

# Curriculum Vitæ

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## Andrea ORECCHINI

Born in Rome, 5<sup>th</sup> October 1973

### Physics and Geology Department

#### University of Perugia

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## Professional Experience

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- Dec 2015 – Present      **Associate Professor** at the Physics and Geology Department of the University of Perugia (Italy).
- Mar 2005 – Dec 2015    **Researcher** at the Physics and Geology Department of the University of Perugia (Italy).
- Nov 2008 – Oct 2013    **Instrument Responsible** of the IN4C spectrometer at the Institut Laue-Langevin (ILL) in Grenoble (France).
- Dec 2002 – Feb 2005    **Scientist (5-years tenure track)** at the Italian Institute for the Physics of Matter (INFM), c/o the BRISP CRG at the ILL in Grenoble (France).  
Responsible of the time-of-flight spectrometer BRISP during the installation and commissioning phase.
- Jan 2002 – Dec 2002    **Post-doctoral position** at the Italian Institute for the Physics of Matter, c/o BRISP CRG at the ILL in Grenoble (France).  
Installation and fine-tuning of some components of the time-of-flight spectrometer BRISP.
- Nov 1998 – Dec 2001    **PhD in Physics** at the University of Perugia (Italy).  
In collaboration with the Biology & Environmental Science Department of Tuscia University, Viterbo (Italy).  
Thesis title: *Pico and Nanosecond Dynamics in  $\beta$ -lactoglobulin: a Neutron Scattering and Molecular Dynamics Simulation Study.*
- Jun 1998 – Jul 1998    **Collaboration Contract** with the Italian Institute for the Physics of Matter, at the Physics Department of the University of Perugia (Italy).

## Teaching

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### University Lectures

- 2010 – Present      **Introduction to Solid State Physics** (63 hours/year) for Undergraduate students of the Physics course at the University of Perugia (Italy).
- 2016 – Present      **Radiation Physics** (24 hours/year) for Undergraduate students of the Radiation Therapy course at the University of Perugia (Italy).
- 2016 – Present      **General Physics** (42 hours/year) for Undergraduate students of the Biology and Biotechnology courses at the University of Perugia (Italy).
- 2015 – Present      **Basic theory and data analysis in neutron spectroscopy** (24 hours/year) for Undergraduate and Master students of the Physics course at Université Grenoble-Alpes, Grenoble (France), funded in the framework of the Erasmus Teaching European programme.
- 2010 – 2011        **Biophysics** (42 hours/year) for Master students of the Physics course at the University of Perugia (Italy).
- 2009 – 2010        **Introduction to Physics of Atoms and Molecules** (32 hours/year) for Undergraduate students of the Physics course at the University of Perugia (Italy).
- 2007 – 2009        **Laboratory for Solid State Physics** (60 hours/year) for Master students of the Physics course at the University of Perugia (Italy).
- 2006 – 2007        **Didactics of Physics** (16 hours/year) for school teachers of the Specializing School SSISS at the University of Perugia (Italy).
- 2005 – 2009        **Solid State Physics** (48 hours/year) for Master students of the Physics course at the University of Perugia (Italy).

### Lectures for Thematic Schools

- Sep 2018            **Quasi-elastic and inelastic neutron scattering in biology: instrumentation and data analysis practicals**, “Neutrons and Biology” School of the French Neutron Society, Carqueiranne (Italy).
- Sep 2017            **Crystal dynamics and inelastic neutron scattering**, School of the Italian Association for Neutron Scattering, Pra Catinat (Italy).
- Sep 2016            **Inelastic neutron scattering by crystals**, Advanced Summer School of the Italian Association for Neutron Scattering, Perugia (Italy).
- Direct-geometry Time-of-Flight spectrometers**, Advanced Summer School of the Italian Association for Neutron Scattering, Perugia (Italy).
- Jun 2016            **Crystal dynamics and inelastic neutron scattering**, School of the Italian Association for Neutron Scattering, San Giovanni in Valle Aurina (Italy).

- Jun 2015            **Inelastic neutron scattering**, School of the Italian Association for Neutron Scattering, San Giovanni in Valle Aurina (Italy).
- Feb 2014            **Time-of-Flight spectroscopy at the Institut Laue-Langevin**, School on Neutrons as Probes of Condensed Matter, Bhabha Atomic Research Center, Mumbai (India).
- Sep 2013            **Inelastic coherent neutron scattering by crystals**, Advanced Summer School of the Italian Association for Neutron Scattering, San Giovanni in Valle Aurina (Italy).
- Oct 2010            **Time-of-Flight Neutron Spectroscopy at Small Angles**, X International School of Neutron Scattering FPR for PhD students, Villa Mondragone, Frascati (Italy).
- Sep 2007            Tutor for hands-on experiments at the BRISP spectrometer, School of the Italian Association for Neutron Spectroscopy, Grenoble (France).
- Jul 2004            Tutor for data analysis practicals, School of the Italian Association for Neutron Spectroscopy, Sirolo (Italy).
- Sep 2002            Tutor for data analysis practicals, School of the Italian Association for Neutron Spectroscopy, Palau (Italy).

## **Education and Titles**

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- Sep 2018            Italian “**Abilitazione Scientifica Nazionale**” for access to the role of **Full Professor** in Applied Physics (“Fisica Applicata” - 02/B3).
- Jul 2018            Italian “**Abilitazione Scientifica Nazionale**” for access to the role of **Full Professor** in Experimental Solid State Physics (“Fisica Sperimentale della Materia” - 02/B1).
- Oct 2014            Italian “**Abilitazione Scientifica Nazionale**” for access to the role of **Associate Professor** in Experimental Solid State Physics (“Fisica Sperimentale della Materia” - 02/B1).
- Dec 2013            Italian “**Abilitazione Scientifica Nazionale**” for access to the role of **Associate Professor** in Applied Physics (“Fisica Applicata” - 02/B3).
- Feb 2013            French “**Qualification**” for access to the role of “**Professeur des Universités**”.  
Section 28: “Milieux denses et materiaux” (Dense matter and materials).

- Nov 1998 – Dec 2001    **PhD in Physics** at the University of Perugia (Italy).  
In collaboration with the Biology & Environmental Science Department of  
Tuscia University, Viterbo (Italy).  
Thesis title: *Pico and Nanosecond Dynamics in  $\beta$ -lactoglobulin: a Neutron  
Scattering and Molecular Dynamics Simulation Study.*
- Oct 1999                School of the Italian Institute for the Physics of Matter (INFM) for PhD  
students, Torino (Italy): protein systems, surface physics.
- Sep 1998                Italian School of Neutron Spectroscopy, Palau (Italy).
- May 1998                **Master Degree in Physics** at the University of Perugia (Italy).  
Final evaluation grade: 110/110 cum laude.  
Master thesis title: *Structural analysis of the conducting polymer poly(3-  
n-decylpyrrole) by means of neutron and x-ray diffraction.*

## Research interests

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My initial scientific activity was mainly focused on the microscopic dynamics of biological macromolecules and liquids of biological relevance. These interests have led me to broaden my studies to glasses and confined liquids, because of their profound dynamical similarities with biological systems. Most recently, following this scientific thread has taken me to another class of soft materials: smart thermoresponsive microgels, which are the subject of my latest results. My scientific activity has always been complemented by the parallel development of neutron spectroscopy instrumentation, which is particularly suited for this kind of investigations.

It is well known that proteins and enzymes can fulfill their biological functionality only if capable of moving. On the other hand, the presence of their natural solvent, the archetype of which is water, is needed to provide them with the flexibility necessary to activate the functional movements. Hence, understanding the mechanisms which rule the secrets of these molecules of life requires a detailed knowledge of the microscopic dynamics of the complex system composed of both the biomolecule and its surrounding solvent. Such a system displays a rich variety of movements occurring on timescales spanning several orders of magnitudes, from few milliseconds to fractions of picoseconds. Contrary to what common sense would suggest, fast picosecond fluctuations, developing on the length scale of interatomic distances, play a fundamental role with respect to functional activity. Within such dynamical range, a variety of *single-particle* diffusive movements of biological relevance take place, which are the subject of a vast, yet increasing literature. In addition, recent interest has been attracted by the existence, in the same dynamical window, of *coherent collective modes* propagating in liquids and in soft (biological) matter at THz frequencies. Such fast collective density fluctuations, whose existence is *per se* an interesting physical fact, are suggested to be responsible for transport phenomena involved in many vital biological processes, ranging from electron transfer to enzyme action. Such picosecond motions, of both single-particle and collective nature, have been the predominant subject of my research activity, in systems such as proteins, water under pressure and in confined geometry, complex liquids and glasses, and – most recently – PNIPAM microgels.

Neutron spectroscopy turns out to be an ideal tool for studying such kind of movements, not only because it covers the dynamical range of interest, but also because it is a non-destructive probe for samples as delicate as soft matter ones. In addition, the opportunity of exploiting contrast methods, offered by the very different neutron scattering lengths of hydrogen and deuterium, is of incomparable advantage in the study of abundantly hydrogenated organic compounds.

## Skills and Competences

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### Students Supervision

- Fixed-Term University Researchers
  1. M. Zanatta, *Simulation, prototype and optimization of a thermal neutron spectrometer for long-pulsed sources* (2015–2016).
- Post-Docs
  2. P. Tozzi, *Simulation and optimization of the optical elements for the time-of-flight spectrometer T-REX at the European Spallation Source* (2017–2019).
- PhD Students
  3. B. Rosi, *Fast dynamics of concentrated PNIPAM microgels* (2017–2020).
  4. F. Sebastiani, *Terahertz collective dynamics of bulk, hydration and intracellular water* (2009 – 2012).
  5. N. Violini, *High-frequency dynamics in vitreous GeSe<sub>2</sub>* (2008 – 2010, co-tutorship).
- Master Students
  6. A. D'Angelo, *Effects of co-solvency on PNIPAM dynamical transition* (2019).
  7. M. Saraceni, *A new stability indicator of the Atlantic Meridional Circulation* (2018, co-tutorship).
  8. A. Polidori, *Ion collective dynamics in liquid gold* (2012).
  9. F. Ferdeghini, *Vibrational dynamics of single- and double-walled imogolite nanotubes* (2012).
  10. F. Sebastiani, *Collective modes in DNA hydration water* (2008).
  11. G. Lorusso, *Coherent dynamics of hydration water in Ribonuclease A protein* (2007).
  12. N. Violini, *Neutron Brillouin spectroscopy in GeSe<sub>2</sub> glasses* (2007, co-tutorship).
- Bachelor Students
  13. Pietro Bovini, *Dynamics of water confined inside dense PNIPAM microgels* (2020).
  14. A. Mischianti, *Solid phases of Carbon* (2019).
  15. A. Bartoli Langeli, *Quantum processes in chlorophyll photosynthesis* (2019).
  16. A. Passeri, *High-frequency collective dynamics of water* (2018).
  17. F. Millucci, *Integer quantum Hall effect* (2018).
  18. R. Morbidini, *Low-frequency vibrational modes in Maltose Binding Protein* (2018).
  19. I. Mosca, *Dynamics of proteins embedded in matrices of modified bioprotective monosaccharides* (2018).
  20. C. Riccardizi, *Neutron diffraction in cultural heritage applications* (2017).
  21. A. Placidi, *Hall effect and transverse magnetoresistance* (2017).
  22. T. Righetti, *The solid phases of water* (2017).
  23. V. Libera, *Microscopic diffusion of water in oriented single-walled carbon nanotubes* (2016).
  24. S. D'Agrosa, *Electric guitar timber and new perspectives opened up by new materials* (2016, co-tutorship).
  25. V. Sposini, *DNA structure by X-ray diffraction* (2014).
  26. M. Soriente, *Effects of electron screening on phonons in metals* (2014).
  27. B. Rosi, *X-ray diffraction on FeRu alloys* (2014).
  28. F. Mugianesi, *Role of the dynamical transition in the biological functionality of proteins* (2014).
  29. F. Mariani, *Construction of a Cu(111) monochromator for the neutron spectrometer BRISP* (2005).
  30. M. Collura, *Reflectivity study and alignment of a matrix of HOPG(002) crystals for neutron applications* (2004).

## **Management and Project Coordination**

- Since 2015  
Italian Coordinator of the construction project for the time-of-flight spectrometer T-REX, as an in-kind contribution to the European Spallation Neutron Source (ESS, Lund, Sweden), in collaboration with Jülich Center for Neutron Science (Jülich, Germany).
- 2014 – 2015  
Italian Coordinator of the construction proposal for the time-of-flight spectrometer T-REX, as a possible in-kind contribution to the European Spallation Neutron Source (ESS, Lund, Sweden), in collaboration with Jülich Center for Neutron Science (Jülich, Germany).
- 2013 – 2014  
Project Manager of the construction proposal for the time-focusing spectrometer Tempus Fugit, as a possible in-kind contribution to the European Spallation Neutron Source (ESS, Lund, Sweden).
- 2011 – 2014  
Project Manager of the pre-construction study for the time-focusing spectrometer Tempus Fugit. Work Unit SD067IT (Time-Focusing Crystal-Chopper Spectrometer) for in-kind contribution to the European Spallation Source (ESS, Lund, Sweden).
- 2008 – 2013  
Co-Responsible of the IN4C spectrometer.
  - Users program and local contacting.
  - Renewal and improvement of the small-angle detector bank and related optics.
  - Software development for data analysis.
- 2010 – 2011  
National Coordinator of the “Neutron Devices and Technology” workgroup for the Italian contribution to the development of the new European Spallation Neutron Source (ESS).
- 2004 – 2005  
First responsible of the BRISP project during the final construction and commissioning phase.
  - Coordination and supervision of 3 post-docs, 1 engineer, 1 technician.
  - Management of budget and time-schedule.

## **Neutron Instrumentation**

- Crystal monochromators: assembling and mechanical alignment.
- Disk and Fermi choppers: installation and calibration.
- Bidimensional multi-beam collimators and other collimators for small-angle spectroscopy: development and construction.
- Software development for step motors control.

## **Experimental techniques and data processing**

- Neutron spectroscopy: time-of-flight, backscattering, three-axis.
- Neutron diffraction.
- Synchrotron-light inelastic scattering
- In-house x-ray diffraction.
- Lyophilisation, de-hydration and hydration techniques for organic and protein molecules.

- High pressures: diamond anvil cells for x-rays and laser light, piston cells (0-5 kbars) for neutron scattering.
- Calorimetry.
- Molecular dynamics simulations (DL-poly and DL-protein software packages).
- Software development for data analysis (Basic, Fortran, IDL)

### Languages

- Italian: native
- English: very good
- French: fluent

### Other activities

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Sep 2016	Director of the Advanced Summer School of the Italian Association for Neutron Scattering, Perugia (Italy).
2005 – 2013	Member of the Executive Committee of the Italian Association for Neutron Spectroscopy.
Sep 2007	Director of the Italian School of Neutron Spectroscopy, held in Sestri Levante (Italy) and Grenoble (France).
May 2007	Co-organizer of the international workshop <i>Proteins At Work 2007</i> , held in Perugia (Italy).



## Conferences

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### Invited oral contributions

- Jul 2019 *Picosecond Dynamics of highly-concentrated PNIPAM microgels*  
Frontiers in Water Biophysics, Erice (Italy).
- Jun 2019 *State of advancement of the T-REX spectrometer*  
Annual Meeting of the Italian Association for Neutron Spectroscopy, Roma (Italy).
- Jul 2018 *Dynamics of highly-concentrated PNIPAM microgels*  
Annual Meeting of the Italian Association for Neutron Spectroscopy, Parma (Italy).
- Oct 2017 *Hydration vs. bulk water: what we have learnt from high-frequency collective modes.*  
Annual Meeting of the Italian Association for Neutron Spectroscopy @FisMat2017, Trieste (Italy).
- Feb 2016 *Hydration vs. bulk water: what we have learnt from neutron Brillouin spectroscopy.*  
2<sup>nd</sup> International Workshop on Brillouin Scattering, Rome (Italy).
- May 2015 *Il movimento veloce e coordinato dell'acqua nelle biomolecole.*  
Conference on Water organized by the University of Perugia for Expo2015, Perugia (Italy).
- Sep 2014 *Tempus Fugit: a time-focusing spectrometer for ESS.*  
7<sup>th</sup> In-Kind Contributions Meeting for Neutron Science for the ESS (IKON-7), Lund (Sweden).
- Feb 2014 *Collective Modes and Vibrational Density of States of Hydration Water in Biomolecules of Increasing Complexity.*  
Conference on Neutron Scattering, Pune (India).
- Oct 2013 *Dynamics of lysozyme solvated by an effective amorphous bioprotectant.*  
Workshop on Stability of Amorphous Pharmaceuticals, Castiglioncello (Italy).
- Jun 2012 *Neutron Scattering in Optical Materials.*  
4<sup>th</sup> International Conference on Smart Materials Structures & Systems (CIMTEC 2012), Montecatini Terme (Italy).
- May 2012 *Collective Modes and Amorphous Dynamical Character of Hydration Water in Biomolecules.*  
20<sup>èmes</sup> Journées de la neutronique – Rencontres Rossat-Mignod, Seignosse (France).
- Sep 2011 *Collective Modes and Amorphous Dynamics of Hydration Water in Biomolecules.*  
33<sup>rd</sup> International Symposium on Dynamical Properties of Solids (DyProSo XXXIII), Aussois (France).
- Dec 2005 *The New Brillouin Spectrometer BRISP.*  
2<sup>nd</sup> Workshop on Inelastic Neutron Spectrometers (WINS 2005), Cairns (Australia).
- Jul 2005 *BRISP: A New Thermal-Neutron Spectrometer for Small-Angle Studies of Disordered Matter.*  
5<sup>th</sup> International Discussion Meeting on Relaxations in Complex Systems, Lille (France).
- Jun 2005 *BRISP: a technical overview.*  
First International Workshop on Neutron Brillouin Scattering, Perugia (Italy).

## Oral contributions

- Jul 2019 *Dynamics of highly-concentrated PNIPAM microgels*  
VII European Conference on Neutron Scattering, Saint Petersburg (Russia).
- Oct 2017 *T-REX: a bispectral chopper spectrometer for ESS.*  
Annual Meeting of the Italian Association for Neutron Spectroscopy @FisMat2017, Trieste (Italy).
- Sep 2017 *T-REX: Inelastic Neutron Scattering for magnetism.*  
5<sup>th</sup> Italian Conference on Magnetism, Assisi (Italy).
- Jul 2017 *Dynamics of highly-concentrated PNIPAM microgels.*  
11<sup>th</sup> International Conference on Neutron Scattering (ICNS 2017), Dae-jeon (Korea).
- Sep 2015 *Tempus Fugit, a parallel-beam time-focusing spectrometer for long-pulse and continuous neutron sources.*  
VI European Conference on Neutron Scattering, Zaragoza (Spain).
- Sep 2014 *Fast and slow dynamics of lysozyme solvated by an effective bioprotectant.*  
Joint EMLG and JMLG Conference, Rome (Italy).
- Sep 2013 *Status of the TFi project.*  
Workshop on “New science from time-focusing neutron spectroscopy at the ESS”, Taormina (Italy).
- Sep 2013 *Tempus Fugit: an Italian time-focusing spectrometer for ESS.*  
5<sup>th</sup> In-Kind Contributions Meeting for Neutron Science for the ESS (IKON-5), Lund (Sweden).
- Jul 2013 *Water structure and dynamics inside oriented single-walled carbon nanotubes.*  
7<sup>th</sup> International Discussion Meeting on Relaxations in Complex Systems, Barcelona (Spain).
- Nov 2012 *Picosecond Collective Modes and Amorphous Dynamics of Hydration Water in Biomolecules.*  
GDR LIquides Aux INterfaces (LIAIN 2012), Lyon (France).
- Sep 2012 *Collective Modes and Amorphous Dynamical Character of Hydration Water in Biomolecules.*  
Frontiers in Water Biophysics, Perugia (Italy).
- Feb 2012 *Tempus Fugit: time focusing at ESS.*  
2<sup>nd</sup> In-Kind Contributions Meeting for Neutron Science for the ESS (IKON-2), Malmö (Sweden).
- Jul 2011 *Collective Dynamics of Intracellular Water in Living Cells.*  
5<sup>th</sup> European Conference on Neutron Scattering (ENCS 2011), Prague (Czech Republic).
- Sep 2009 *Collective Modes and Amorphous Character of Hydration Water in Biomolecules.*  
6<sup>th</sup> International Discussion Meeting on Relaxations in Complex Systems, Roma (Italy).
- May 2008 *The BRISP spectrometer: working principles and first scientific achievements.*  
16<sup>èmes</sup> Journées de la neutronique – Rencontres Rossat-Mignod, Albé (France).
- Jun 2007 *Collective dynamics of Ribonuclease hydration water.*  
4<sup>th</sup> European Conference on Neutron Scattering, Lund (Sweden).
- Nov 2006 *First results about collective modes in Ribonuclease hydration water.*

CRS SOFT Meeting (CNR-INFN), Camerino (Italy).

- Jul 2006 *Experimental results during the commissioning phase of the new Brillouin Spectrometer BRISP.*  
Meeting of the Italian Association for Neutron Spectroscopy, Sirolo (Italy).
- Mar 2006 *First time-of-flight measurements with the new Brillouin spectrometer BRISP.*  
10<sup>th</sup> International Workshop on Disordered Systems, Molveno (Italy).
- Sep 2003 *Construction progress of the neutron scattering spectrometer BRISP.*  
INFN Unit Meeting, Perugia (Italy).
- Jun 2003 1) *Protein dynamics on the picosecond timescale as affected by the environment: a quasielastic neutron scattering study.*  
2) *The Thermal Neutron Scattering Spectrometer BRISP.*  
Meeting of the Italian Association for Neutron Spectroscopy, Genova (Italy).
- Jun 2002 *BRISP: a neutron Brillouin spectrometer*  
INFN Unit Meeting, Perugia (Italy).
- Oct 1999 *Structure of the conducting polymer poly(3-n-decylpyrrole).*  
Meeting of the Italian Association for Neutron Spectroscopy, Genova (Italy).

### Poster contributions

- Jul 2017 *T-REX: A Bispectral Chopper Spectrometer at the European Spallation Source.*  
11<sup>th</sup> International Conference on Neutron Scattering (ICNS 2017), Dae-jeon (Korea).
- Jul 2013 *Hydration water collective modes in biological systems of increasing complexity.*  
7<sup>th</sup> International Discussion Meeting on Relaxations in Complex Systems, Barcelona (Spain).
- Sep 2011 *Italian In-Kind Projects for ESS.*  
1<sup>st</sup> In-Kind Contributions Meeting for Neutron Science for the ESS (IKON-1), Lund (Sweden).
- Jul 2011 1) *Vibrational density of states measurements in disordered systems.*  
2) *Phonon Density of States and Search for Resonance in LaFeAsO<sub>0.85</sub>F<sub>0.15</sub>.*  
3) *The Time-of-Flight spectrometer for small-angle inelastic scattering Brisp.*  
4) *Low-momentum vibrational dynamics of Zr-Be metallic glasses.*  
5) *Studying collective modes in liquid Rb with rising temperature at the thermal neutron scattering spectrometer Brisp.*  
5<sup>th</sup> European Conference on Neutron Scattering (ENCS 2011), Prague (Czech Republic).
- May 2010 *Collective Dynamics of Intracellular Water in Living Bacteria.*  
Frontiers in Water Biophysics, Trieste (Italy).
- Jun 2009 *Collective Dynamics of Protein Hydration Water.*  
Annual Meeting of the Italian Association for Neutron Spectroscopy, Sirolo (Italy).
- Jul 2008 *Collective Dynamics of RNase Hydration Water by Brillouin Neutron Spectroscopy.*  
7<sup>th</sup> Liquid Matter Conference, Lund (Sweden).
- Dec 2005 *The Thermal Neutron Scattering Spectrometer BRISP.*  
8<sup>th</sup> International Conference on Neutron Scattering, Sydney (Australia).
- Jun 2005 *Self dynamics of hydrogen gas as probed by inelastic neutron scattering.*  
First International Workshop on Neutron Brillouin Scattering, Perugia (Italy).

- Jun 2005 *Co-doped  $Mg_{(1-x)}(AlLi)_xB_2$  compounds: a key system to probe the effect of interband-scattering.*  
MMD Matter, Materials and Devices Meeting 2005, Genova (Italy).
- Sep 2004 *Microscopic diffusion in liquid water under pressure.*  
QENS 2004, Arcachon (France).
- Sep 2003 1) *The thermal neutron scattering spectrometer BRISP.*  
2) *High-temperature dynamical transition in  $\beta$ -lactoglobulin.*  
3<sup>rd</sup> European Conference on Neutron Scattering, Montpellier (France).
- Jun 2003 *The Thermal Neutron Scattering Spectrometer BRISP.*  
INFMeeting 2003, Genova (Italy).
- Mar 2001 *Low-frequency vibrational anomalies in  $\beta$ -lactoglobulin: contribution of different hydrogen classes revealed by inelastic neutron scattering.*  
8<sup>th</sup> International Workshop on Disordered Systems, Andalo (Italy).
- Oct 2000 *Vibrational anomalies in  $\beta$ -lactoglobulin.*  
Annual Meeting of the Italian Association for Neutron Spectroscopy, Roma (Italy).
- Nov 1998 *Phonon softening in Tantalum above and below the superconducting transition temperature.*  
Annual Meeting of the Italian Association for Neutron Spectroscopy, Perugia (Italy).

## Publications

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### Peer Reviewed Publications

1. M. Zanatta, L. Tavagnacco, E. Buratti, E. Chiessi, F. Natali, M. Bertoldo, A. Orecchini, E. Zaccarelli, *Atomic scale investigation of the volume phase transition in concentrated PNIPAM microgels*, J. Chem. Phys., 152, 204904 (2020).
2. A. Paciaroni, L. Comez, M. Longo, F. Sebastiani, F. Bianchi, A. Orecchini, M. Zanatta, R. Verbeni, A. Bosak, F. Sacchetti, C. Petrillo, *Terahertz collective dynamics of DNA as affected by hydration and counterions*, J. Mol. Liq., 318 113956 (2020).
3. G. Monet et al., *Solid wetting-layers at inorganic nano-reactors: the water at imogolite nanotubes case*, Nanoscale Adv., 2,1869 (2020).
4. K. Andersen et al., *The instrument suite of the European Spallation Source*, Nuclear Inst. And Methods A, 957, 163402 (2020).
5. L. Tavagnacco, E. Chiessi, M. Zanatta, A. Orecchini, E. Zaccarelli, *Water-Polymer Coupling Induces a Dynamical Transition in Microgels*, J. Phys. Chem. Lett., 10, 870-876 (2019).
6. M. Zanatta, K. H. Andersen, P. P. Deen, A. Orecchini, A. Paciaroni, C. Petrillo, F. Sacchetti, *Disentangling time-focusing from beam divergence: A novel approach for high-flux thermal neutron spectroscopy at continuous and long-pulse sources*, 90, 095101 (2019).
7. M. Zanatta, L. Tavagnacco, E. Buratti, M. Bertoldo, F. Natali, E. Chiessi, A. Orecchini, E. Zaccarelli, *Evidence of a low-temperature dynamical transition in concentrated microgels*, Science Adv., 4, eaat5895 (2018).
8. W.-C. Pilgrim, D. Szubrin, F. Demmel, A. Orecchini, S. Rols, A. Laloni, A. De Francesco, *New perspectives onto the metal-to-non-metal transition in expanded liquids metals*, EPL 122, 36005 (2018).
9. C. Petrillo, P. Postorino, A. Orecchini, F. Sacchetti, *Search for the elusive magnetic state of hexagonal iron: The antiferromagnetic Fe<sub>71</sub>Ru<sub>29</sub> hcp alloy*, J. Mag. and Mag. Materials, 449, 552–557 (2018).
10. K. Niessen, M. Xu, A. Paciaroni, A. Orecchini, E. H. Snell, A. Markelz, *Moving in the Right Direction: Protein Vibrational Steering Function*, Biophys. J., 112, 933–942 (2017).
11. G. Syrykh, A. Orecchini, A. de Francesco, A. Laloni, and A. Stoliarov, *Search for Acoustic and Optic Vibrational Modes in Zr<sub>40</sub>Be<sub>60</sub> Metallic Glass*, JETP Letters, 105, 8, 488–491 (2017).
12. M. Zanatta et al., *A high-flux upgrade for the BRISP spectrometer at ILL*, Rev. Sci. Instrum., 88, 053905 (2017).
13. S. Mitra, V.K. Sharma, V. Garcia Sakai, M. Johnson, A. Orecchini, R. Mukhopadhyay, *Dynamics of Catanionic Vesicles: Effect of Multilamellar to Unilamellar Transition*, J. Phys. Chem. B, 120, 3777–3784 (2016).
14. M. Zanatta, A. Orecchini, S. Aisa, F. Casinini, P. P. Deen, L. Farnesini, A. Paciaroni, C. Petrillo, F. Sacchetti, *A large-area double rotating-crystal monochromator for time-focusing neutron instruments*, J. Phys.: Conf. Ser., 012002, 746 (2016).
15. G. Schirò, Y. Fichou, F.-X. Gallat., K. Wood, F. Gabel, M. Moulin, M. Härtlein, M. Heyden, J.-P. Colletier, A. Orecchini, A. Paciaroni, J. Wuttke, D. J. Tobias and M. Weik, *Translational diffusion of hydration water correlates with functional motions in folded and intrinsically disordered proteins*, Nature Commun., 6, 6490 (2015).

16. M. Zanatta, F. Sacchetti, E. Guarini, A. Orecchini, A. Paciaroni, L. Sani and C. Petrillo, *Collective Ion Dynamics in Liquid Zinc: Evidence for Complex Dynamics in a Non-Free-Electron Liquid Metal*, Phys. Rev. Lett., 114, 187801 (2015).
17. D. Colognesi, U. Bafile, M. Celli, M. Neumann and A. Orecchini, *Hydrogen self-dynamics in liquid H<sub>2</sub>-D<sub>2</sub> mixtures studied through inelastic neutron scattering*, Phys. Rev. E, 92, 012311 (2015).
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