ABBREVIATED CURRICULUM VITAE

Héctor Jorge Sánchez



PERSONAL DATA

- Name:
- Date of Birth: October ,1 1961
- Place of Birth: Córdoba, Argentina

ACADEMIC POSITION

• Full Professor (permanent position). Faculty of Mathematics Astronomy and Physics, National University of Córdoba, Córdoba, Argentina

RESEARCHER POSITION

• Principal Researcher (permanent position), National Council of Scientific and Technologic Research, Argentina.

ACADEMIC QUALIFICATIONS

- 1980: Designer Technician (Secondary School), Salesian Technical Institute, Córdoba, Argentina
- 1988: Bachelor in Physics National University of Córdoba, Córdoba, Argentina
- 1993: Ph.D. in Physics National University of Córdoba, Córdoba, Argentina

TEACHING ACTIVITIES

- At the Faculty of Mathematics Astronomy and Physics (National University of Córdoba)
 - 1986-1987 Undergraduate Teacher Assistant,
 - 1988-1990 Teacher Assistant
 - 1992-1994 Senior Teacher Assistant
 - 1995-2000 Adjunct Professor
 - 2000- 2008 Associate Professor
 - 2008- Full Professor
- Invited Professor at the Laboratori Nazionali di Frascati (INFN, Frascati, Italy) 2004.
- Invited Professor at the National Polytechnic Institute, (Mexico City, México) 2010.
- Invited Professor at the International Center for Theoretical Physics and International Agency for Atomic Energy, (Trieste, Italia) 2014.
- Temporary Professor at the Faculty of Engineering, University of Buenos Aires (Argentina), since 2018
- Since 1992, I supervise students and young researchers at the Faculty of Mathematics, Astronomy, and Physics (National University of Córdoba) for licentiate theses and Ph.D. theses in physics. As of now, several students have completed their graduate theses, six students have obtained their Ph.D. degrees, and one more is expected to complete his thesis in 2023.
- Since 1995 I have served as a supervisor for several fellowships, young scientists, and technicians.

SCIENTIFIC TRAININGS

- 1990 1992 Training period at the synchrotron facility of the Frascati National Laboratories, PWA Group, Frascati (ITA).
- 1992 1994 Several short periods and courses at the Laboratorio Nacional de Luz Síncrotron, Campinas (BRA).
- 1992 1995 Several short periods (one-two months) at the synchrotron facility of the Frascati National Laboratories, PWA Group, Frascati (ITA).

RESEARCH ACTIVITIES

- 1988 1990 Assistant Researcher at the Atomic and Nuclear Spectroscopy Group, Faculty of Mathematics Astronomy and Physics (National University of Córdoba)
- 1990 1992 Invited Researcher at the Frascati National Laboratories, PWA Group, National Institute of Nuclear Physics, Frascati (ITA)
- 1992 1994 Associate Researcher at the Atomic and Nuclear Spectroscopy Group, Faculty of Mathematics Astronomy and Physics (National University of Córdoba)
- 1994 1998 Researcher at the Non-Conventional Fluorescence Techniques Lab., Atomic and Nuclear Spectroscopy Group, Faculty of Mathematics Astronomy and Physics (National University of Córdoba)
- 1998 Present Head of the Non-Conventional Fluorescence Techniques Lab., Atomic and Nuclear Spectroscopy Group, Facultad de Matemática Astronomía y Física (National University of Córdoba)
- 2022- Present Head of the Atomic and Nuclear Spectroscopy Group, Facultad de Matemática Astronomía y Física (National University of Córdoba)

DIRECTION OF RESEARCH PROJECTS

- Since 1993 I have directed research projects supported by national and international institutions for the promotion of sciences.
- I acted as the co-director of the project to construct a dedicated XRF beamline at the National Synchrotron Light Laboratory in Campinas (Brazil); it was approved in 1996 by the Foundation for Science and Research of the state of São Paulo. This beamline was operational and open to external users till the final shutdown of the LNLS storage ring in 2021.
- I acted as director of joint research international projects with laboratories from Brazil (since 1998) Italy (2007, 2008), Portugal (2009, 2010), and IAEA (International Agency for Atomic Energy Vienna, Austria, 2014-2018).

SCIENTIFIC EXPERIENCE

- Extensive experience in X-ray spectroscopy, particularly in X-ray fluorescence techniques, spectrochemical analysis, and XRF spectroscopy with Synchrotron Radiation. Profound knowledge of SR beamline components.
- Wide experience in instrumentation for X-ray spectroscopy and data analysis, including methods and algorithms for spectrum treatment.

- In-depth knowledge of non-conventional X-ray fluorescence techniques, including total-reflection analysis, depth profiling, and surface analysis by X-ray total reflection, microanalysis by XRF, etc.
- Significant contributions to the development of instrumentation for total-reflection related experiments, including a new spectrometer for grazing emission analysis and beam guides for TXRF.
- Several studies on basic atomic processes and atomic parameters and constants, such as Fluorescence yields, Coster-Kronig coefficients, multielectron transitions, resonant Raman scattering, etc.
- Interdisciplinary activities related to non-conventional XRF analysis of biological samples, including studies of dental calculus formation and predictions of oral diseases.
- Duties include lectures and classes to students in the above-mentioned branches of physics at both undergraduate and postgraduate levels, direction of academic careers, major and doctorate, and service as Secretary of Faculty and member of the Faculty Council.
- Coordination of multidisciplinary projects involving both national and international members. Management of Sections, Departments, and Laboratories in different scientific and academic institutions.

LIST OF MOST RELEVANT PUBLICATIONS PER YEAR At present, I have more than <u>80 publications</u> in international journals and more than 150 publications in total considering reports, proceedings etc.

- "A Method of XRF Spectrochemical Analysis Based on some Geometrical Properties of the X-Ray Fluorescent Intensity", J. Fernández, M. Rubio y H. J. Sánchez, *Nuclear Instruments and Method*, **A280** 546 (1989)
- "Multi-electron Transitions Effects on X-Ray Fluorescence Spectra", H. J. Sánchez, E. Burattini and M. Rubio, *Physical Review A*, 47 4078 (1993)
- "Correction to the XRF Equations Considering Double *K*-Photoionizations", H. J. Sánchez and M. Rubio, *Journal of Analytica Atomic Spectroscopy*, **11** 136 (1996)
- "New Spectrometer for Grazing Exit X-Ray Fluorescence", 68, 2861 (1997).
 Spectrometer for Grazing Exit X-RobertoD. Pérezand Héctor Jorge Sánchez, *Review of Scientific Instruments*
- "Spectrochemical Analysis of Dental Calculus by Synchrotron Radiation X-Ray Fluorescence" J. Abraham, M. Grenón, H. J. Sánchez, C. Pérez and R. Barrea, *Analytical Chemistry* **74**, 324 (2002).
- "Erbium L-subshell Coster-Kronig and fluorescence yields determination by synchrotron photoionization", R. A. Barrea, C.A. Pérez and H. J. Sánchez, *J. Phys. B* **35**, 3167 (2002).
- "Microscopic X-Ray Fluorescence Analisis of Human Dental Calculas using Synchrotron Radiation" C. Pérez, H. J. Sánchez, M. Grenón, J. Abraham and R. Barrea, *Journal of Analytical Atomic Spectrometry* 19, 392 (2004).

- "Anisotropic angular distribution of Er L x-raysfollowing photoionization by linearly polarized radiation" Raul A. Barrea, Carlos A. Pérez, Tomás S. Plivelic, Edgardo V. Bonzi and Héctor J Sánchez, *J. Phys. B* **38**, 839 (2005)
- "A Case Study of Elemental and Structural Composition of Dental Calculus During Several Stages of Maturation Using SRXRF" J. Abraham, M. Grenón, H. J. Sánchez, C. Pérez, and R. Barrea, *Journal* of Biomedical Materials Research 75A 623-628 (2005)
- "X-Ray Resonant Raman Scattering Cross-Sections of Mn, Fe, Cu and Zn", H.J. Sánchez, M.C. Valentinuzzi and C.A. Pérez, *Journal of Physics B* **39**, 4317-4327 (2006)
- "Comparative Analysis of the Resonant Raman Cross-Sections of Pure Samples and Oxides", María Cecilia Valentinuzzi, Héctor Jorge Sánchez, José Abraham and Carlos Pérez, *X-Ray Spectrometry* 37, 555-560 (2008)."Characterization of Homemade X-Ray Polycapillaries" Roberto D. Pérez, Héctor J. Sánchez, Marcelo Rubio and Carlos A. Pérez, *X-Ray Spectrometry* 37, 646-651 (2008).
- "Study of Copper Surface Oxidation by Grazing Angle X -Ray Excitation", Héctor Jorge Sánchez and Carlos Alberto Pérez, *Spectrochimica Acta B* **65**, 466-470 (2010)
- "Determination of the Oxidation State by Resonant-Raman Scattering Spectroscopy", H.J. Sánchez, J.J. Leani, M.C. Valentinuzzi, and C.A. Pérez, *Journal of Analytical. Atomic Spectrometry* 26, 378-382 (2011)
- "Theoretical Calculations of the influence of Resonant Raman Scattering on the Quantification of XRF Analysis", Héctor Jorge Sánchez, María C. Valentinuzzi and J. J. Leani, *Journal of Analytical Atomic Spectrometry* **27**, 232-238 (2012).
- "Depth Profiling Nano-Analysis of Chemical Environments using Resonant Raman Spectroscopy at Grazing Incidence Conditions" Juan Jose Leani, Héctor J. Sánchez, Roberto D. Pérez, and Carlos Pérez, *Analytical Chemistry*, **85**, 7069-7075 (2013)
- "TXRF Analysis of Metals in Oral Fluids of Patients with Dental Implants", José A. Abraham, Héctor J. Sánchez, Miriam S. Grenón, and Carlos A. Pérez, *X-Ray Spectrometry* **43** 193–197 (2014)
- "Exploratory Methodology for Retrieving Oxidation State Information from X-Ray Resonant Raman Scattering Spectrometry", J. Robledo, Héctor Jorge Sánchez, Juan José Leani, Carlos Alberto Pérez, Analytical Chemistry 87 3639–3645 (2015)
- "Determination of X-ray excitation spectra in micro X-ray fluorescence spectrometry with capillary optics", Roberto D. Perez, Carlos Sosa, Viviana Sbarato, Juan José Leani, Héctor Jorge Sánchez, *Spectrochimica Acta B* **117** 23-28 (2016)
- "3D-reconstruction of chemical state distributions in stratified samples by spatially resolved micro-Xray resonant Raman spectroscopy" J. J. Leani, R. D. Pérez, J. I. Robledo and H. J. Sánchez, *Journal of Analytical Atomic Spectrometry* **32**, 402-407 (2017)
- "Energy-Dispersive Total-Reflection Resonant Inelastic X-ray Scattering as a Tool for Elemental Speciation in Contaminated Water" José I. Robledo, Juan J. Leani, Andreas G. Karydas, Alessandro Migliori, Carlos A. Pérez, and Héctor J. Sánchez, Analytical Chemistry 90, 3886–3891 (2018)
- "Energy dispersive inelastic X-ray scattering (EDIXS) spectroscopy A review", Juan José Leani, José Ignacio Robledo, and Héctor Jorge Sánchez Sánchez, Spectrochimica Acta - Part B 154, 10-24 (2019)
- "The Potential of EuPRAXIA@SPARC_LAB for Radiation Based Techniques", Antonella Balerna, Samanta Bartocci, Giovanni Batignani, Alessandro Cianchi, Enrica Chiadroni, Marcello Coreno, Antonio Cricenti, Sultan Dabagov, Andrea Di Cicco, Massimo Faiferri, Carino Ferrante, Massimo Ferrario, Giuseppe Fumero, Luca Giannessi, Roberto Gunnella, Juan José Leani, Stefano Lupi, Salvatore Macis, Rosa Manca, Augusto Marcelli, Claudio Masciovecchio, Marco Minicucci, Silvia Morante, Enrico Perfetto, Massimo Petrarca, Fabrizio Pusceddu, Javad Rezvani, José Ignacio Robledo, Giancarlo Rossi, Héctor Jorge Sánchez, Tullio Scopigno, Gianluca Stefanucci, Francesco Stellato, Angela Trapananti and Fabio Villa, Condens. Matter 4, 30 (2019)

- "Identifying Different States of Lithiation of Li4Ti5O12 Spinel by Energy-Dispersive Inelastic X-Ray Scattering (EDIXS) Spectroscopy" José Ignacio Robledo, Juan José Leani, Susana Chauque, Osvaldo Cámara, Fabiana Yolanda Oliva, and Héctor Jorge Sánchez, *Journal of Analytical Atomic Spectrometry* https://doi.org/10.1039/D0JA00402B (2020)
- "First characterization of chemical environments using energy dispersive inelastic x-ray scattering induced by an x-ray tube", Roberto Daniel Pérez, Juan José Leani, José Ignacio Robledo, and Héctor Jorge Sánchez, *Review of Scientific Instruments* 92, 013102 (2021); https://doi.org/10.1063/5.0026061
- "Depth profiling characterization of the titanium chemical state on electrode surfaces for technological applications", Juan José Leani, José Ignacio Robledo, Fabiana Yolanda Oliva and Héctor Jorge Sánchez, Journal of Analytical Atomic Spectrometry 37, 612-619 (2022) https://doi.org/10.1039/D1JA00413A
- "Discriminating Oxidation States of Rare Earth Elements by EDIXS spectroscopy through L-lines inspection", Juan José Leani, José Ignacio Robledo, Héctor Jorge Sánchez, Radiation Physics and Chemistry 213, 111207 (2023)

Books

- Co-editor of "Annals of the V Latin-American Seminar on X-Ray Techniques" vol IX, (1997) ISSN 1515-1565
- Co-editor of "Annals of the VI Latin-American Seminar on X- Ray Techniques" vol X, (2000) ISSN 1515-1565
- "XRF analysis of lead in suspended air particulate matter collected using glass fibre filter", V. Sbarato, R.D. Pérez, M. Rubio, H.J. Sánchez, Advances in Destructive and Non-Destructive Analysis for Environmental Monitoring and Nuclear Forensics IAEA Scientific and Technical Publications. Proceeding Series, STI/PUB/1169, 2003, 233-242 (ISBN 92-0-110203-8),
- "XRF and state-of-the-art related techniques to the study of teeth, tartar and oral tissues" Héctor Jorge Sánchez and Miriam Grenón, in X-Ray Fluorescence in Biological Sciences: Principles, Instrumentation and Applications edited by Vivek Kumar Singh, Jun Kawai, and Durgesh Kumar Tripathi, Wiley & Sons, UK, 2022. doi: 10.1002/9781119645719.ch32 ISBN: 9781119645542

MAIN INVITED LECTURES AT CONFERENCES AND SCIENTIFIC MEETINGS (At present, I have more than <u>200 contributions</u> to Conferences and Scientific Meetings.)

• "X-Ray Fluorescence", H. J. Sánchez, JORNADA INTRODUTORIA SOBRE PRINCIPIOS BASICOS DA GERAÇÃO DE LUZ SINCROTRON, INSTRUMEN-TAÇÃO CIENTIFICA E TECNICAS DE DIFRAÇÃAO, ESPALHAMENTO E FLUORESCENCIA DE RAIOS X", LNLS, Campinas (BRA), 1994 (Relator Invitado)

• "Total Reflection X-Ray Fluorescence", Héctor Jorge Sánchez, IX User Workshop - Micro-symposium on XRF, LNLS, Campinas (BRA), 1999. (Invited Conference).

• "Análisis de Interfaces de Tejidos Dentarios por SRXRF", Héctor Jorge Sánchez, XII USER WORKSHOP, LNLS Campinas (BRA) 2002. (Invited Talk)

• "Total Reflection XRF using Beam Guides", Héctor Jorge Sánchez, EDXRS'2002, Berlín (ALE) (2002). (Invited Conference).

• "Análisis por Reflexión Total con Guía de Haces" Héctor Jorge Sánchez, SARX' 2002 Rio de Janeiro (Brasil) (2002). (Invited Conference).

• "Currently Research Activities in Environmental and Surface Science using Micro-XRF and Grazing-Exit XRF Spectroscopy at the XRF Beamline of the LNLS", C.A. Pérez, H.J. Sánchez, S. Moreira, G. Bongiovanni, R. Pérez, and M. Rubio, EXRS 2006, París (FRA), 2006 (Invited Conference) • "Total Reflection XRF Analysis. Fundamentals, New Developments and Related Techniques", H.J. Sánchez, C.A. Pérez, M.C. Valentinuzzi, J. Abraham and M. Grenón, 9th Rio Symposium on Atomic Spectrometry, Barquisimeto (VEN), 2006. Invited Conference

• "μXRF Analysis with Homemade Polycapillaries", R. D. Pérez, Héctor Jorge Sánchez, Carlos A. Pérez and M. Rubio, SARX 2008, Rio de Janeiro (Bra) 2008. Invited Conference.

• "Different Applications of Polycapillaries to X-Ray Spectroscopy", Héctor Jorge Sánchez, Roberto D. Pérez and Carlos A. Pérez, 2010 Denver Conference, Denver (USA) 2010. Invited Conference

• "Theoretical Comparison of the Resonant Raman Scattering contributions to the Background of XRF Spectra" Héctor J. Sánchez, María Cecilia Valentinuzzi, Juan José Leani, SARX 2010, Puebla (MEX) 2010 (Invited Plenary Talk)

• "Fundamental Parameters of Low Probabilities Processes", Héctor Jorge Sánchez, SARX 2012, Santa Marta (COL) 2012, (Invired Conference)

• "Grazing-Incidence Resonant Raman Scattering" Héctor Jorge Sánchez, TXRF 2013, Osaka (JAP) September 2013. Invited Conference.

• "Core-level RIXS: A versatile Spectroscopic Tool for Chemical State Assessments" Héctor Jorge Sánchez, Juan José Leani, SARX 2016, Petrópolis (BRA) 2016. Invited Conference.

• "Low Resolution RIXS: A versatile Spectroscopic Tool for Chemical State Assessments", Héctor Jorge Sánchez, Juan José Leani, and José Robledo, INTERNATIONAL Forum on Advances in Radiation Physics, Buenos Aires (ARGENTINA), May 2017. Invited Conference.

• "New Advances in Energy Dispersive Resonant Inelastic X Ray Scattering", Héctor Jorge Sánchez, Juan José Leani, José Robledo, Roberto Pérez, International Symposium on Radiation Physics 2018, Córdoba (ARGENTINA), Oct 2018. Invited Conference.

• "GI-EDIXS for the Determination of the Oxidation State of Titanium Surface Films", J.I. Robledo, J.J. Leani, F.Y. Oliva, M. García, O. Cámara, H. J. Sánchez, International Conference on Total Reflection X-Ray Fluorescence Analysis and Related Methods (TXRF2019). 2019, Girona, España. Awarded as "Best Poster of the Conference".

• "Energy-Dispersive RIXS", Héctor Jorge Sánchez, Juan José Leani, High precision X-ray measurements HPXM2021 (Jun 2021) Fracati (Italia). Invited talk.

• "Painting characterization by spatially-resolved Energy Dispersive Inelastic X-ray Scattering spectroscopy", Juan José Leani, José Robledo, Héctor Jorge Sánchez, EUROPEAN CONFERENCE ON X-RAY SPECTROMETRY (EXRS 2022), 2022, Brudge, Belgium (Plenary Talk)

OTHER RELEVANT INFORMATION

- Reviewer of several international journals, international science foundations, and books since 1995.
- Associate Editor of X-Ray Spectrometry since 2005.
- Referee of academic activities and competitions since 1997.
- Member of the Council of the Faculty of Mathematics Astronomy and Physics (National University of Córdoba) (2004-2006, 2008-2010).
- Secretary of Extension of the Faculty of Mathematics Astronomy and Physics (National University of Córdoba) between 1999 and 2002

- Member of the Organizing Committee of several international scientific meetings since 1995.
- Distinctions/honours: "University Award" of the Rector of the National University of Córdoba, Argentina (1995). "Ten Distinguished Young People Award" of the Stock market of Córdoba (ARG) for Exceptional Scientific Performance (1997).
- Member of the Physics Commission of the National Council of Scientific and Technologic Research (CONICET), Argentina (2012, 2013, 2015, 2016, 2020, 2021).
- Director of the Doctorate in Physics career of the Faculty of Mathematics Astronomy and Physics (National University of Córdoba) since 2011-2015.
- Advisor for the International Agency for Atomic Energy (2014, 2015, 2016)

October 2023

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