

Arnaud Tourin

Professor at ESPCI Paris - PSL
Head of Institut Langevin (ESPCI Paris, PSL University, CNRS)



Personal information

Date of birth: June 9, 1972 in Boulogne Billancourt (France)
Citizenship: French
Married, two children

Professional address

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Education

- 2005 « Habilitation à Diriger des Recherches », University of Paris
Subject: Waves in complex media
Members of Committee: C. Boccara (President), F. Cohen-Tenoudji (Referee), M. Fink, C. Miniatura (Referee), G. Montambaux, G. El Zein (Referee)
- 1999 PhD in Physical Acoustics, University of Paris
Subject: Multiple scattering and time reversal of ultrasound
Members of Committee: C. Boccara, Y. Couder, A. Derode, M. Fink (Advisor), G. Maret (Referee), R. Maynard (President), J. Scales, B. Van Tiggelen (Referee)
- 1995 Engineering Degree in Materials Science from ENSI Caen
Master Degree in Materials Science (University of Caen)
Master Degree in Company Administration and Management (University of Caen)

Scientific coordination and networking

- Head of Institut Langevin
- Scientific coordinator of the Labex (Laboratory of Excellence) WIFI
Waves and Imaging: from Fundamentals to Innovation
- Member of the steering committee of ESPCI Paris
- Member of the governance committee of incubator *PC Up*
- Member of the scientific committee of the DIM (Domain of Main Interest) *Empowering Life sciences with Innovative Technologies* (key research sector backed by the Paris Region)
- Member of the Research Council of PSL University / member of the bureau (2016-2019)
- Member of the National Scientific Research Committee (CoNRS) (2012-2016)
- Deputy Director of *Institut Langevin* (2009-2013)
- Deputy Director of *Laboratoire Ondes et Acoustique (LOA)* (2005-2009)
- Member of ESPCI board (2005-2008)
- Member of the National Council of Universities (CNU, 2007-2010)

Teaching activities

- Waves and Acoustics, ESPCI Paris (2nd year)
- Voice and Image, Engineering School of Information and Digital Technologies (2004-2006)
- Waves in complex media, Master of Science in acoustics, University of Paris (2004-2008)
- Electronics, Bachelor of Science, University of Paris (1999-2000)
- Image analysis, Master of Science in optics, University of Paris (1997-2003)

Research Interests

My research mainly focuses on wave propagation in strongly scattering media. During my PhD work under the supervision of Mathias Fink, I carried out pioneering experiments to test the reversibility of ultrasound in multiple scattering media and explained why the size of the focal spot is all the thinner than the medium is more complex. This rather counterintuitive result contributed to creating a new paradigm for the manipulation of waves in complex media: contrary to long-held beliefs, disorder is not only an impediment to focusing and imaging but can be turned into an ally for controlling waves. Since then, I have sought to apply that concept to various fields such as wireless communications or geophysics.

Using ultrasound, I have also studied spectacular effects that have their equivalent in condensed matter physics such as weak localization, transverse localisation or resonant tunnelling.

My recent work has focused on two main topics: acoustics in granular matter and acoustic bubbly metamaterials with exotic properties (super reflection, super absorption, negative refraction, sub wavelength focusing).

PhD supervisions and co-supervisions

F. Van der Biest (2002-2005), V. Mamou (2002-2005), G. Lerosey (2003-2006), A. Bretagne (2007-2011), M. Vanderhaegen (2010-2013), J. Aulbach (2010-2013), M. Lanoy (2013-2016), M. Harazi (2014-2017), M. Thieury (2017-2020), Y. Abraham Fernandes (2017-), R. Monsarrat (2018-), Guyu Zhou (2019-), Pedro Nieckele Azevedo (2019-), Arthur Le Ber (2020,-)

Publication record

- 54 international peer-reviewed papers in international journals
- h index: 23 (Scopus); h index: 29 (Google Scholar)
- 25 invited talks and lectures in conferences and summer schools
- Editor of the book « Imaging of complex media with acoustic and seismic waves »
- 4 book chapters

Innovation

- 6 patents
- Co-founder of start-up: *Time Reversal Communications* (now a Bull-Atos company)
- Member of the Research Council of Withings

Award

Diderot Innovation prize (2007)