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Dr. Christian Blum

Senior Research Scientist

Personal Information

Job Title	Senior Research Scientist
Institution	Artificial Intelligence Research Institute (IIIA-CSIC)
Honorary Position	Honorary Professor (Amity University Uttar Pradesh, India)

Main Scientific Measures

h-index	47 (Google Scholar, October 2025)
Total Citations	21,782
JCR-Cited Papers	86
Top 2% Scientists (Stanford-Elsevier)	Position 29,519 (globally) among 230,332 scientists in the list, and 616 in AI & Image Processing

Latest News

- July 2025: Gave a keynote talk at **ECC 2025** in Ostrava, Czech Republic
- February 2025: Gave a keynote talk at **SocProS 2025** at IIT Roorkee, India
- March 2024: Bestowed with a **honorary professorship** at Amity University, Uttar Pradesh, India
- July 2021: Won the **SEIO-BBVA award 2021** for best methodological contribution in OR

Research Interests

My research group focuses on two main areas:

Swarm Intelligence	Artificial intelligence discipline inspired by collective behavior of social insects, flocks of birds, and fish schools. Applications include ant colony optimization (ACO) and particle swarm optimization (PSO) for combinatorial optimization problems and distributed environments.
Hybrid Metaheuristics	Hybridization of metaheuristics with AI and OR methods, including branch & bound techniques and deep learning. Current work includes Construct, Merge, Solve & Adapt (CMSA) and machine learning integration.
Recent Work	Development of STNWeb for visual comparison of iterative optimization algorithms, and exploration of large language models for automated interpretation of optimization graphics.

Applications Focus on sustainability issues, particularly electric vehicle routing problems.

Education

2004 **PhD in Applied Sciences**, *Université Libre de Bruxelles*, Brussels, Belgium, *Summa cum laude*
Dissertation: "Theoretical and practical aspects of ant colony optimization". Supervisor: Prof. M. Dorigo

2002 **DEA in Applied Sciences**, *Université Libre de Bruxelles*, Brussels, Belgium
Dissertation: "Metaheuristics for group shop scheduling". Supervisor: Prof. M. Dorigo

1998 **Diplom in Mathematik**, *Universität Kaiserslautern*, Germany
Equivalent to Masters degree in Mathematics. Dissertation: "Optimality criteria and local search methods for node-weighted k-cardinality tree and subgraph problems". Supervisor: Prof. H.W. Hamacher

1994 **Vordiplom in Mathematik**, *Johannes-Gutenberg Universität Mainz*, Germany

Professional Employment History

2017–Present **Senior Research Scientist**, *IIIA-CSIC*, Bellaterra, Spain
Spanish National Research Council

2012–2016 **Ikerbasque Research Professor**, *University of the Basque Country*, San Sebastian, Spain
Funded by Ikerbasque, Basque Foundation for Science

2011–2012 **Associate Professor**, *Universitat Politècnica de Catalunya*, Barcelona, Spain

2006–2011 **Tenure Track Research Fellow**, *Universitat Politècnica de Catalunya*, Barcelona, Spain
Programa Ramón y Cajal, Spanish Ministry of Science and Technology

2004–2006 **Post-doctoral Research Fellow**, *Universitat Politècnica de Catalunya*, Barcelona, Spain
Programa Juan de la Cierva, Spanish Ministry of Science and Technology. **1st place** in evaluation

2004 **Post-doctoral Researcher**, *Universitat Politècnica de Catalunya*, Barcelona, Spain
Project "SegraVis", EU research training network

2004 **Post-doctoral Researcher**, *IRIDIA, Université Libre de Bruxelles*, Brussels, Belgium
Project "Metaheuristics Network", EU research training network

2000–2004 **Pre-doctoral Researcher**, *IRIDIA, Université Libre de Bruxelles*, Brussels, Belgium
Project "Metaheuristics Network", EU research training network

1999–2000 **Scientific Officer**, *Imperial Cancer Research Fund*, London, UK
Interfacing clinical decision support system with electronic patient record systems

Awards (Selected)

2024 **EvoCOP 2024 Best Paper Award**
European Conference on Evolutionary Computation in Combinatorial Optimization

2021 **SEIO-BBVA Award**
Best methodological contribution in Operations Research (€6,000)

2020 **ANTS 2020 Best Paper Award**
International Conference on Swarm Intelligence

2016 **GECCO 2016 Best Paper Award**
ECOM track, Genetic and Evolutionary Computation Conference

2014 **ACM Recognition of Service Award**
For service as editor-in-chief of GECCO 2013

2012 **"Certamen Arquímedes" Award**
For having directed the winning student (Mateo Bellido) (€2,000)

2010 **TCS Top Cited Article Award**
Most cited paper in Theoretical Computer Science (2005-2010)

2007 **IEEE TEVC Outstanding Paper Award**
Best paper in IEEE Transactions on Evolutionary Computation 2005 (€1,000)

Editorial Activities (Selected)

2016–Present **Editor**, *Computers & Operations Research (CAOR)*

2015–Present **Editor**, *Natural Computing*

2025–Present **Associate Editor**, *Evolutionary Intelligence*

2012–Present **Editorial Board Member**, *Neural Computing & Applications*

2020–2025 **Associate Editor**, *Artificial Intelligence (ArtInt)*

2018–2023 **Associate Editor**, *Engineering Applications of AI (EAAI)*

2015–2023 **Associate Editor**, *Theoretical Computer Science (TCS)*

Research Projects (as Principal Investigator)

2024–2028 **Red.es Project MMT24-IIIA-02**, *HEU-ML-EVRP*
Funding: €293,933

2023–2026 **AEI Project PID2022-136787NB-I00**, *ACISUD*
Funding: €183,500

2022–2024 **AEI Project TED2021-129319B-I00**, *E-TRANS*
Funding: €91,425

2020–2023 **AEI Project PID2019-104156GB-I00**, *CI-SUSTAIN*
Funding: €102,850

2013–2016 **AEI Project TIN2012-37930-C02-02**
Funding: €20,124

2009–2010 **Integrated Action AI-ES-AT**, *MEC HA2008-0005*
Funding: €11,950

Invited Keynote and Plenary Talks (Selected)

Note I gave more than 20 invited seminar talks during my career in many different places in the world. It would be impossible to list them here.

July 2025 **ECC 2025**, *9th Euro-China Conference on Intelligent Data Analysis and Applications*, **Title: On the Use of LLMs in Optimization**
Ostrava, Czech Republic

February 2025 **SocProS 2025**, *13th International Conference on Soft Computing for Problem Solving*, **Title: Understanding the Behavior of Metaheuristics Through Search Trajectory Visualization**
Roorkee, India

August 2024 **ICITAMEE 2024**, *4th International Conference on Information Technology*, **Title: STNWeb: A Web Application for Visualizing Optimization Algorithm Behavior**
Yogyakarta, Indonesia

March 2024 **InCITe 2024**, *4th International Conference on Information Technology*, **Title: STNWeb: A Web Application for Visualizing Optimization Algorithm Behavior**
Noida, India

May 2023 **CORS 2023**, *64th Annual Conference of the Canadian Operational Research Society (jointly with Optimization Days)*, **Title: Construct, Merge, Solve & Adapt: A General Recipe for Solving Combinatorial Optimization Problems**
Montreal, Canada

July 2022 **MIC 2022**, *14th Metaheuristics International Conference*, **Title: Recent Hybrid Techniques for Solving Large-Scale Combinatorial Optimization Problems**
Ortigia-Syracuse, Italy

Conference Organization (Selected)

2020 **Co-organizer**, *ANTS 2020*, Barcelona, Spain

2018 **Technical Program Co-chair**, *ANTS 2018*, Rome, Italy

2017 **IEEE CEC 2017 Technical Program Co-chair**, *San Sebastian, Spain*

2013 **Editor-In-Chief**, *GECCO 2013*, Amsterdam, Netherlands

PhD Students

Completed PhDs

2024 **Mehmet Anıl Akbay**, UAB, Barcelona, Spain
"Developing Efficient Routing Algorithms for Sustainable City Logistics"

2022 **Teddy Nurcahyadi**, UAB, Barcelona, Spain
"An Algorithmic Framework for Making Use of Negative Learning in Ant Colony Optimization"

2021 **Matthias Horn**, *(Role: Co-advisor)*, TU Wien, Austria
"Advances in Search Techniques for Combinatorial Optimization: New Anytime A* Search and Decision Diagram Based Approaches"

2021 **Marko Djukanovic**, *(Role: Co-advisor)*, TU Wien, Austria
"Exact and Heuristic Approaches for Solving String Problems from Bioinformatics"

2017 **Pedro Pinacho Davidson**, UPV, San Sebastián, Spain
"Development of hybrid metaheuristics based on instance reduction"

2013 **Salim Bouamama**, *(Role: Co-advisor)*, Ferhat Abbas University Sétif 1, Algeria
"Design of a Learning Method for Automatic Data Extraction"

2012 **Hugo Hernández Pibernat**, UPC, Barcelona, Spain
"Swarm Intelligence Methods for Optimization and Management Tasks in Sensor Networks"

Ongoing PhDs

2021-Present **Camilo Chacón Sartori**, UAB, Barcelona, Spain
Topic: STNs and LLMs in/for Optimization

2022-Present **Guillem Rodríguez Corominas**, UPC, Barcelona, Spain
Topic: Computerized Anastylosis

2023-Present **Jaume Reixach i Pérez**, UAB, Barcelona, Spain
Topic: Metaheuristics with Online and Offline Learning

2025-Present **Rocco Ballester Benito**, UAB, Barcelona, Spain
Topic: Quantum Computing and Federated Learning

2025-Present **Ramon Vallés Puig**, UAB, Barcelona, Spain
Topic: Multiple Satellite Scheduling

Teaching Experience

2022 **TU Wien Guest Lecturer**, *Austria*
Metaheuristics and Hybrid Methods for Combinatorial Optimization (20 hours)

2021 **Universidad de Cuenca**, *Ecuador*
Course on Metaheuristics and Hybrids (40 hours)

2018 **MESS Metaheuristics Summer School**, *Italy*
Swarm intelligence and CMSA (2 hours)

2018 **BGSMath Graduate Course**, *Barcelona Graduate School of Mathematics*
Metaheuristics Course (2 hours)

2017 **TU Wien Guest Lecturer**, *Austria*
Metaheuristics and Hybrid Methods for Combinatorial Optimization (20 hours)

2006–2011 **Various Courses**, *UPC Barcelona*
Programming in C++, Algorithmics, Mathematics courses (multiple semesters). In this time period I had an average teaching load of 5 hours per week.

Professional Service (Selected)

Note — I have been on the **Program Committee (PC)** of more than 100 conferences during my scientific career. Moreover, I have prepared **reviewer reports** for hundreds of journal papers for most well-regarded, scientific journals from the AI and OR fields. It would be impossible to list all this information here.

2010-Present — Member of the **Steering Committee** of the LION conference series

2010-Present — Member of the **Scientific Advisory Board** of the company Reactive Search S.r.l.

2014-Present — Member of the **Steering Committee** of the EvoCOP conference series

2022 — Member of the **Scientific-Technical Committee** of the Ramón y Cajal (RyC) Call 2021 of the AEI

2023 — Member of the **CORE conference area committee for AI** (`https://www.core.edu.au/conference-portal`)

2025-Present — Member of the **External Advisory Board** of the Institute for Software Technologies and Software Engineering of University of Malaga (ITIS, `https://www.itis.uma.es`)

Languages

German — Native speaker

English — Fluent — *Written and spoken*

Spanish — Fluent — *Written and spoken*

Catalan — Basic knowledge

Other Skills

Programming — `C++ (20+ years)`, `Java (3 years)`, `Smalltalk (3 years)`

Development — Optimization software, AI applications

Basic knowledge — `Pascal`, `Modula-2`, `Fortran`, `Lisp`, `Prolog`

Recent Journal Publications (Past 2 Years)

Note — Rather complete publication lists, including conference publications, are on Google Scholar (`https://scholar.google.es/citations?user=4e-ykx0AAAAJ&hl=es`), on DBLP (`https://dblp.uni-trier.de/pid/b/CBlum.html`) and on my personal website.

[1] J. Reixach, C. Blum. *How to improve "Construct, Merge, Solve and Adapt"? Use Reinforcement Learning!*. **Annals of Operations Research**, 2024, in press. DOI: 10.1007/s10479-024-06243-7. **[JCR, Q1, IF: 4.5]**

[2] C. Blum. *Construct, Merge, Solve and Adapt. Application to the Minimum Global Domination Problem*. **Transactions in Operations Research (TOP)**, 33, pp. 357–377, 2025. DOI: 10.1007/s11750-024-00689-5. **[JCR, Q4, IF: 1.4]**

[3] M.A. Akbay, C. Blum. *EVRPGen: A Web-Based Instance Generator for the Electric Vehicle Routing Problem with Road Junctions and Road Types*. **Software Impacts**, article number 100778, 2025. DOI: 10.1016/j.simpa.2025.100778. **[JCR, Q4, IF: 1.2]**

[4] C. Jimenez-Romero, A. Yegenoglu, C. Blum. *Multi-Agent Systems Powered by Large Language Models: Applications in Swarm Intelligence*. **Frontiers in Artificial Intelligence**, vol. 8, 2025. DOI: 10.3389/frai.2025.1593017. **[JCR, Q1, IF: 4.7]**

[5] M. Djukanovic, J. Reixach, T. Eftimov, A. Kartelj, G.R. Raidl, C. Blum. *A Learning Search Algorithm for the Restricted Longest Common Subsequence Problem*. **Expert Systems with Applications**, vol. 284, article number 127731, 2025. DOI: 10.1016/j.eswa.2025.127731. **[JCR, Q1, IF: 7.5]**

[6] G. Rodriguez Corominas, M.J. Blesa, C. Blum. *Accelerating the k-means++ algorithm by using geometric information*. **IEEE Access**, vol. 13, pp. 67693–67717, 2025. DOI: 10.1109/ACCESS.2025.3561293. **[JCR, Q2, IF: 3.6]**

[7] G. Rodriguez Corominas, M.J. Blesa, C. Blum. *SoftBinReduce: Data Reduction for Color Quantization through Soft Binning*. **Multimedia Systems**, vol. 31, article number 193, 2025. DOI: 10.1007/s00530-025-01755-z. **[JCR, Q2, IF: 3.1]**

[8] M.A. Akbay, C. Blum. *A Dataset for Two-Echelon Electric Vehicle Routing Problems*. **Data in Brief**, vol. 60, article number 111470, 2025. DOI: 10.1016/j.dib.2025.111470. **[JCR, Q3, IF: 1.4]**

[9] J. Reixach, C. Blum, M. Djukanovic, G.R. Raidl. *A Biased Random Key Genetic Algorithm for Solving the Longest Common Square Subsequence Problem*. **IEEE Transactions on Evolutionary Computation**, vol. 29(2), pp. 390–403, 2025. DOI: 10.1109/tevc.2024.3413150. **[JCR, Q1, IF: 12.0]**

[10] C. Chacon Sartori, C. Blum, F. Bistaffa. *VisGraphVar: A Benchmark Generator for Assessing Variability in Graph Analysis Using Large Vision-Language Models*. **IEEE Access**, vol. 13, pp. 21788–21810, 2025. DOI: 10.1109/ACCESS.2025.3535837. **[JCR, Q2, IF: 3.6]**

[11] C. Chacon Sartori, C. Blum, F. Bistaffa, G. Rodriguez Corominas. *Metaheuristics and Large Language Models Join Forces: Toward an Integrated Optimization Approach*. **IEEE Access**, vol. 13, pp. 2058–2079, 2025. DOI: 10.1109/ACCESS.2024.3524176. **[JCR, Q2, IF: 3.6]**

[12] M.A. Akbay, C. Blum, C.B. Kalayci. *CMSA Based on Set Covering Models for Packing and Routing Problems*. **Annals of Operations Research**, vol. 343, pp. 1–38, 2024. DOI: 10.1007/s10479-024-06295-9. **[JCR, Q1, IF: 4.5]**

[13] N. Nakhjiri, M. Salamo, M. Sanchez-Marre, C. Blum, J.C. Morales. *Forgetful Swarm Optimization for Astronomical Observation Scheduling*. **IEEE Access**, vol. 12, pp. 171644–171661, 2024. DOI: 10.1109/ACCESS.2024.3492100. **[JCR, Q2, IF: 3.6]**

[14] C. Blum. *Ant Colony Optimization: A Bibliometric Review*. **Physics of Life Reviews**, vol. 41, pp. 87–95, 2024. DOI: 10.1016/j.plrev.2024.09.014. **[JCR, Q1, IF: 14.3]**

[15] P. Pinacho Davidson, C. Blum, M.A. Pinninghoff, R. Contreras. *Extension of CMSA with a Learning Mechanism: Application to the Far from Most String Problem*. **International Journal of Computational Intelligence Systems**, vol. 17, article number 109, 2024. DOI: 10.1007/s44196-024-00488-7. **[JCR, Q2, IF: 3.0]**

[16] E.G. Morquecho, S.P. Torres, F. Astudillo-Salinas, H. Ergun, D. Van Hertem, C.A. Castro, C. Blum. *Comparison of an Improved Metaheuristic and Mathematical Optimization Based Methods to Solve the Static AC TNEP Problem*. **IEEE Transactions on Power Systems**, vol. 39(2), pp. 3240–3256, 2024. DOI: 10.1109/TPWRS.2023.3305431. **[JCR, Q1, IF: 7.2]**

[17] R.M. Rosati, S. Bouamama, C. Blum. *Multi-constructor CMSA for the maximum disjoint dominating sets problem*. **Computers and Operations Research**, vol. 161, article number 106450, 2024. DOI: 10.1016/j.cor.2023.106450. **[JCR, Q1, IF: 4.3]**