


Gregorio Alanis-Lobato

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I am a researcher using network science, machine learning and data analytics to study complex biological systems and provide data-driven guidance to wet-lab biologists for more informed experimental design. I enjoy working with interdisciplinary teams on the development of ground-breaking solutions to challenging problems.

SKILLSET

Technical		Soft	
<i>Programming/Scripting</i>	R, Python, C/C++, shell, git	<i>Project management</i>	Project planning, staffing, implementation and control
<i>Data wrangling and analysis</i>	tidyverse, pandas, mlr, tidymodels, scikit-learn, igraph, Matplotlib, Gephi	<i>Team work and leadership</i>	Part of various collaborative projects, supervision of students, conference and event organisation
<i>Web development</i>	JavaScript, HTML, CSS, PHP	<i>Creativity and engineering</i>	Development of novel methods to approach complex problems
<i>Databases & HPC</i>	SQL, MySQL, Slurm	<i>Communication and writing</i>	Presentations in international conferences, publications in scientific journals, teaching
<i>Office suites/Text editors</i>	MS Office, iWork, Markdown, L ^A T _E X, vi	<i>Intercultural and interdisciplinary skills</i>	Work with multidisciplinary groups, part of an international team
<i>Operating systems</i>	Linux, macOS, Windows	<i>Languages</i>	Spanish (native), English (fluent), German (A2)

PROFESSIONAL EXPERIENCE

December 2020-Present **Principal Computational Biologist for Central Nervous System Disease Research and Research Beyond Borders**

Boehringer Ingelheim Pharma, Biberach an der Riß, Germany
Supervisor: Dr. Francesc Fernandez-Albert

January 2019-December 2020 **Postdoctoral Training Fellow at the Human Embryo and Stem Cell Laboratory**

The Francis Crick Institute, London, UK
Supervisor: Dr. Kathy Niakan

- Integration of diverse omics data and use of machine learning, network science and systems biology for mapping and inspection of the protein networks that regulate the development of the human pre-implantation embryo.
- Mapping and analysis of the human pre-implantation embryo proteome.
- Estimation of the frequency of CRISPR-Cas9-induced on-target damage in human embryos.
- Establishment and standardisation of pipelines for omics data analysis.
- Support to other lab members with bioinformatics and statistical analyses.
- Responsible for training sessions on statistics and data analysis tools for lab members.

February 2015-
December 2018

Research associate at the Computational Biology and Data Mining Research Group

Johannes Gutenberg Universität, Mainz, Germany

Supervisor: Prof. Miguel Andrade

- Integration of bio-data, analysis of the latent geometry of the human protein interaction network, bias reduction in protein network datasets, development of bioinformatic web tools.
- Postdoc representative at the Institute of Molecular Biology.

July 2014-
December 2014

Research consultant at the KAUST Environmental Epigenetics Programme

Department of Bioscience, King Abdullah University of Science and Technology, Thuwal, Makkah, Saudi Arabia

Supervisor: Prof. Valerio Orlando

- Systems-based analysis of RNA-Seq and hCAGE data from human skeletal muscle cell differentiation time series. Healthy donors and Duchenne Muscular Dystrophy patients were compared with the aim to detect the set of transcripts whose expression over time contributes the most to their differences.

Summer 2013

Intern at the Centre for Complex Network Research

Department of Physics, Northeastern University, Boston, MA, USA

Supervisor: Prof. Albert-László Barabási

Project title: *Towards the construction of a reliable genetic interaction map for human*

- Explored different data integration approaches for the construction of a reliable human genetic interaction network.

Summer 2010

Intern at Cisneros Lab

Department of Chemistry, Wayne State University, Detroit, MI, USA

Supervisor: Prof. Andrés Cisneros

Project title: *Analysis of the impact of P. falciparum's LCRs in protein folding regulation by coarse grained molecular dynamics*

- Studied the role of low-complexity regions in the correct folding of *P. falciparum's* proteins by means of molecular dynamics tools such as VMD. These analyses are important for drug design against malaria.

July 2008-July
2009

Intern at IBM

Service Management Automation, Integrated Technology Delivery, IBM, Mexico City, Mexico

- Administered the Server Resource Manager tool in the servers of >5 IBM clients, which allowed IBM to comply with the service level agreement contracted by these clients.
- Administered the Virtual Server Administration tool in the servers of a couple of IBM clients, which allowed for remote server administration of IBM software in client machines.

Sept. 2005-July
2008

Software Developer at the National Paediatric Hospital "Federico Gómez"

Information Systems Department, Mexico City, Mexico

- Migrated the database serving the hospital at the time from MS SQL Server 2000 to MS SQL Server 2005.
- Developed the Patient Classification System, which improved the attention of the >30,000 patients that visit the hospital annually.
- Made walk-in patient attention more efficient by training medical staff in the Classification System.
- Provided training to >20 administrative employees and medical staff in Office tools and medical software every 6 months, making them more updated and competent personnel.
- Started the development of the current Surgery Scheduling System that serves the >9,000 patients that undergo surgery in the hospital annually.

EDUCATION

King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

PhD in Computer Science, 2011-2014

Dissertation title: *Exploitation of complex network topology for link prediction in biological interactomes*

Dissertation advisor: Prof. Timothy Ravasi

King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

MSc in Computer Science, 2009-2010

Research focus: Computational Biosciences

Instituto Politécnico Nacional, Escuela Superior de Cómputo, Mexico City, Mexico

Computer Systems Engineering, 2005-2009

Dissertation title: *Application of self-organising maps to the protein folding problem*

Dissertation advisor: Prof. Jorge Rosas-Trigueros

AWARDS AND RECOGNITIONS

- Science*
- Academic Excellence Award, King Abdullah University of Science and Technology, (Saudi Arabia, 2013-2014).
 - 1st place in the 1st King Abdullah University of Science and Technology Graduate Research Symposium (Saudi Arabia, 2011).
 - King Abdullah University of Science and Technology Provost Award (Saudi Arabia, 2009).
 - King Abdullah University of Science and Technology Graduate Fellowship Scholarship (Saudi Arabia, 2009).
 - Acknowledgement of Academic Excellence in Computer Systems Engineering (Mexico, 2005).
 - Winner of the Knowledge Olympiad, lunch with Mexican president at the time (Mexico, 1999).
- Athletics*
- Gold Medal, Discus Throw, Distrital Olympic Games (Mexico, 2001).
 - Silver Medal, Discus Throw, National Olympic Games (Mexico, 1999).

PUBLICATION LIST

Google Scholar Profile: <https://scholar.google.de/citations?user=nAGRhSEAAAAJ&hl=en>

* *Publications in which I am a first co-author.*

✉ *Publications in which I am corresponding author.*

Peer-reviewed papers

- 2020 Gerri, C., McCarthy A., **Alanis-Lobato, G.**, Demtschenko, A., Bruneau, A., Loubersac, S., Fogarty, N. M. E., Hampshire, D., Elder, K., Snell, P., Christie, L., David, L., Van de Velde, H., Fouladi-Nashta, A. A. & Niakan, K. K. Initiation of a conserved trophectoderm program in human, cow and mouse embryos. *Nature* 587, 443-447.
- ✉ **Alanis-Lobato, G.**, Möllmann, J. S., Schaefer, M. & Andrade-Navarro, M. A. MIPPIE: the mouse integrated protein-protein interaction reference. *Database* 2020, baaa035.
- Dallago, C., Goldberg, T., Andrade-Navarro, M. A., **Alanis-Lobato, G.** & Rost, B. Visualizing human protein-protein interactions and subcellular localizations on cell images through CellMap. *Current Protocols in Bioinformatics* 69(1), e97.
- Laidou, S., **Alanis-Lobato, G.**, Pribyl, J., Raskó, T., Tichy, B., Mikulasek, K., Tsagiopoulou, M., Oppelt, J., Kastrinaki, G., Lefaki, M., Singh, M., Zink, A., Chondrogianni, N., Psomopoulos, F., Prigione, A., Ivics, Z., Pospisilova, S., Skladal, P., Izsvák, Z., Andrade-Navarro, M. A. & Petrakis, S. Nuclear inclusions of pathogenic ataxin-1 induce oxidative stress and perturb the protein synthesis machinery. *Redox Biology* 101458.
- Wamaitha, S., Grybel, K., **Alanis-Lobato, G.**, Gerri, C., Ogushi, S., McCarthy, A., Mahadevaiah, S., Healy, L., Lea, R., Molina-Arcas, M., Devito, L., Elder, K., Snell, P., Christie, L., Downward, J., Turner, J. & Niakan, K. K. IGF1-mediated human embryonic stem cell self-renewal recapitulates the embryonic niche. *Nature Communications* 11, 764.
- Della Valle, F., Thimma, M. P., Caiazzo, M., Pulcrano, S., Celii, M., Adroub, S., Liu, P., **Alanis-Lobato, G.**, Broccoli, V. & Orlando, V. Transdifferentiation of mouse embryonic fibroblasts into dopaminergic neurons reactivates LINE-1 repetitive elements. *Stem Cell Reports* 14(1), 60-74.
- 2019 Geiß, C., **Alanis-Lobato, G.**, Andrade-Navarro, M. A., Régnier-Vigouroux, A. Assessing the reliability of gene expression measurements in very-low-numbers of human monocyte-derived macrophages. *Sci. Rep.* 9, 17908.
- *El Amrani, K., **Alanis-Lobato, G.**, Mah, N., Kurtz, A. & Andrade-Navarro, M. A. Detection of condition-specific marker genes from RNA-seq data with MGFR. *PeerJ* 7, e6970.
- 2018 Härtner, F., Andrade-Navarro, M. A. & ✉ **Alanis-Lobato, G.** Geometric characterisation of disease modules. *Applied Network Science* 3(10).

- ✉ **Alanis-Lobato, G.**, Mier, P. & Andrade-Navarro, M. A. The latent geometry of the human protein interaction network. *Bioinformatics* 34(16), 2826-2834.
- 2017 Hildebrandt, A., **Alanis-Lobato, G.**, Voigt, A., Zarnack, K., Andrade-Navarro, M. A., Beli, P. & König, J. Interaction profiling of RNA-binding ubiquitin ligases reveals a link between posttranscriptional regulation and the ubiquitin system. *Sci. Rep.* 7, 16582.
- Mier, P., **Alanis-Lobato, G.** & Andrade-Navarro, M. Context characterization of amino acid homorepeats using evolution, position and order. *Proteins: Structure, Function, and Bioinformatics* 85(4) 709-719.
- Mier, P., **Alanis-Lobato, G.** & Andrade-Navarro, M. Protein-protein interactions can be predicted using coiled coil co-evolution patterns. *Journal of Theoretical Biology* 412, 198-203.
- Alanis-Lobato, G.**, Andrade-Navarro, M. & Schaefer, M. HIPPIE v2.0: enhancing meaningfulness and reliability of protein-protein interaction networks. *Nucleic Acids Research* 45(D1) D408-D414.
- 2016 ✉ **Alanis-Lobato, G.**, Mier, P. & Andrade-Navarro, M. Manifold learning and maximum likelihood estimation for hyperbolic network embedding. *Applied Network Science* 1(10).
- ✉ **Alanis-Lobato, G.** & Andrade-Navarro, M. Distance distribution between complex network nodes in hyperbolic space. *Complex Systems* 25(3), 223-236.
- ✉ **Alanis-Lobato, G.**, Mier, P. & Andrade-Navarro, M. Efficient embedding of complex networks to hyperbolic space via their Laplacian. *Sci. Rep.* 6, 30108.
- 2015 *, ✉ **Alanis-Lobato, G.**, Cannistraci, C.V., Eriksson, A., Manica, A. & Ravasi, T. Highlighting nonlinear patterns in population genetics datasets. *Sci. Rep.* 5, 8140.
- 2013 **Alanis-Lobato, G.**, Cannistraci, C.V. & Ravasi, T. Exploitation of genetic interaction network topology for the prediction of epistatic behavior. *Genomics* 102(4), 202-208.
- *Cannistraci, C.V., **Alanis-Lobato, G.** & Ravasi, T. Minimum curvilinearity to enhance topological prediction of protein interactions by network embedding. *Bioinformatics* 29, i199-i209.
- *Cannistraci, C.V., **Alanis-Lobato, G.** & Ravasi, T. From link-prediction in brain connectomes and protein interactomes to the local-community-paradigm in complex networks. *Sci. Rep.* 3, 1613.

Book chapters

- 2020 **Alanis-Lobato, G.** & Schaefer, M. Generation and interpretation of context-specific human protein-protein interaction networks with HIPPIE. *Chapter in the book Protein-Protein Interaction Networks* 2074, 135-144.

Reviews & editorials

- 2018 ✉ **Alanis-Lobato, G.** & Petrakis, S. Protein interaction networks and disease: highlights of the 3rd Challenges in Computational Biology Meeting. *Genomics and Computational Biology* 4(1), e100056.
- 2015 ✉ **Alanis-Lobato, G.**, Mining protein interactomes to improve their reliability and support the advancement of network medicine. *Front. Genet.* 6(296).

Others

- 2020 **Alanis-Lobato, G.**, Zohren, J., McCarthy, A., Fogarty, N.M.E., Kubikova, N., Hardman, E., Greco, M., Wells, D., Turner, J.M.A. & Niakan, K. Frequent loss-of-heterozygosity in CRISPR-Cas9-edited early human embryos. *bioRxiv* 2020.06.05.135913, <https://doi.org/10.1101/2020.06.05.135913>
- 2017 ✉ **Alanis-Lobato, G.** & Andrade-Navarro, M. A reliable and unbiased human protein network with the disparity filter. *bioRxiv* 207761, <https://doi.org/10.1101/207761>
- 2014 **Alanis-Lobato, G.**, Cannistraci, C.V. & Ravasi, T. Exploring the Genetics Underlying Autoimmune Diseases with Network Analysis and Link Prediction. *Proceedings of the MECBME 2014*, 167-170.

CONTRIBUTED TALKS AND POSTERS

Alanis-Lobato, G., Bartlett, T. & Niakan, K. K. *Multimomics-based inference of cell type-specific regulatory networks in early human embryos*. Complex Network Conference (remote), Madrid, Spain, December 2020 (Poster).

Härtner, F., Andrade-Navarro, M. & **Alanis-Lobato, G.** *Geometric characterisation of disease modules*. NetMed18, Paris, France, June 2018 (Talk).

Alanis-Lobato, G. & Andrade-Navarro, M. *A reliable and unbiased human protein network with the disparity filter*. Joint Boehringer Ingelheim Research Beyond Borders-IMB Symposium, Mainz, Germany, November 2017 (Talk).

Alanis-Lobato, G., Mier, P. & Andrade-Navarro, M. *GAPI: A web tool for the geometric analysis of the human protein interactome*. Mapping Complexity, Foundations and Applications of Network Geometry, Barcelona, Spain, November 2017 (Talk).

Alanis-Lobato, G., Mier, P. & Andrade-Navarro, M. *The latent geometry of the human protein interaction network*. NetSci-X, Tel Aviv, Israel, January 2017 (Talk).

Alanis-Lobato, G., Mier, P. & Andrade-Navarro, M. *Efficient hyperbolic embedding of complex networks via the spectral decomposition of their Laplacian*. 7th International Workshop on Complex Networks, Dijon, France, March 2016 (Talk).

Alanis-Lobato, G., Cannistraci, C.V. & Ravasi, T. *Exploring the Genetics Underlying Autoimmune Diseases with Network Analysis and Link Prediction*. Middle East Conference on Biomedical Engineering 2014, Doha, Qatar, February 2014 (Talk).

Alanis-Lobato, G., Cannistraci, C.V. & Ravasi, T. *Learning new biology from GWAS by means of network analysis and link prediction*. Human Genome Meeting 2013, Singapore, April 2013 (Poster).

Alanis-Lobato, G., Cannistraci, C.V. & Ravasi, T. *A novel graph dissimilarity index for prediction of genetic interactions*. European Conference in Computational Biology (ECCB) 2012, Basel, Switzerland, September 2012 (Poster).

Alanis-Lobato, G., Cannistraci, C.V. & Ravasi, T. *Prediction of genetic interactions using network topology*. Intelligent Systems for Molecular Biology (ISMB) 2012, Long Beach, CA, USA, July 2012 (Poster).

Cannistraci, C.V., **Alanis-Lobato, G.** & Ravasi, T. *Minimum curvilinearity to address high-throughput protein-protein interaction experiments*. ISMB/ECCB 2011, Vienna, Austria, July, 2011 (Poster).

Cannistraci, C.V., **Alanis-Lobato, G.** & Ravasi, T. *Minimum curvilinearity to address high-throughput protein-protein interaction experiments*. King Fahd University of Petroleum and Minerals Graduate Seminar, Dhahran, Saudi Arabia, May 2011 (Talk).

Cannistraci, C.V., **Alanis-Lobato, G.** & Ravasi, T. *Minimum curvilinearity to address high-throughput protein-protein interaction experiments*. 1st KAUST Graduate Research Symposium, Thuwal, Saudi Arabia, May 2011 (Talk).

Alanis-Lobato, G. T. *Self-organising maps applied to protein structure classification*. ECCB 2010, Ghent, Belgium, September 2010 (Poster).

Alanis-Lobato, G., Rodriguez-Garibay, G. & Rosas-Trigueros, J. *Self-organising maps applied to protein structure prediction*. USA-Mexico Workshop in Biological Chemistry, Mexico City, Mexico, March 2009 (Poster).

CONFERENCES ORGANISED/CHAired

November 2017 *3rd Challenges in Computational Biology - Protein Interaction Networks and Disease*, Johannes Gutenberg Universität, Mainz, Germany
Organisers: Prof. Miguel Andrade-Navarro; **Gregorio Alanis-Lobato, PhD**; Jean-Fred Fontaine, PhD; Spyros Petrakis, PhD

February 2014 *Middle East Conference on Biomedical Engineering 2014*, Hilton, Doha, Qatar
Chair of Bioinformatics and Systems Biology Session

January 2013 *Workshop in network theory and paradigms in complex networks*, King Abdullah University of Science and Technology, Saudi Arabia
Invited speakers: Prof. Marián Boguñá (University of Barcelona), Prof. Jesper Tegnér (Karolinska Institute) and Dr. Carlo V. Cannistraci (King Abdullah University of Science and Technology)
Organisers: **Gregorio Alanis-Lobato, MSc**; Prof. Timothy Ravasi; Prof. David Keyes

TEACHING

Johannes Gutenberg Universität 2016, 2017, 2018	Responsible for the <i>Network Biology</i> and <i>Data Wrangling with R</i> sessions of the master-level course <i>Proteinbiochemie und Bioinformatik</i> taught by Prof. Miguel Andrade-Navarro (~30 students).
Johannes Gutenberg Universität 2017	Responsible for the <i>Network Biology</i> session of the postgraduate-level course <i>Einführung in die Bioinformatik</i> taught by Prof. Susanne Gerber (~20 students).
Johannes Gutenberg Universität 2017, 2018	Teaching assistant at the <i>Protein Structure</i> sessions of the undergraduate-level course <i>Biostatistik und Bioinformatik</i> taught by Prof. Miguel Andrade-Navarro (~120 students).

SUPERVISION

David Lingard <i>Jul-Sep 2020</i>	<ul style="list-style-type: none">• Summer student• An interactive web resource of gene expression in the human pre-implantation embryo• Currently an undergraduate student at the University of Warwick
Jannik Möllman <i>Sep-Dec 2018</i>	<ul style="list-style-type: none">• Undergraduate student• Prediction of signal transduction pathways by navigation of the multi-layer protein-protein interactome• Currently a master student of Bioinformatics at the Johannes Gutenberg Universität
Alexandra Pogorelskaya <i>Summer 2018</i>	<ul style="list-style-type: none">• Summer student• Assessment of the relationship between high gene ontology semantic similarities and human protein-protein interactions• Currently a master student of Bioengineering and Bioinformatics at the Lomonosov Moscow State University
Franziska Härtner <i>Oct 2016-May 2018</i>	<ul style="list-style-type: none">• Master student• Geometric characterisation of disease modules• Currently a bioinformatician at the Institute of Medical Biostatistics, Epidemiology and Informatics, Mainz
Abel Hodelin-Hernández <i>Apr-Oct 2017</i>	<ul style="list-style-type: none">• Undergraduate student• Network geometry and machine learning to predict protein interaction effects• Currently a bioinformatician at the Universitätsmedizin Mainz

EXTERNAL FUNDING

2020	<i>British Society for Cell Biology</i> . Summer vacation studentship to host David Lingard (University of Warwick). £2000 to develop the 8-week project entitled <i>An interactive web resource of gene expression in the human pre-implantation embryo</i> .
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REFERENCES

Prof. Kathy K. Niakan

Mary Marshall and Arthur Walton Professor of Reproductive Physiology
Director, Centre for Trophoblast Research
Chair, Strategic Research Initiative in Reproduction
Physiological Laboratory, Downing Street, Cambridge CB2 3EG, UK
e-mail: kkn21@cam.ac.uk

Prof. Miguel Andrade Navarro

Professor, Faculty of Biology
Head of the Computational Biology and Data Mining Research Group
Johannes Gutenberg Universität and Institute of Molecular Biology, Mainz, Germany
e-mail: andrade@uni-mainz.de

Prof. Valerio Orlando

Professor, Bioscience
Head of the Environmental Epigenetics Programme
King Abdullah University of Science and Technology, Thuwal, Makkah, Saudi Arabia
e-mail: valerio.orlando@kaust.edu.sa

Prof. Timothy Ravasi

Professor, Marine Sciences
Head of the Marine Climate Change Unit
Okinawa Institute of Science and Technology, Okinawa, Japan
e-mail: timothy.ravasi@oist.jp