

Curriculum Vitae

Giovanni Romanelli, Ph.D.

Name	Giovanni Romanelli
Place and date of birth	Firenze, Italia – June 20 th , 1985
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Overview

I am an experimental physicist in the field of chemical physics and materials science, with a background in experimental and theoretical nuclear physics. My research interests include the adsorption and catalysis of molecular hydrogen in porous materials, the study of nuclear and molecular dynamics in hydrogen-bonded systems; the measurement of thermal neutron cross sections, and the development of neutron and γ -ray detection strategies and instrumentation.

Since 2015 I have been instrument scientist at the ISIS Neutron & Muon Source of the Science & Technology Facilities Council (UK), as responsible for the VESUVIO neutron spectrometer in the Molecular Spectroscopy Group. ISIS is research centre where the international community tackles physical-chemistry and applied-physics challenges.

In recent years I have supervised several M.Sc and Ph.D students with theses about neutron spectroscopy, and since 2016 I am responsible for the practicals at the ISIS Facility for master students from the *Università degli Studi di Roma Tor Vergata*. Since 2011 I have participated in scientific outreach within the *Associazione Scienzimpresa*, and since 2016 I have been responsible for the organisation of the ISIS Student Meeting, an international biannual event for Ph.D students working on neutron scattering.

Education

- **Ph.D degree in physics** cum Laude (27 February 2015), at the Università degli Studi di Roma Tor Vergata. Thesis *on the quantum contributions to phase transitions in water probed by inelastic neutron scattering* with Prof C. Andreani and Prof. R. Senesi;
- **M.Sc degree in physics** cum Laude (27 May 2011), at the Università degli Studi di Roma Tor Vergata. Thesis in: *Pion Tensor Generalized Parton Distributions in a covariant constituent quark model* with Prof. E. Pace.

Professional experience

- **Instrument Scientist** (07/09/2015 – present), on the VESUVIO spectrometer in the Molecular Spectroscopy Group, at the ISIS Neutron & Muon Source, Rutherford Appleton Laboratory (UK);
- **Post-doctoral position** (01/09/2014 – 01/09/2015) at the ISIS Facility, Rutherford Appleton Laboratory (UK) and within the PANAREA project, on the development of techniques for electron-volt neutron spectroscopy with applications across the chemical and physical sciences;
- **Visiting student** at the Oak Ridge National Laboratory (January – March 2014) for experiments on hydrogen dynamics in fuel cells and in the supercritical phase of water, using quasi-elastic and inelastic neutron scattering;
- **Visiting student** at the Rutherford Appleton Laboratory, for a total period of 4 months, investigating the hydrogen and oxygen dynamics in water as a function of temperature, pressure, and environment, using inelastic neutron scattering;
- **Research grant** (01/09/2012 – 01/09/2014), on *Neutron Imaging on Cultural-Heritage materials*, at the NAST Center, Università degli Studi di Roma Tor Vergata;

Selected publications

- **G. Romanelli**, T. Minniti, G. Škoro, M. Krzystyniak, J. D. Taylor, D. Fornalski, and F. Fernandez-Alonso, “Visualisation of the Catalysed Nuclear-Spin Conversion of Molecular Hydrogen Using Energy-Selective Neutron Imaging”, *J. Phys. Chem. C*, **123**, 18, 11745–11751 (2019);
- C. Andreani, M. Krzystyniak, **G. Romanelli**, R. Senesi, and F. Fernandez-Alonso, “Electron-volt neutron spectroscopy: beyond fundamental systems”, *Advances in Physics*, 1–73 (2017);
- **G. Romanelli**, M. Ceriotti, D. E. Manolopoulos, C. Pantalei, R. Senesi, and C. Andreani, “Direct measurement of competing quantum effects on the kinetic energy of heavy water upon melting”, *J. Phys. Chem. Lett.*, **4**, 19, 3251–3256 (2013).

Teaching activities

- Responsibility and supervision (2016 – present) of the experimental activities at the ISIS Facility as part of the master course of laboratory of condensed-matter physics (Prof. R. Senesi, Università degli Studi di Roma Tor Vergata);
- Co-supervisor for the Ph.D thesis in Physics (2018 – presente) of Dalila Onorati (supervisor: Prof. R. Senesi) at the Università degli Studi di Roma Tor Vergata;

- Co-supervisor for the Ph.D thesis in Materials for Health, Energy, Environment (2018 – presente) of Pierfrancesco Ulpiani (supervisor: Prof. C. Andreani) at the Università degli Studi di Roma Tor Vergata;
- Co-supervisor for the M.Sc thesis in Physics (2018 – 2019) of Alex Di Giulio (supervisor: Prof. R. Senesi) at the Università degli Studi di Roma Tor Vergata, with title of the thesis: *Simulation of the VESUVIO eV neutron spectrometer using Monte Carlo transport codes*;
- Co-supervisor for the M.Sc thesis in Physics (2017 – 2018) of Pierfrancesco Ulpiani (supervisor: Prof. R. Senesi) at the Università degli Studi di Roma Tor Vergata, with title of the thesis: *Inelastic neutron scattering at eV energies with enhanced counting statistics and noise reduction*;

Talks at recent international conferences

- **Invited talk** at the *Engineering Neutron User Meeting 2019*, Abingdon, 24 – 25 September 2019, titled: “Visualization of the Catalyzed Nuclear-Spin Conversion of Molecular Hydrogen Using Energy-Selective Neutron Imaging”;
- **Invited lecture** at the *Erice school on “Neutron Science and Instrumentation”*, Erice, 4–13 July 2018, titled: “Electron-Volt Neutron Spectroscopy”;
- **Invited lecture** at the *New Materials for a Better life! 2017 Workshop*, Bilbao, 27 October 2017, titled: “Neutron Spectroscopy”
- **Talk** at the *International Collaboration on Advanced Neutron Sources XXII*, Oxford, 29 March 2017, titled “Robust measurement of para-ortho H₂ ratios to characterise the ISIS hydrogen moderators”;
- **Talk** at the *Neutrons and Global Challenges I: Energy and Environment*, London, 16 December 2016, titled: “Mass-selective neutron spectroscopy to investigate nuclear quantum effects”;
- **Invited talk** at the *International Workshop on the Structure and Dynamics of Supercooled Water and Other Glassy Materials*, Palermo, 10 – 13 October 2015, titled: “Evolution of Hydrogen Dynamics in Amorphous Ice with Density”;
- **Invited talk** at the *Workshop on Water at the Interface between Biology, Chemistry, Physics and Material Sciences*, Trieste – ICTP, 5 – 9 October 2015, titled: “Evolution of Hydrogen Dynamics in Amorphous Ice with Density”;
- **Talk** at the *VI Workshop in Electron Volt Neutron Spectroscopy: Frontiers and Horizons*, Abingdon, 21 – 22 January 2014, titled: “Direct Measurement of Competing Quantum Effects on the Kinetic Energy of Heavy Water Upon Melting”;

Journal editor and reviewer

- Guest editor, with Dr Giulia Festa and Dr Matthew Krzystyniak, of the volume 1055 titled “VII International Workshop on Electron Volt Neutron Spectroscopy” published in 2018 in the “Journal of Physics: Conference Series”, included in the SCOPUS e WOS databases;
- Reviewer (2012 – presente) in scientific journals including: AIP Advances; Surface Science; Physica Scripta; Journal of Physics: Conference Series; Journal of Physics Communications.
- Editor of “Good Vibrations”, the newsletter of the Molecular Spectroscopy User Group at ISIS (2014 – 2019);

Organisation of conferences and meetings

- *UK neutron and muon science and user meeting*, Warwick, 2016 – 2019;
- *ISIS Student Meeting*, Abingdon, 2016 – 2019;
- *VII International Workshop on Electron-Volt Neutron Spectroscopy*, Roma, 7 – 8 November 2017.
- *Molecular Spectroscopy Science Meeting*, Abingdon, 9 – 10 November 2016.

Computer skills

- **Programming:** Fortran, C++, python, Java, HTML.
- **Data analysis:** Root, Mantid, Materials Studio, Mathematica, Excel, Origin.
- **Simulation software:** CASTEP, FLUKA, GEANT-4.
- **Editing and graphics:** L^AT_EX, Office, Prezi, Articulate, Blender, GLE-Graphics, GIMP, Inkscape.

Language skills

- Italian: native language;
- English: fluent speaking, reading, and writing;
- French: good reading; basic speaking and writing.

Complete list of peer-reviewed articles

53. S. C. Capelli and **G. Romanelli**, “An effective hydrogen scattering cross section for time-of-flight neutron experiments with simple organic molecules”, *J. Appl. Cryst.*, 52 (2019);
52. P. Ulpiani, **G. Romanelli**, D. Onorati, A. Parmentier, G. Festa, E. Schooneveld, C. Cazzaniga, L. Arcidiacono, C. Andreani, and R. Senesi, “Optimization of detection strategies for epithermal neutron spectroscopy using photon-sensitive detectors”, *Rev. Sci. Instrum.*, 90, 073901 (2019);
51. **G. Romanelli**, T. Minniti, G. Škoro, M. Krzystyniak, J. D. Taylor, D. Fornalski, and F. Fernandez-Alonso, “Visualisation of the Catalysed Nuclear-Spin Conversion of Molecular Hydrogen Using Energy-Selective Neutron Imaging”, *J. Phys. Chem. C*, **123**, 18, 11745–11751 (2019);
50. M. Krzystyniak, **G. Romanelli**, F. Fernandez-Alonso, “Non-destructive quantitation of hydrogen via mass-resolved neutron spectroscopy”, *Analyst* (2019);
49. L. A. Rodríguez Palomino, J. Dawidowski, C. Helman, J. I. Márquez Damián, **G. Romanelli**, M. Krzystyniak, S. Rudić, and G. J. Cuello, “Determination of the scattering cross section of calcium using the VESUVIO spectrometer”, *Nucl. Inst. Meth. Phys. Res. A*, 927, 443-450 (2019);
48. C. Andreani, C. Corsaro, D. Mallamace, **G. Romanelli**, R. Senesi, F. Mallamace, “The onset of the tetrabonded structure in liquid water”, *Science China Physics, Mechanics & Astronomy*, 62, 107008 (2019);
47. V. De Michele, **G. Romanelli**, A. Cupane, “Kinetic energy and radial momentum distribution of hydrogen and oxygen atoms of water confined in silica hydrogel in the temperature interval 170 – 325 K”, *Science China Physics, Mechanics & Astronomy*, 62, 107012 (2019);
46. **G. Romanelli**, S. Rudić, M. Zanetti, C. Andreani, F. Fernandez-Alonso, G. Gorini, M. Krzystyniak, and G. Škoro, “Measurement of the para-hydrogen concentration in the ISIS moderators using neutron transmission and thermal conductivity”, *Nucl. Inst. Meth. Phys. Res. A*, **888** 88 – 95 (2018);
45. C. Andreani, R. Senesi, M. Krzystyniak, **G. Romanelli**, F. Fernandez-Alonso, “Experimental studies of nuclear quantum effects in condensed matter: the case of water”, *Riv. Nuovo Cimento*, 291 – 340 (2018);
44. M. Krzystyniak, **G. Romanelli**, R. Tolchenov, M. Gigg, B. Hewer, and F. Fernandez-Alonso, “Nuclear kinetic energies from final-state effects in the harmonic limit”, *J. Phys.: Conf. Ser.*, **1055** 012011 (2018);
43. A. I. Kolesnikov, G. F. Reiter, T. R. Prisk, M. Krzystyniak, **G. Romanelli**, D. J. Wesolowski, L. M. Anovitz, “Inelastic and deep inelastic neutron spectroscopy of water molecules under ultra-confinement”, *J. Phys.: Conf. Ser.*, **1055** 012002 (2018);
42. M. Krzystyniak, M. J. Gutmann, **G. Romanelli**, Y. Trenikhina, A. Romanenko, F. Fernandez-Alonso, “Nitrogen doping and the performance of superconducting radio-frequency niobium cavities: insights from neutron diffraction and neutron Compton scattering”, *J. Phys.: Conf. Ser.*, **1055** 012006 (2018);
41. **G. Romanelli**, B. Hewer, M. Krzystyniak, M. Gigg, R. Tolchenov, S. Mukhopadhyay, F. Fernandez-Alonso, “Data analysis of neutron Compton scattering experiments using MANTID”, *J. Phys.: Conf. Ser.*, **1055** 012016 (2018);
40. **G. Romanelli**, M. Krzystyniak, G. Festa, C. Andreani, F. Fernandez-Alonso, R. Senesi, “The road to a station for epithermal and thermal neutron analysis”, *J. Phys.: Conf. Ser.*, **1055** 012017 (2018);

39. A. Di Giulio, M. Zanetti, **G. Romanelli**, M. Krzystyniak, R. Senesi, F. Fernandez-Alonso, “A McStas simulation of the incident neutron beam on the VESUVIO spectrometer”, *J. Phys.: Conf. Ser.*, **1055** 012014 (2018);
38. P. Ulpiani, **G. Romanelli**, L. Arcidiacono, D. Onorati, G. Festa, M. Krzystyniak, E. Schooneveld, F. Fernandez-Alonso, C. Andreani, R. Senesi, “Enhancement of counting statistics and noise reduction in the forward-scattering detectors on the VESUVIO spectrometer”, *J. Phys.: Conf. Ser.*, **1055** 012008 (2018);
37. **G. Romanelli**, M. Krzystyniak, F. Fernandez-Alonso, “Neutron-resonance capture analysis on the VESUVIO spectrometer: Towards high-throughput material characterisation”, *J. Phys.: Conf. Ser.*, **1055** 012015 (2018);
36. K. Druzbicki, M. Krzystyniak, D. Hollas, V. Kapil, P. Slavíček, **G. Romanelli**, F. Fernandez-Alonso, “Hydrogen dynamics in solid formic acid: insights from simulations with quantum colored-noise thermostats”, *J. Phys.: Conf. Ser.*, **1055** 012003 (2018);
35. **G. Romanelli**, G. Festa, M. Krzystyniak, C. Andreani, F. Fernandez-Alonso, R. Senesi, “Neutrons matter: VII international workshop on electron-Volt neutron spectroscopy—A preface to the workshop proceedings”, *J. Phys.: Conf. Ser.*, **1055** 011001 (2018);
34. M. Krzystyniak, **G. Romanelli**, K. Druzbicki, R. Tolchenov, M. Gigg, B. Hewer, F. Fernandez-Alonso, “Model selection in neutron Compton scattering—a Bayesian approach with physical constraints”, *J. Phys.: Conf. Ser.*, **1055** 012012 (2018);
33. D. Onorati, C. Andreani, L. Arcidiacono, F. Fernandez-Alonso, G. Festa, M. Krzystyniak, **G. Romanelli**, P. Ulpiani, R. Senesi, “Gamma background characterization on VESUVIO: before and after the moderator upgrade”, *J. Phys.: Conf. Ser.*, **1055** 012009 (2018);
32. J. Armstrong, M. Krzystyniak, **G. Romanelli**, S. F. Parker, K. Druzbicki, F. Fernandez-Alonso, “Fractal dimension as a scaling law for nuclear quantum effects: a neutron Compton scattering study on carbon allotropes”, *J. Phys.: Conf. Ser.*, **1055** 012007 (2018);
31. J. Dawidowski, L. A. Rodríguez Palomino, **G. Romanelli**, M. Krzystyniak, “Procedure for the determination of effective temperatures employing VESUVIO spectrometer”, *J. Phys.: Conf. Ser.*, **1055** 012013 (2018);
30. A. Parmentier, L. Arcidiacono, R. Senesi, **G. Romanelli**, C. Andreani, J. Moir, G. Festa, “Absolute efficiency calibration of a coaxial HPGe detector for quantitative PGAA and T-PGAA”, *J. Phys.: Conf. Ser.*, **1055** 012010 (2018);
29. M. Krzystyniak, G. Syrykh, A. Stolyarov, R. A. Sadykov, J. Armstrong, I. da Silva, **G. Romanelli**, F. Fernandez-Alonso, “Mass-selective neutron spectroscopy of glassy versus polycrystalline structures in binary mixtures of beryllium and zirconium”, *J. Phys.: Conf. Ser.*, **1055** 012004 (2018);
28. **G. Romanelli**, S. Rudic, M. Krzystyniak, F. Fernandez-Alonso, D. Fornalski, M. Kibble, C. Goodway, J. Bones, M. Probert, and G. Škoro, “Robust measurement of para-ortho H₂ ratios to characterise the ISIS hydrogen moderators”, *J. Phys.: Conf. Ser.* **1021** 012055 (2018);
27. M. Krzystyniak, **G. Romanelli**, M. Fabian, M. J. Gutmann, G. Festa, L. Arcidiacono, M. Gigg, K. Druzbicki, C. Andreani, R. Senesi, and F. Fernandez-Alonso, “VESUVIO+: The Current Testbed for a Next-generation Epithermal Neutron Spectrometer”, *J. Phys.: Conf. Ser.* **1021** 012026 (2018);
26. G. Škoro, R. Bewley, S. Lilley, R. Ewings, **G. Romanelli**, M. J. Gutmann, R. Smith, S. Rudic, and S. Ansell, “A tale of two foils: ISIS TS-1 water moderators”, *J. Phys.: Conf. Ser.* **1021** 012039 (2018);

25. M. Probert, G. Škoro, S. Rudic, **G. Romanelli**, R. Bewley, S. King, D. Haynes, J. Webster, F. Fernandez-Alonso, and M. Krzystyniak, “Spin isomers in the ISIS TS1 cryogenic hydrogen moderator”, *J. Phys.: Conf. Ser.* **1021** 012057 (2018);
24. L. A. Rodríguez Palomino, J. Dawidowski, J. I. Márquez Damián, G. J. Cuello, **G. Romanelli**, and M. Krzystyniak, “Neutron total cross-section of hydrogenous and deuterated 1-and 2-propanol and n-butanol measured using the VESUVIO spectrometer”, *Nucl. Inst. Meth. Phys. Res. A*, **870** 84–89 (2017);
23. **G. Romanelli**, M. Krzystyniak, R. Senesi, D. Raspino, J. Boxall, D. Pooley, S. Moorby, E. Schooneveld, N. J. Rhodes, C. Andreani, and F. Fernandez-Alonso, “Characterisation of the incident beam and current diffraction capabilities on the VESUVIO spectrometer”, *Meas. Sci. Tech.* **28** 9 095501 (2017);
22. V. De Michele, **G. Romanelli**, and A. Cupane, “Dynamics of supercooled confined water measured by deep inelastic neutron scattering”, *Frontiers of Physics*, **13** 1 138205 (2017);
21. A. Parmentier, C. Andreani, **G. Romanelli**, J. J. Shephard, C. G. Salzmänn, and R. Senesi, “Hydrogen mean force and anharmonicity in polycrystalline and amorphous ice”, *Frontiers of Physics*, **13** 1 (2017);
20. G. F. Syrykh, A. A. Stolyarov, M. Krzystyniak, **G. Romanelli**, R. A. Sadykov, “The temperature dependence of the kinetic energy in the amorphous alloy Zr₄₀Be₆₀”, *JETP Letters*, 1–4 (2017);
19. C. Andreani, M. Krzystyniak, **G. Romanelli**, R. Senesi, and F. Fernandez-Alonso, “Electron-volt neutron spectroscopy: beyond fundamental systems”, *Advances in Physics*, 1–73 (2017);
18. M. Krzystyniak, K. Druźbicki, **G. Romanelli**, M. J. Gutmann, S. Rudic, S. Imberti, and F. Fernandez-Alonso, “Nuclear dynamics and phase polymorphism in solid formic acid”, *Phys. Chem. Chem. Phys.* **19** 13 9064-9074 (2017);
17. **G. Romanelli**, S. Rudic, C. G. Salzmänn, R. Senesi, and F. Fernandez-Alonso, “Molecular Spectroscopy Science Meeting—MSSM2016 ”, *Neutron News* (2017);
16. C. Andreani, R. Senesi, M. Krzystyniak, **G. Romanelli**, and F. Fernandez-Alonso, “Atomic Quantum Dynamics in Materials Research”, *book chapter in Neutron Scattering - Applications in Biology, Chemistry, and Materials Science. Experimental Methods in the Physical Sciences* **49** edited by F. Fernandez-Alonso, DL Price, chapter 7, 403–457, Elsevier, (2017);
15. **G. Romanelli**, A. Liscio, R. Senesi, R. Zamboni, E. Treossi, F. Liscio, G. Giambastiani, V. Palermo, F. Fernandez-Alonso, and C. Andreani, “Soft confinement of water in graphene-oxide membranes”, *Carbon*, **108** 199–203 (2016);
14. C. Andreani, **G. Romanelli**, and R. Senesi, “Direct measurements of quantum kinetic energy tensor in stable and metastable water near the triple point: an experimental benchmark”, *J. Phys. Chem. Lett.*, **7** 12 2216-2220 (2016);
13. **G. Romanelli** and M. Krzystyniak, “On the line-shape analysis of Compton profiles and its application to neutron scattering”, *Nucl. Inst. Meth. Phys. Res. A*, **819** 84–88 (2016);
12. C. Fanelli, E. Pace, **G. Romanelli**, G. Salmè, and M. Salmistraro, “Pion generalized parton distributions within a fully covariant constituent quark model”, *Eur. Phys. J. C*, **76** 5 253 (2016);
11. A. Parmentier, J. J. Shephard, **G. Romanelli**, R. Senesi, C. G. Salzmänn, and C. Andreani, “Evolution of Hydrogen dynamics in amorphous ice with density”, *J. Phys. Chem. Lett.*, **6**, 11 2038–2042 (2015);

10. **G. Romanelli**, R. Senesi, X. Zhang, K. P. Loh, and C. Andreani, “Probing the effects of 2D confinement on hydrogen dynamics in water and ice adsorbed in graphene oxide sponges”, *Phys. Chem. Chem. Phys.*, **17** 47 31680-31684 (2015);
9. **G. Romanelli**, “On the quantum contributions to phase transitions in Water probed by inelastic neutron scattering”, *Ph.D Thesis*, <http://purl.org/net/epubs/work/12422430> (2015);
8. C. Andreani *et al.*, “Discussion: Nuclear quantum dynamics - Protons and beyondn”, *J. Phys: Conf. Ser.*, **571** 012004 (2014);
7. **G. Romanelli**, F. Fernandez-Alonso, and C. Andreani, “The harmonic picture of nuclear mean kinetic energies in heavy water”, *J. Phys: Conf. Ser.*, **571** 12003–12009 (2014).
6. C. Andreani, **G. Romanelli**, and R. Senesi, “A combined INS and DINS study of proton quantum dynamics of ice and water across the triple point and in the supercritical phase”, *Chem. Phys.*, **427** 106–110 (2013);
5. R. Senesi, **G. Romanelli**, M. Adams, and C. Andreani, “Temperature dependence of the zero point kinetic energy in ice and water above room temperature”, *Chem. Phys.*, **427** 111–116 (2013);
4. **G. Romanelli**, M. Ceriotti, D. E. Manolopoulos, C. Pantalei, R. Senesi, and C. Andreani, “Direct measurement of competing quantum effects on the kinetic energy of heavy water upon melting”, *J. Phys. Chem. Lett.*, **4**, 19 3251–3256 (2013);
3. R. Senesi, D. Flammini, **G. Romanelli** and C. Andreani, “From neutron Compton profiles to momentum distribution: Assessment of direct numerical determination”, *Nucl. Inst. Meth. Phys. Res. A*, **704** 36–39 (2013);
2. G. Salmè, E. Pace and **G. Romanelli**, “Exploring the Pion phenomenology within a fully covariant constituent quark model”, *Few-Body Systems*, **54** 5–6 769–777 (2013);
1. E. Pace, **G. Romanelli** and G. Salmè, “Tensor generalized parton distributions in a covariant constituent quark model”, *Few-Body Systems*, **52** 3–4 301–306 (2012);

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