"Evolutionary perspective in cell biology", KITP - University of CAlifornia Santa Barbara, CA USA
Jun 2009	"Gordon conference on non-linear science", Mount Holyoke College, South Hadley, MA USA
Feb-apr 2007	"Statistical Physics in Biology", Prof. M. Kardar and Prof. L. Mirny, MIT, Cambridge (USA) - not for credit
May 2006	"Statistical Mechanics and Conformal Field Theories", Prof. F. Gliozzi and Prof. M. Caselle, University of Turin (Italy)
Feb 2006	"8th Minerva winter school " the Weizmann Institute of Science, Rehovot (Israel)
Sep 2004	INFM national school on "non-equilibrium systems: turbulence in fluids and plasmas", Turin (Italy)
Sep 2004	INFM national school on "single molecule biophysics", Turin (Italy)
Sep 2003	ICTP-INFM summer school on "transport, reaction and propagation in fluids", Trieste (Italy)

Other Activities

2010	tutoring at public charter school - Cambridge, MA (USA)
2002 – 2004	dance teacher, Mus-E project, public primary school M. Mazzini, Genova (Italy)
2000 – 2004	educational custody of a child with special needs, Genova (Italy)
1999 – 2001	dance teacher for children with special needs, Institut David Chiossone, Genova (Italy)