

Héctor Andrade Loarca

Curriculum Vitae

General Information

Birth Date March 9th, 1991
Birth Place Querétaro, Querétaro, Mexico
Residence Berlin/Munich, Germany
Nationality Mexican
Personal site <http://hectorandrade.xyz>
Github @arsenal9971

Education

- 2020-2021 **PhD in Mathematics**, *LMU Munich*, Munich, Germany, Thesis: "Applied Microlocal Analysis for Deep Neural Networks in Inverse Problems".
Supervised by Professor Gitta Kutyniok
- 2017-2020 **PhD in Mathematics**, *Technische Universität Berlin (TUB)*, Berlin, Germany.
Supervised by Professor Gitta Kutyniok, finished at LMU Munich
- 2015-2017 **MSc in Mathematics**, *Technische Universität Berlin (TUB)*, Berlin, Germany, *GPA 1.2/1.0*.
Thesis: "Fast Sparse Light Field Reconstruction with Shearlet-Based Inpainting", Supervised by Professor Gitta Kutyniok
- 2013-2014 **BSc in Mathematics**, *National Autonomous University of Mexico (UNAM)*, Mexico City, Mexico, *GPA 9.93/10*.
Thesis: "Acoustic Metafluid: Periodic Homogenization by two scale convergence", Degree with honours, Supervised by Professor Antonio Capella
- 2009-2013 **BSc in Physics**, *National Autonomous University of Mexico (UNAM)*, Mexico City, Mexico, *GPA 9.80/10*.

Professional Experience

- August 2022-Present Lead Imaging Scientist, R&D, *AngioWave Imaging (AWI) LLC.*, Boston, Massachusetts
- November 2021-Present Postdoctoral Researcher, *LMU Munich*, Munich, Germany
- October 2020-November 2021 Research Assistant, *LMU Munich*, Munich, Germany

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- March 2019-August 2022 Software and algorithm development consultant for biomedical imaging (remote), AngioWave Imaging (AWI) LLC., Boston, Massachusetts
- October 2017-September 2020 Research Assistant (Stipendiat), Technische Universität Berlin, Berlin, Germany
- February 2015-February 2016 Data Scientist, OPI Analytics (<https://opianalytics.com/>), Mexico City, Mexico
- January 2014-August 2015 Research Assistant in Institute of Mathematics, UNAM (with Professor Antonio Capella Kort): Numerical simulation of effective properties in physical materials with microstructure, Mexico City, Mexico
- January-2015 June 2015 Teaching Assistant of Computational Methods for Statistical Physics (with Professor David P. Sanders), School of Science, UNAM, Mexico City, Mexico
- June-2014 December 2014 Teaching Assistant of Electromagnetism I (with Professor Mirna Villavicencio Torres), School of Science, UNAM, Mexico City, Mexico
- February-2014 June 2014 Teaching Assistant of Electromagnetism I (with Professor Mirna Villavicencio Torres), School of Science, UNAM, Mexico City, Mexico
- February-2014 June 2014 Teaching Assistant of Ordinary Differential Equations (with Professor Maria del Carmen Jorge y Jorge), School of Science, UNAM, Mexico City, Mexico
- August-2013 December 2013 Teaching Assistant of Classical Mechanics (with Professors David Phillip Sanders and Pablo Barberis Blostein), School of Science, UNAM, Mexico City, Mexico
- Summer 2007,2008 Work at CFATA-UNAM (Center of Applied Physics and Advanced Technology) in Shock Wave Lab with Phd Achim Max Loske Mehling (development of electronic circuits to implementations in Shock Wave Machines), Querétaro, Mexico

List of Publications

- S. Kolek, R. Windesheim, H. Andrade-Loarca, G. Kutyniok, R. Levie, "*Explaining Image Classifiers with Multiscale Directional Image Representation*", preprint arXiv:2211.12857, 2022
- H. Andrade-Loarca, G. Kutyniok, O. Öktem, P. Petersen, "*Deep Microlocal Reconstruction for Limited-Angle Tomography*", Applied and Computational Harmonic Analysis, Vol. 59, 2022
- H. Andrade-Loarca, G. Kutyniok, "*tfShearlab: The TensorFlow Digital Shearlet Transform for Deep Learning*", preprint arXiv:2006.04591, 2020
- H. Andrade-Loarca, G. Kutyniok, O. Öktem, "*Shearlets as Feature Extractor for Semantic Edge Detection: The Model-Based and Data-Driven Realm*", Proceedings of Royal Society A, Vol. 476, Issue 2243, 2020
- H. Andrade-Loarca, A. Hashemi, S. Haufe, K.-R. Müller, G. Kutyniok, "*Deep Brain Source Imaging: A LSTM-inspired Approach for EEG Source Localization based on Sparse Bayesian Learn-*

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ing", accepted in Signal Processing with Adaptive Sparse Structured Representations (SPARS) Workshop, 2019

- H. Andrade-Loarca, G. Kutyniok, O. Öktem, P. Petersen, "Extraction of digital wavefront sets using applied harmonic analysis and deep neural networks", SIAM J. Imaging Sciences, Vol. 12, No. 4, pp. 1936-1966, 2019
- H. Andrade-Loarca, "Fast Sparse Light Field Reconstruction with Shearlet-Based Inpainting", Master Thesis, supervised by Prof. Gitta Kutyniok, Technische Universität Berlin, 2017
- H. Andrade-Loarca, "Acoustic Metafluid: Periodic Homogenization by two scale convergence", Bachelor Thesis, supervised by Prof. Antonio Capella Kort, UNAM, 2015

Invited Talks (outdated list)

- January 2020 AFG Oberseminar, TU Berlin, Berlin, Germany; with talk "Task-Adapted Reconstruction in Computed Tomography: Microlocal Analysis meets Deep Learning"
- May 2019 AFG Oberseminar, TU Berlin, Berlin, Germany; with talk "Insights on learning hard inverse problems"
- February 2019 AFG Oberseminar, TU Berlin, Berlin, Germany; with talk "Extraction of digital wavefront sets using applied harmonic analysis and deep neural networks"
- August 2018 JuliaCon, International Julia Conference Invited Speaker, UCL, London, UK; with talk "LightFields.jl: Fast 3D image reconstruction for VR applications"
- July 2018 PyData Berlin, International Python Conference Invited Speaker, Charite, Berlin, Germany; with talk "LightFields.jl: Fast 3D image reconstruction for VR applications"
- August 2018 AFG Oberseminar, TU Berlin, Berlin, Germany; with talk "Learned Tomographic Reconstruction and Wavefront Set"
- June-July 2017 PyData Berlin, International Python Conference Invited Speaker, HTW Berlin, Berlin, Germany; with talk "Shearlab.jl: Fast Multidimensional Signal Processing"
- June 2017 JuliaCon, International Julia Conference Invited Speaker, UC Berkeley, California, USA; with talk "Shearlab.jl: Fast Multidimensional Signal Processing"

Scientific Talks and Workshops (outdated list)

- July 2020 SIAM Conference on Imaging Science, Toronto, Ontario, Canada; with talk "Task-Adapted Reconstruction in Computed Tomography: Microlocal Analysis meets Deep Learning", virtual talk due to covid-19
- May 2020 SIAM Conference on Mathematics of Data Science, Cincinnati, Ohio, USA; with talk "Shearlets as Feature Extractor for Semantic Edge Detection", virtual talk due to covid-19
- May 2019 Digital Future Conference, Berlin, Germany: Attending as Young Digital Changer
- February 2019 GAMM Annual Meeting, TU Wien, Vienna, Austria; with talk "Extraction of wavefront sets by deep convolutional neural networks and shearlets"
- January 2019 Deep Learning and Inverse Problems Workshop, KTH, Stockholm, Sweden; with talk "Learned Primal Dual Reconstruction in Shearlet Domain and Wavefront set recovery"

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- June 2018 SIAM Conference on Imaging Science, Bologna University, Bologna, Italy; with talk "Solving Inverse Problems in Imaging with Shearlab.jl"
- May 2018 Digital Future Science Match, Berlin, Germany: Attending as Young Digital Changer
- July-August 2016 BMS Summer School: Mathematical and Numerical Methods in Image Processing, TU Berlin, Berlin, Germany
- July 2016 7th European Congress of Mathematics, TU Berlin, Berlin, Germany
- December 2015 2nd International Matheon Conference on Compressed Sensing and its Applications, TU Berlin, Berlin, Germany
- September 2015 Shape-Up conference, TU Berlin, Berlin, Germany
- August-September 2014 BMS Summer School: Applied Analysis for Materials, Berlin Mathematical School, Technische Universität Berlin, Berlin, Germany
- July 2014 First Intensive Program in high performance scientific computing, Geophysics Institute, UNAM, Mexico City, Mexico
- July 2013 Third Summer School in Mathematics, CINMA, Querétaro, Mexico
- July 2012 Second Summer School in Mathematics, CINMA, Querétaro, Mexico
- July 2011 First Summer School in Mathematics, CINMA, Querétaro, Mexico
- July 2011 Summer School in Mathematics, IMATE, UNAM, Cuernacava, Morelos, Mexico

Academic Activities

- February 2018 6th BMS Student Conference, ZIB, Berlin, Germany; part of organization committee
- December 2017 2nd BMS Career Talk, Urania, Berlin, Germany; part of organization committee
- December 2017 3rd International MATHEON Conference on Compressed Sensing and its Applications, TU Berlin, Berlin, Germany; part of organization committee
- December 2017 CoSIP Intense Course on Deep Learning, TU Berlin, Berlin, Germany; part of organization committee

Extracurricular Activities

- December 2016-December 2017 BMS Student Representative
- November 2007 National Physics Olympiad, Tuxtla Gutiérrez, Chiapas, Mexico
- October 2007 National Logic Olympiad, Morelia, Michoacan, Mexico
- November 2006 National Mathematical Olympiad, Zacatecas, Zacatecas, Mexico

Awards and Scholarships

- 2019 Young Digital Changers Scholarship, Digital Future Science Match, Berlin, Germany
- 2018 Diversity Scholarship in JuliaCon 2018, International Julia Conference, UCL, London, UK
- 2018 Young Digital Changers Scholarship, Digital Future Science Match, Berlin, Germany
- 2017-2020 Berlin Mathematical School Phase II Scholarship, Berlin, Germany
- 2017 Diversity Scholarship in JuliaCon 2017, International Julia Conference, UC Berkeley, California, USA
- 2015-2017 Complementary Scholarship for Outstanding Mexican Graduate Students given by the Mexican Secretary of Education
- 2015-2017 Berlin Mathematical School Phase I Scholarship, Berlin, Germany
- 2014 Candidate to "Gabino Barreda" medal for best class student of Mathematics by UNAM
- 2014 Candidate to "Gabino Barreda" medal for best class student of Physics by UNAM.

Academic Memberships

- o Berlin Mathematical School (BMS).
- o Berlin Mathematical Research Center (MATH+).
- o Activity Group for Mathematics of Data Science (MATH+MoDS).
- o Julia Users Group Berlin.

Languages

Spanish	Mother tongue	
English	Fluent	C1
German	Fluent	C1
Japanese	Basic	A1

Computer Skills

Python, Julia, PostgreSQL, R	High Level
TensorFlow, PyTorch	High Level
Fortran 90, C/C++, OpenGL, CUDA	High Level
Wolfram Mathematica	Medium Level
Hadoop, Spark	Medium Level

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OpenMPI, Medium Level
OpenCL
JavaScript, Low Level
HTML5, CSS