Curriculum Vitae Professor Dr Àngel Rubio

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Name: **Ángel Rubio**
Born: **27 September 1965**

Research Priorities: Ultrafast phenomena in molecular and condensed systems, time-dependent functional theory for quantum electrodynamics, characterizing new non-equilibrium states of matter.

Angel Rubio is a Spanish physicist. He develops theoretical instruments that both aid in the study of electronical reactions of materials and molecules as well as in the prediction of non-equilibrium phases of matter. He is known for his highly impactful works and leadership in computational solid-state physics, predicting novel materials properties at the nanometer scale, and, more recently, new non-equilibrium phases of matter, opening the fields of cavity materials engineering and QED-polaritonic chemistry. He is considered a pioneer of computer-aided material science and is one of the founders of modern theoretical spectroscopy.

Academic and Professional Career

since 2019	Co-Director, Max-Planck-New York City Center for Non-equilibrium Quantum Phenomena, New York City, USA
since 2017	Distinguished Research Scientist, Center for Computational Quantum Physics (CCQ), Flatiron Institute, Simons Foundation, New York City, USA
since 2017	Distinguished Honorary Professor, Condensed Matter Physics, Universidad del País Vasco UPV/EHU, San Sebastián, Spain
since 2016	Professor, Universität Hamburg (UHH), Hamburg, Germany
since 2014	Director and Scientific Member, Max-Planck-Institute for the Structure and Dynamics of Matter (MPSD), Hamburg, Germany (Managing Director from 2016-2019 and since 2022)
2014	Miller Guest Professor, University of California, Berkeley (UC Berkeley), Berkeley, USA

2009 - 2011	Distinguished Visiting Scientist, Fritz Haber Institute, Max-Planck Society (MPG), Berlin, Germany
2007	Professor, Université de Montpellier 2, Montpellier, France
2006 - 2006	Humboldt-Professor, Freie Universität (FU) Berlin, Berlin, Germany
2001 - 2014	Professor for Condensed Matter Physics and Director, Group “Nano-Bio Spectroscopy”, Universidad del País Vasco UPV/EHU, San Sebastián, Spain
2000 - 2001	Professor, Laboratoire des Solides Irradié, École Polytechnique, Palaiseau, France
1994 - 2001	Associate Professor, Section “Física Teórica, Atomica y Nuclear”, Universidad de Valladolid, Valladolid, Spain
1992 - 1993	Fulbright Fellow, Department of Physics, UC Berkeley, Berkeley, USA
1988 - 1992	Research Fellow, Ministerio de Educación y Ciencia, Universidad Valladolid, Valladolid, Spain
1991	PhD in Physics, Universidad de Valladolid, Valladolid, Spain
1988	BSc in Physics, Universidad de Valladolid, Valladolid, Spain

Functions in Scientific Societies and Committees

2019 - 2023	Member, Scientific Advisory Board, Focus Area “Information”, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
since 2017	Co-Editor, Proceedings of the National Academy of Sciences (PNAS)
2017 - 2023	Co-Editor, NanoLetters ACS
since 2015	Member, Faculty, Wolfgang Pauli Centre, Hamburg, Germany
2012 - 2014	Vice-President for Scientific Development, European Theoretical Spectroscopy Facility (ETSF)
2008 - 2014	Co-Founder and Chair, ETSF

Project Coordination and Membership in Collaborative Research Projects

2019 - 2025	Participating Researcher, Cluster of Excellence (EXC) 2056 “CUI: Advanced Imaging of Matter (AIM)”, German Research Council (DFG), Germany
2019 - 2023	Chair, Subproject “Ultrafast stabilization mediated by electronic correlations”, Collaborative Research Center (SFB) 925, DFG, Germany
2018 - 2021	Participating Researcher, Transnational Research Project “ERA-NET: Cofund in Quantum Technologies”, QuanTERA, Federal Ministry of Education and Research, Germany

2017 - 2019	Participating Researcher, Graduate School “Quantum Mechanical Materials Modelling – QM3“, DFG, Germany
2016 - 2021	Coordinator and Principal Investigator, Advanced Grant „QSpec-NewMat”, European Research Council (ERC)
2015 - 2018	Participating Researcher, Center of Excellence “The Novel Materials Discovery (NoMaD)“, Horizon 2020 Research and Innovation Programme, European Union (EU)
2011 - 2016	Coordinator and Principal Investigator, Advanced Grant „DYNamo”, ERC

Honours and Awarded Memberships

2023	Premio Nacional de Investigación Blas Cabrera, Spain
since 2023	Member, German National Academy of Sciences Leopoldina, Germany
since 2022	Member, Berlin-Brandenburg Academy of Science (BBAW), Germany
2022	Alumni UvA de Honor, Universidad de Valladolid, Spain
2022	Highly Cited Researcher, Web of Science, Clarivate Analytics, London, UK
2021	Member, European Physical Society (EPS)
2020	Member, European Academy of Sciences
2018	Max-Born Award and Medal, German Physical Society (DPG), Germany, and Institute of Physics (IOP), London, UK
since 2016	Member, Academia Europaea
2016	Gold Medal, Spanish Royal Physics Society, Spain
since 2014	Foreign Associate Member, National Academy of Sciences (NAS), USA
2014	Premio Jaime I de Investigación Básica, Spain
2010	Fellow, American Association for Advanced Science (AAAS), USA
2004	Member, American Physical Society (APS), USA

Research Priorities

Angel Rubio is a Spanish physicist. He develops theoretical instruments that both aid in the study of electronical reactions of materials and molecules as well as in the prediction of non-equilibrium phases of matter. He is known for his highly impactful works and leadership in computational solid-state physics, predicting novel materials properties at the nanometer scale, and, more recently, new non-equilibrium phases of matter, opening the fields of cavity materials engineering and QED-

polaritonic chemistry. He is considered a pioneer of computer-aided material science and is one of the founders of modern theoretical spectroscopy.

Angel Rubio research focuses on the modelling and theory of the electronical and structural properties of condensed matter. He develops theoretical instruments that underpin the study of electronical reactions of materials and molecules as well as the prediction of non-equilibrium phases of matter. He is considered a pioneer of computer-aided material science and is one of the founders of modern theoretical spectroscopy. The instruments he developed make it possible to calculate the electronic excitation of materials and nanostructures. Rubio and his group are the originators and developers of the widely used ab initio computational materials research open-source project octopus http://www.tddft.org) that simulates the non-equilibrium dynamics of quantum matter under the influence of arbitrary time-dependent fields.

Rubio's findings on computational solid-state physics embrace the modification of the molecular chemical landscape and reactivity by coupling molecules to quantum cavity vacuum fluctuations (polaritonic chemistry). He developed and established the theoretical framework for "Quantum-Electrodynamic Density Functional Theory (QEDFT)". This theory is used to describe strong light-matter phenomena in chemistry and material science. It is a generalisation of time-dependent Density Functional Theory (DFT) that explicitly treats time-dependent interactions of protons and electrons. His theories provide novel insights on the changes of the molecular chemical landscape and its reactivity by coupling molecules to vacuum fluctuations in quantum cavities. This allows for the prediction and description of newly emerging material states.

Angel Rubio also accomplished breakthrough work on composite nanotubes, new light-driven collective phenomena in solids, theoretical spectroscopy and its applications to quantum materials, Floquet and cavity materials engineering and moiré quantum simulators. He worked on the theory of the electronic structure of low-dimensional systems, molecular compounds, and clusters – most notably of carbon and boron-carbon-nitrogen nanostructures.