CURRICULUM VITAE (maximum 4 pages)

CV date	May 2021

Part A. PERSONAL INFORMATION

First and Family name	**Alfonso Rodríguez-Patón Aradas**		

A.1. Current position

Name of University/Institution	Universidad Politécnica de Madrid		
Department	Departamento de Inteligencia Artificial		
Address and Country	Campus de Montegancedo s/n Boadilla del Monte 28660 Madrid		
Current position	**Catedrático de Univ.**	From	30 de Sept. 2019
Espec. cód. UNESCO	Computer Science and Artificial Intelligence		
Palabras clave/Topics	DNA computing, Synthetic Biology, Cellular computation, Automata Theory, Artificial Life, Artificial Intelligence, Systems Biology, Programmable Biology		

A.2. Education

Degree	University	Year
Bachelors in Physics	Univ. de Santiago de Compostela - Spain	June 1992
Masters in Knowledge Engineering	Universidad Politécnica de Madrid - Spain	Dec 1993
PhD in Informatics	Universidad Politécnica de Madrid- Spain	July 1999

A.3. JCR articles, h Index, thesis supervised.

4 sexenios (6 year period) of recognized research.
Last 'sexenio' period 2015-2020.

5 quinquenios '5 year' teaching periods recognized.

11 PhD thesis supervised and defended with *cum laude*.

6 PhD thesis supervised in the last 5 years**.** 4 PhD students on board.

- A paper published in **Nature Biotechnology** journal (April 2019).
  https://doi.org/10.1038/s41587-019-0105-3 Impact Factor: 43.271
- A paper published in **Science** journal (12 March, 2021)
  https://science.sciencemag.org/content/371/6534/eabc9531
  https://doi.org/10.1126/science.abc9531 Impact factor: 41.8

Web of Science**: H-index=17**,
104 papers in ISI Web, **72 papers in JCR journals,**
21 conferences, 9 book chapters.
1309 citations in ISI Web (Publons).
Co-author of the most cited paper in Theoretical Computer Science Journal in 2003.
Google Scholar: h-index – 26, citations - **3039**

Part B. CV SUMMARY *(max. 3500 characters, including spaces)*

I have a Bachelor in Physics (1992) specialization in electronics by the University of Santiago de Compostela. I got my dissertation in Fuzzy Logic in the area of temporal reasoning in the group of Senén Barro and Roque Marín (result published in JCR journal "Fuzzy Sets and Systems). After finishing, I went to Madrid to study a Master on Artificial Intelligence in Universidad Politécnica de Madrid, and I stayed there to make the PhD. My PhD thesis (1999) was one of the first in the world (the third one) in the area of DNA computing (full text: http://oa.upm.es/509/). During the period of my PhD thesis I learnt about the tools of theoretical computer science, automata theory, formal languages theory, and computational complexity. I've used these tools during my research career. Moreover, I am a professor of Theoretical Computer Science and Automata Theory since 1993. I have published several papers (10 in total) in one of the most prestigious journals of the topic, which is "Theoretical Computer Science". I made a postdoctoral internship during 4 months in 2000-2001 in TUCS-Finland under the supervision of Arto Salomaa. In 2000 I started working on cell-inspired computational models called P-systems (membrane computation). I have published several papers in this area with its founder (George Paun). One of my papers in this area (titled "Tissue P Systems") has 190 citations (ISI Web of Science) and was the most cited paper of TCS Journal (in JCR) in 2003. In 2006 I was accepted as a postdoctoral researcher at Harvard University under the supervision of Yaakov Benenson (named TR35 by the MIT). Since then, I work in the area of Synthetic and Systems Biology i.e. the design, modeling and simulation of genetic circuits and devices (programmable biology). As a result of my incursion in this area, there are 4 FET European projects in which I was PI (BACTOCOM, EVOPROG, PLASWIRES and BioCellPhe). In particular, I was the co-coordinator and PI of the PLASWIRES EU project: www.plaswires.eu. I have also obtained a patent for a DNA device for genetic diagnostic. From the point of view of management, I have been deputy director of the Department of Artificial Intelligence (June 2007 – December 2008) and coordinator of the Doctoral Program of AI in UPM (2007-2008).

I am the PI of the research group in Artificial Intelligence (LIA): www.lia.upm.es. I have published 104 papers in WOS and 72 papers in JCR journals. My h-index is 17 (ISI Web) or 26 (Google Scholar). I have 3 “sexenios” and have directed 11 PhD students (currently I have 3 PhD students under my supervision). International Talent attraction: Tutor of several Juan de la Cierva researchers (Mihaela Paun, Xiangxiang Zeng), PICATA postdoc (Niall Murphy), and Ramón y Cajal researchers (Andrei Paun, Petr Sosík). And one more Juan de la Cierva – incorporación (Tao Song).

Part C. RELEVANT MERITS

C.1. Publications (including books)

I have published **72 articles in JCR journals** such as **Science**, **Nature Biotechnology**, PLOS One, ACS Synthetic Biology, IEEE Access, Artificial Life, Theoretical Computer Science, Fundamenta Informaticae, Biosystems, Fuzzy Sets and Systems, Natural Computing, J. Comput . Syst. Sci . , Neural Network World , Neurocomputing, International Journal of Unconv. Computing, Soft Computing, International Journal of Found. of Comp. Science, and Philosophical Transactions of the Royal Society A.

Authors: David Ruano-Gallego, Julia Sanchez-Garrido, Zuzanna Kozik, Elena Núñez-Berrueco, Massiel Cepeda-Molero, Caroline Mullineaux-Sanders, Jasmine Naemi-Baghshomali Clark, Sabrina L Slater, Naama Wagner, Izabela Glegola-Madejska, Theodoros I Roumeliotis, Tal Pupko, Luis Ángel Fernández, Alfonso Rodríguez-Patón, Jyoti S Choudhary, Gad Frankel
Title: **“Type III secretion system effectors form robust and flexible intracellular virulence networks”.** JOURNAL: **SCIENCE** **Q1. Impact Factor: 41.8**
DOI: https://doi.org/10.1126/science.abc9531

Authors: López-Igual R., Bernal-Bayard J., Rodríguez-Patón A., Ghigo J.-M., and Mazel D. Title: "**Engineered toxin-intein antimicrobials can selectively target and kill antibiotic-resistant bacteria in mixed populations**". JOURNAL: **Nature Biotechnology**. JCR, Q1. 5-year Impact factor: **43.271**. Date: April 2019. DOI: 10.1038/s41587-019-0105-3

AUTHORS (alphabetical order): Carlos Martín-Vide, Gheorghe Paun, Juan Pazos, Alfonso Rodríguez- Patón. Title: "Tissue P Systems". JOURNAL: **Theoretical Computer Science**. JCR JOURNAL. VOLUME: 296 NUMBER: Issue 2 PAGES, INITIAL: 295 FINAL: 326 DATE: March 2003. EDITORIAL: Springer Verlag http://dx.doi.org/10.1016/S0304-3975(02)00659-X **Prize**: **Most cited paper** of Theoretical Computer Science journal in 2003.

Authors: X Liu, Z Hong, J Liu, Y Lin, A Rodríguez-Patón, Q Zou, X Zeng
Title: "Computational methods for identifying the critical nodes in biological networks"
Journal: **Briefings in bioinformatics**. JCR**, Q1**. Impact factor: **6.3**. Date: Feb. 2019.

Authors: Zhang, X., Zou, Q., Rodríguez-Patón, A., & Zeng, X. (2019).
Title: Meta-Path Methods for Prioritizing Candidate Disease miRNAs.
Journal: *IEEE/ACM Transactions on Computational Biology and Bioinformatics, 16*, 283-291. Revista en JCR. **Q1**. IF: **2.89**

AUTHORS: Martyn Amos, Ilka Maria Axmann, Nils Blüthgen, Fernando de la Cruz, Alfonso Jaramillo, Alfonso Rodriguez-Paton, Friedrich Simmel. TITLE: Bacterial computing with engineered populations JOURNAL: **Phil. Trans. R. Soc. A** Revista en **JCR**. **Q1.** VOLUMEN: 373, Número: 2046, Página:20140218, AÑO: June 2015

AUTHORS: David Benes, Petr Sosík, Alfonso Rodríguez-Patón. TITLE: "An Autonomous In Vivo Dual Selection Protocol for Boolean Genetic Circuits". JOURNAL: **Artificial Life**. **Revista en JCR. Q1.** VOLUMEN: 21 (2), Páginas: 247-260 AÑO: 2015

AUTHORS: Miró-Bueno, JM; Rodríguez-Patón, A.
TITLE: A simple negative interaction in the positive transcriptional feedback of a single gene is sufficient to produce reliable oscillations. JOURNAL: KEY: A JOURNAL: **PLOS ONE**. **(JCR, Q1)** Volume: 6 Number: 11 ARTICLE NUMBER: e27414 PUBLISHED: NOV 10, 2011 JCR JOURNAL index of ISI Web. Q1 Impact factor ISI Web (2010): **4.41**

Authors: Zeng, X., Lin, J., Lin, C., Liu, X., & Rodríguez-Patón, A. (2018).
Title: Structural Hole Spanner in HumanNet Identifies Disease Gene and Drug targets. Journal: *IEEE Access, 6*, 35392-35401. Q1 Impact factor ISI Web (2010): **4.098**

AUTHORS: Martín Gutiérrez, Guillermo Pérez del Pulgar, Paula Gregorio, Sandra Sáez, Luis Enrique Muñoz, Alfonso Rodríguez-Patón. TITLE: A New Improved and Extended Version of the Multicell Bacterial Simulator gro. JOURNAL: **ACS Synthetic Biology** (Impact factor: **6.07**) **JCR, Q1**. DOI: 10.1021/acssynbio.7b00003 2017

AUTHORS: Vishal Gupta, Jesús Irimia, Iván Pau, and Alfonso Rodríguez-Patón
TITLE: BioBlocks: Programming Protocols in Biology Made Easier. JOURNAL: **ACS Synthetic**

PROJECT TITLE: **PLASWIRES.** "Engineering multicellular biocircuits: programming cell-cell communication using plasmids as wires" ACRONYM: PLASWIRES. ICT project funded in the **FP7** of the European Union ICT-2013.9.6 **FET** Proactive: Evolving living technologies (EVLIT): www.plaswires.eu *PROJECT CODE*: 61214. *Financing Agency*: **European Commission** *DURATION*: 36 months. *Start date*: October 2013. UPM Budget: 570K €. PRINCIPAL INVESTIGATOR AND INTERNATIONAL **COORDINATOR**: A. Rodríguez-Patón.

PROJECT TITLE: **EVOPROG** "General-Purpose Programmable Evolution Machine on a Chip" Acronym: ***EVOPROG***. www.evoprog.eu . **FET** project funded in the **FP7** of the European Union. PROJECT CODE: 610730 Financing Agency: **European Commission.** DURATION: 36 months From 01/10/2013 to 33/09/2016. UPM Budget: 381K €. PI :A Rodríguez-Patón.

PROJECT TITLE: **InGEMICS** (Ingeniería Microbiana, Salud y Calidad de Vida) Evolutionary Programmable Antibiotics. PROJECT CODE: BMD 3691 Ayuda: COMUNIDAD DE MADRID. Proyectos I+D en Biomedicina 2017. UPM Budget: 100.000€ Execution. From: 01/02/18 To: 31/01/21 DURATION : 48 months. PI: A. Rodríguez-Patón

PROJECT TITLE: **PID2019-106960GB-I00**. Título: HACIA LA INTELIGENCIA ARTIFICIAL IN VIVO: PROGRAMACION DE FARMACOS MULTICELULARES VIVOS INTELIGENTES. FINANCING AGENCY : Ministry of Science. Duración: 36 meses. FPI fellow granted.

PROJECT TITLE: **BACTOCOM** - "Bacterial Computing with Engineered Populations" PROJECT CODE: 248919. Call (part) identifier **FP7** -ICT- 2009-4 . Funding scheme: Collaborative Project **FET** Program (Future Emerging Technologies) www.bactocom.eu FINANCING AGENCY : **European Commission**. UPM Budget: 240K € DURATION : 36 months. Start date : February 2010 . PI RESEARCHER: A.Rodríguez-Patón

OTHER OLDER SPANISH PROJECTS. REFERENCES: **TIN2016-81079-R** . " INGENIERIA DE BIOCIRCUITOS PROGRAMABLES PARA COMPUTACION ANALOGICA, MULTICELULAR Y ESPACIAL" 36 months. From 30/12/2016 to 29/12/2019. **TIN2012-36992** "Engineering and Programming Biocircuits: Design and *in silico* modeling" From 01/01/2013 to 31/12/2015 Granted a **FPI** fellow and project **TIN2009-14421.** TITLE : "Modeling of biological processes with P systems and design of new biomolecular computing devices" Granted a **FPI** fellow. DURATION: 3 years. From January 2010 to December 2012. PI RESEARCHER: Alfonso Rodríguez-Patón

Also projects EUIN2013-51219 and EUIN2017-88180 funded by the Spanish Ministry to help in the EU projects application process.

C.4. Patents Alfonso Rodríguez-Patón Aradas, JM Larrea and I. Sainz de Murieta . Nucleic acids devices for performing logical inference. **Patent** No. 2383651 issued on Oct. 26, 2012.

C.5 Institutional responsabilities

- Sub-director of the Artificial Intelligence Department of the UPM 15/05/2007 al 18/12/2008 (19 months). Coordinator of the Doctoral Program with Mención de Calidad in Artificial Intelligence in UPM. 15/05/2007 al 18/12/2008 (19 months).

C.5 Teaching courses

- I have taugh several courses in Bachelor degrees: Automata Theory, Formal Languages, Computability, (since 1994), Information theory (1994-2000). 27 final grade projects directed and 15 master thesis. Course in AI Master/PhD program and Computational Biology UPM Master: "Non-conventional computation. Biomolecular computing and quantum computing". Since 2000 until 2017. Professor of "Programmable Biology: DNA Computing and biocircuit engineering" master course since 2017 in AI master and Computational Biology master (both in UPM). Invited professor in UIMP - Santander (Universidad Internacional Menéndez Pelayo) in 2018 and 2019.