

Marta García Martínez

*Computational Scientist
Argonne National Laboratory*

Education

2005–2009 **Ph.D. in Fluid Dynamics**, *Toulouse Institute of Technology*, Toulouse (France) 01/19/2009

Ph.D. studies carried out at the European Centre for Research and Advanced Training in Scientific Computation (CERFACS), Toulouse (France)

Title: *Development and Validation of the Euler-Lagrange Formulation on a Parallel and Unstructured Solver for Large-Eddy Simulation*

Supervisor: Thierry Poinso, Research Director (CNRS - French National Centre for Scientific Research)

1994–2001 **Engineer's Degree in Mechanical Engineering**, *Centro Politécnico Superior*, Saragossa (Spain) 02/22/2001

Final project carried out in the Mechanical and Aerospace Engineering Department, Sapienza University of Rome, Rome (Italy) under a Socrates/Erasmus Grant (1999-2000)

Title: *Numerical Simulation of the Effects of Components Deterioration in Gas Turbine Systems*

Major: Energy and Technology of Heat and Fluids

Research Interests

My current research focuses on applying business and leadership principles to the management and execution of complex and challenging projects with multidisciplinary teams. Based on experiences from projects managed since 2013, I have particular interest in cross-functional, cross-organizational relationships and in understanding human dynamics between teams to build social capital. In addition, my research in the past years has been focused on topics related to high-performance computing, computational fluid dynamics, and most recently in the fields of neuroscience and biomedical engineering through my joint appointment at Northwestern University with the Northwestern-Argonne Institute of Science and Engineering. I have participated in multiple volunteering events at the laboratory over the last 13 years and mentor students/staff to reach their full human and scientific potential.

Positions and Experience

2021-present **Computational Scientist (RD4)**, *Computational Science Division*

ARGONNE NATIONAL LABORATORY, Lemont, IL (USA)

- Collaborated with multidisciplinary teams to develop and refine cutting-edge technology and software for the Aurora exascale supercomputer, capable of performing 1,000,000,000,000,000 operations per second; efforts ongoing to bring next-generation supercomputers into production for science on day one.
- Directed committee during the Innovative and Novel Computational Impact on Theory and Experiment Computational (INCITE) Readiness Review; Selection of high-impact computational science projects responsible for advances in science and engineering. Roles: Lead (2021 – 2022); Deputy Lead (2020).

2018-present **Northwestern–Argonne Institute of Science and Engineering**

FEINBERG SCHOOL OF MEDICINE, NORTHWESTERN UNIVERSITY, Chicago, IL (USA)

- Spearheaded computational efforts to simulate motor neurons on supercomputers with an award (\$3,907,539) from the National Institute of Neurological Disorders and Stroke. Role: Co-Investigator (2022 – 2027).
- Spearheaded computational efforts to apply machine learning techniques to the study of upper limb muscles for clinical applications with an award (\$418,363) from the National Institute of Arthritis and Musculoskeletal and Skin Diseases. Role: Co-Investigator (2022 – 2024).

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- 2018-2021 **Principal Project Specialist - Computational Science (RD3)**, *Computational Science Division*
 ARGONNE NATIONAL LABORATORY, Lemont, IL (USA)
- Orchestrated the Exascale Computing Project Annual Meeting Committee to successfully plan and conduct the meetings and agenda; resulted in increased attendance over the years, received excellent survey reviews from leadership and attendees, and an Argonne Pacesetter Award. Roles: Program Chair (2019); Co-Chair (2020).
 - Organized workshops and developed training material to educate supercomputer users; pioneered relationships with other centers to address computational science challenges; participated in laboratory, and cross-laboratory activities to implement facility plans. Roles: Group Member; Support Staff; Technical Representative.
 - Awarded thousands of supercomputer hours at the Laboratory Computing Resource Center to support projects that study the motor neurons in the spinal cord; enabled the adoption of new technology that resulted in faster time-to-solution computation and fast-paced research. Role: Principal Investigator (2019 – present).
- 2016-2018 **Principal Project Specialist - Computational Science (RD3)**, *Argonne Leadership Computing Facility*
 ARGONNE NATIONAL LABORATORY, Lemont, IL (USA)
- Innovated and transformed the Argonne Training Program on Extreme-Scale Computing (ATPESC) to inspire, motivate, and educate computational scientists on leadership-class supercomputers; efforts recognized with several awards and exceptional service to the nation's computational research community, examples include: the National Aeronautics and Space Administration mission to Mars. Role: Program Director (2016 – 2019).
- 2010-2016 **Assistant Computational Scientist (RD2)**, *Argonne Leadership Computing Facility*
 ARGONNE NATIONAL LABORATORY, Lemont, IL (USA)
- Planned and executed review activities of the Argonne Director's Review Committee for the Laboratory Directed Research and Development Competitive Grants; recognized to bring intellectual horsepower and critical and constructive feedback to the review process. Roles: Chair (2015); Vice-Chair (2014); Member (2013).
 - Collaborated with national and international teams to enable breakthrough science and engineering research at leadership scale; efforts allowed to increase codes performance using scaling, debugging, and profiling tools.
 - Spearheaded computational efforts to study internal combustion engines with an Advanced Scientific Computing Research Leadership Computing Challenge Award; efforts contributed to 100-times speedup in writing files and 1400-times speedup in mesh load balancing operations. Role: Co-Investigator (2015 – 2016).
 - Co-advised postdoctoral student and engineered supercomputer strategy in Laboratory Directed Research and Development Strategic Initiative Grant (\$1,451,100); resulted in the development of better models for the simulation of internal combustion engines. Role: Co-Investigator (2013 – 2015).
- 2009-2010 **Postdoctoral Researcher**, *Computational Fluid Dynamics Team*
 CERFACS, Toulouse (France)
- Analyzed dynamic load balancing and implementation of parallel partitioning algorithms (from ParMETIS library) for unstructured 3D Computational Fluid Dynamics (CFD) codes.
 - Provided code and user support of the Lagrangian module developed during the Ph.D. and memory modules of the CFD code AVBP.
- 2004-2005 **Study Engineer**, *Computational Fluid Dynamics Team*
 CERFACS, Toulouse (France)
- Implemented partitioning algorithms (from ParMETIS library) for CFD computations.
 - Supported parallelism development, code debugging, profiling, and memory optimization of the CFD unstructured solver AVBP.
 - Prepared technical reports and code documentation of partitioning and parallel library.
 - Designer, developer and webmaster of five national and international websites
- 2002-2003 **Study Engineer**, *Computational Fluid Dynamics Team*
 CERFACS, Toulouse (France)
- Implemented partitioning algorithms (from METIS library) for CFD computations.
 - Supported parallelism development, code debugging, profiling, and memory optimization of the CFD unstructured solver AVBP.
 - Prepared technical reports and code documentation of partitioning and parallel library.
- 2001 **Project Manager**
 INGEMETAL S.A., Saragossa (Spain)
- Constructed the Burke Brise Soleil cover for the Milwaukee Art Museum addition (designed by Santiago Calatrava).
 - Responsible for communication, work supervision, and interactions between American and Spanish working teams.
- 2000-2001 **Internship**, *Mechanical and New Materials Department*
 ARAGON INSTITUTE OF TECHNOLOGY, Saragossa (Spain)
- Acoustic measurements and viability studies.

Honors and Awards

- 2023 **Argonne Core Values Shout-Out - Impact** 05/23/2023
For the role played to make the 2023 Open House a success, with broad impact across the lab and Chicagoland
- 2023 **Argonne Core Values Shout-Out - Impact** 03/24/2023
For giving impactful and inspiring tours of Aurora and for creating a safe, welcoming, and inclusive workplace environment putting Argonne's Core Values into action
- 2022 **Impact Argonne Award** 11/30/2022
For Extraordinary Effort leading ALCF's involvement, for the past three years, in the Computational Readiness evaluation for INCITE projects
- 2021 **UChicago Argonne Board of Governors Award - Pinnacle of Education Award** 11/16/2021
For exceptional contributions and continuous efforts that help to make science education and outreach inspiring and unique for students, teachers and community groups
- 2021 **Impact Argonne Award** 09/27/2021
For enhancing Argonne's reputation by organizing monthly virtual meetups for CELS women, including students and visitors
- 2020 **Service Award** 10/18/2020
For 10 years of hard work and dedication at Argonne National Laboratory
- 2020 **Argonne Core Values Shout-Out - Safety** 06/22/2020
For joining the Argonne Health Pact to create a physically and psychologically safe environment
- 2020 **Argonne Core Values Shout-Out - Impact** 06/11/2020
For excellent Computing, Environment and Life Sciences (CELS) Directorate Summer Lecture
- 2020 **Argonne Core Values Shout-Out - Teamwork** 05/29/2020
For helping foster a future generation of scientists and engineering in the nation supporting women in STEM
- 2019 **Argonne Core Values Shout-Out - Teamwork** 12/19/2019
For excellent team player during the organization of the 2020 ECP Annual Meeting
- 2019 **Argonne Core Values Shout-Out - Teamwork** 10/17/2019
For volunteering in the organization of Computational Science Division activities
- 2018 **Northwestern Argonne Institute of Science and Engineering (NAISE)** 06/20/2018
Senior Fellow
- 2018 **Argonne Pacesetter Award** February 2018
For extraordinary effort in supporting and leading preparation efforts for the DOE Exascale Computing Project's Second Annual Meeting
- 2016 **Argonne Pacesetter Award** September 2016
For extraordinary effort and leadership skills for the Argonne Training Program on Extreme-Scale Computing
- 2015 **Service Award** 10/18/2015
For 5 years of hard work and dedication at Argonne National Laboratory
- 2015 **ISC Research Poster Award** 07/13/2015
For "Performance Enhancement of an Internal Combustion Engine CFD Simulation on IBM BG/Q", J. Kodavasal, K. Harms, P. Srivastava, S. Som, S. Quan, K. Richards, and M. García. *ISC High Performance*, July 12-16, 2015, Frankfurt, Germany
- 2013 **Strategic Laboratory Leadership Program (SLLP)** 04/05/2013 - 11/08/2013
Selected by Argonne National Laboratory Director because of leadership abilities, collaborative thinking skills, exceptional work ethic, rigorous scholarship aptitude, and innovative and creative problem solving capabilities
- 2009 **Label C3I - Certificat de Compétences en Calcul Intensif**
Certificate awarded by the CPU (Conférence des Présidents d'Universités), GENCI and the *Maison de la Simulation* to Ph.D. holders who developed and applied skills in HPC during their Ph.D.

Grants

- 2022-2027 **National Institute of Neurological Disorders and Stroke (Role: Co-I)**
1 R01 NS125863-01A1: \$3,907,539 05/01/2022 - 02/28/2027
Supercomputer-based Models of Motoneurons for Estimating Their Synaptic Inputs in Humans
- 2022-2024 **National Institute of Arthritis and Musculoskeletal and Skin Diseases (Role: Co-I)**
1 R21 AR080953-01: \$418,363 09/01/2022 - 07/31/2024
Automatic MRI segmentation for upper limb muscles for clinical applications

Computing Awards

- 2020, 2022 **Advanced Photon Source (APS) User Proposal for beamtime (Role: Co-I)**
Large volume feline spinal cord microtomography
GUP-74456: 2-BM-A,B 2022-1 03/25/2022 - 03/27/2022
GUP-64547: 2-BM-A,B 2020-1 02/27/2020 - 03/02/2020
- 2019-2023 **Laboratory Computing Resource Center (LCRC) Computing Award (Role: PI)**
 - **SPINES_REV:** 650,000 core-hours on Bebop, Intel Broadwell & KNL 10/01/2022 - 09/30/2023
Supercomputer-based Models of Motoneurons for Estimating Their Synaptic Inputs in Humans
 - **NAISE_MN_AVrate_3:** 1,475,000 core-hours on Bebop, Intel Broadwell & KNL 10/01/2020 - 09/30/2022
Modeling of motorpool output with respect to excitation and inhibition inputs
 - **NAISE_Segment_ML:** 599,999 core-hours on Bebop, Intel Broadwell & KNL 01/02/2020 - 06/30/2020
Machine Learning for Semantic Segmentation of feline spinal cord images
 - **NAISE_MN_AVrate_2:** 599,999 core-hours on Bebop, Intel Broadwell & KNL 01/02/2020 - 06/30/2020
Modeling of motorpool output with respect to excitation and inhibition inputs
 - **NAISE_MN_AVrate:** 750,000 core-hours on Bebop, Intel Broadwell & KNL 02/13/2019 - 09/30/2019
Modeling of motorpool output with respect to excitation and inhibition inputs
 - **NAISE_SI19_Segment:** 600,00 core-hours on Bebop, Intel Broadwell & KNL 05/30/2019 - 09/30/2019
Segmentation algorithms and pipeline for feline spinal cord studies
 - **NAISE_SI19_Tuning:** 600,000 core-hours on Bebop, Intel Broadwell & KNL 05/30/2019 - 09/30/2019
Parameter tuning and analysis of motoneurons
- 2019 **Argonne Leadership Computing Facility (ALCF) Computing Award (Role: PI)**
NAISE_SI19_Segment: 8,000 core-hours on Cooley, Intel Haswell 6/14/2019 - 10/01/2019
Segmentation algorithms and pipeline for feline spinal cord studies
- 2015-2016 **Advanced Scientific Computing Research (ASCR) Leadership Computing Challenge (ALCC) Award (Role: Co-I)**
CES_Analysis: 60,000,000 core-hours on Mira, IBM BG/Q (ALCF) 07/01/2015 - 06/30/2016
Advancing Internal Combustion Engine Simulations using Sensitivity Analysis
- 2014-2016 **Innovative and Novel Computational Impact on Theory and Experiment (INCITE) Award (Role: Co-I)**
Comb_Deto: 150,000,000 core-hours on Mira, IBM Blue Gene/Q (ALCF) 01/01/2014 - 12/31/2014
150,000,000 core-hours on Mira, IBM Blue Gene/Q (ALCF) 01/01/2015 - 12/31/2015
140,000,000 core-hours on Mira, IBM Blue Gene/Q (ALCF) 01/01/2016 - 12/31/2016
First-Principles Simulations of High-Speed Combustion and Detonation
- FY13-FY15 **LDRD Strategic Initiative Grant (Role: Co-I)**
P/ANL2013-148: \$1,451,100 10/01/2012 - 09/30/2015
Development of Predictive Multi-dimensional Combustion Modeling Capability with Detailed Chemistry

Professional Development

The University of Chicago Booth School of Business - Harry L. Davis Center for Leadership

- 2024 Mini-Course: Five Drivers of Team Effectiveness
- 2023 Mini-Course: Becoming an Inclusive Leader
- 2023 Mini-Course: Managing Behaviors in High Stakes
- 2022 Mini-Course: Navigating Team Dynamics
- 2021 Mini-Course: Choosing Leadership

University of California, Berkeley - Haas School of Business - Executive Education

- 2023 Leading Complex Projects 08/03/2023 - 10/12/2023 (2 months)
- 2019 Data Science: Bridging Principles and Practice 05/02/2019 - 03/07/2019 (8 weeks)

Managerial Skills Series at Argonne National Laboratory

- 2017-2020 Participation in eight workshops ranging from topics on skillful conversations, conflict resolution and realizing talent in others to guiding collaborative discussion.

The University of Chicago Booth School of Business - Executive Education

- 2018 Engagement, Performance and Execution 07/23-27/2018 (1 week)
- 2015 Essentials of Effective Management: The Psychology of Management 12/7-11/2015 (1 week)
- 2013 Negotiation and Decision Making Strategies 06/17-21/2013 (1 week)

2014 Chicago Collaboration for Women in STEM 2014 Career Development and Leadership Retreat

02/20-21/2014

Sponsored by the Office of the Provost at The University of Chicago and Northwestern University

Summer 2006 Center for Turbulence Research (CTR) Summer Program 07/09/2006 - 08/04/2006 (4 weeks)

Participant of this biennial summer research program at Stanford University, whose objective is to promote the development and evaluation of new ideas in turbulence research.

Publications

Peer-reviewed Scientific Archival Publications

- Meteorol. Z.'17** R. Paoli, O. Thouron, D. Cariolle, M. García and J. Escobar. "Three-dimensional large-eddy simulations of the early phase of contrail-to-cirrus transition: effects of atmospheric turbulence and radiative transfer", *Meteorologische Zeitschrift*, 26:597-620 (2017)
- JERT'16** J. Kodavasal, K. Harms, P. Srivastava, S. Som, S. Quan, K. Richards and M. García. "Development of a Stiffness-Based Chemistry Load Balancing Scheme, and Optimization of Input/Output and Communication, to Enable Massively Parallel High-Fidelity Internal Combustion Engine Simulations", *Journal of Energy Resources Technology*, 138(5), 052203 (Feb 23, 2016) (11 pages)
- J. Sci. Comput.'11** T. Poinso, M. García, J.-M. Senoner, L. Gicquel, G. Staffelbach and O. Vermorel. "Numerical and Physical Instabilities in Massively Parallel LES of Reacting Flows", *Journal of Scientific Computing*, 49:78-93 (2011)
- Proc Combust Inst 2011** F. Jaegle, J.-M. Senoner, M. García, F. Bismes, R. Lecourt, B. Cuenot and T. Poinso. "Eulerian and Lagrangian spray simulations of an aeronautical multipoint injector", *In Proceedings of the Combustion Institute*, 33:2099-2107 (2011)
- CSD'09** N. Gourdain, L.Y.M. Gicquel, M. Montagnac, O. Vermorel, M. Gazaix, G. Staffelbach, M. García, J.-F. Boussuge and T. Poinso. "High performance parallel computing of flows in complex geometries: I. Methods", *Computational Science & Discovery* 2 (November) 015003 (26pp) (2009)
- CRM'09** J.-M. Senoner, M. Sanjosé, T. Lederlin, F. Jaegle, M. García, E. Riber, B. Cuenot, L.Y.M. Gicquel, H. Pitsch and T. Poinso. "Eulerian and lagrangian large-eddy simulations of an evaporating two-phase flow", *Comptes Rendus Mécanique*, 337(6-7), 458-468 (2009)
- JCP'09** E. Riber, V. Moureau, M. García, T. Poinso and O. Simonin. "Evaluation of numerical strategies for LES of two-phase recirculating flows", *Journal of Computational Physics*, 228(2), 539-564 (2009)
- AIAA J'08** J. M. Senoner, M. García, S. Mendez, G. Staffelbach, O. Vermorel and T. Poinso. "Growth of Rounding Errors and Repetitivity of Large-Eddy Simulations", *American Institute of Aeronautics and Astronautics Journal*, 46(7), 1773-1781 (2008)

Book Chapters

- 2022 O.U. Khurram, G.E.P. Pearcey, M.K. Chardon, E.H. Kim, M. García, C.J. Heckman (2022). The Cellular Basis for the Generation of Firing Patterns in Human Motor Units. In: O'Donovan, M.J., Falgairolle, M. (eds) **Vertebrate Motoneurons**, Advances in Neurobiology, Vol 28, pp. 233-258 © Springer Nature Switzerland
- 2019 **Contemporary High Performance Computing: From Petascale toward Exascale**, Chapter: Theta and Mira at Argonne National Laboratory. Publisher: CRC Press, Inc. (May 14, 2019). Editor: Jeffrey Vetter

Dissertation

- 2009 **Ph.D. Thesis**, "Développement et validation du formalisme Euler-Lagrange dans un solveur parallèle et non-structuré pour la simulation aux grandes échelles". M. García, CERFACS TH/CFD/09/1 (in english), Institut National Polytechnique de Toulouse - INPT, 2009 <tel-00414067>

Peer-reviewed Conference Proceedings

- SAE 2016** J. Kodavasal, Y. Pei, K. Harms, S. Ciatti, A. Wagner, P.K. Senecal, M. García and S. Som. "Global Sensitivity Analysis of a Gasoline Compression Ignition Engine Simulation with Multiple Targets on an IBM Blue Gene/Q Supercomputer", *Society of Automotive Engineering (SAE) 2016 World Congress & Exhibition*, 16PFL-0871, 12-14 April 2016, Detroit, Michigan, USA
- ICEF2015** J. Kodavasal, K. Harms, P. Srivastava, S. Som, S. Quan, K. Richards and M. García. "Scaling up a high-fidelity internal combustion engine simulation on an IBM Blue Gene/Q supercomputer", *In Proceedings of the ASME 2015 Internal Combustion Engine Division Fall Technical Conference*, ICEF2015-1035, November 8-11, Houston (2015)
- SAE 2013** S. Som, D. E. Longman, S. M. Aithal, R. Bair, M. García, S. P. Quan, K.J. Richards, P.K. Senecal, T. Shethaji and M. Weber. "A Numerical Investigation on Scalability and Grid Convergence of Internal Combustion Engine Simulations", *SAE 2013 World Congress & Exhibition*, 13PFL-0587 / 2013-01-1095, April 16 (2013)
- ICLASS 2009** F. Jaegle, J.-M. Senoner, M. García, C. Jiménez, B. Cuenot, and T. Poinso. "Evaluation of simulation strategies for multipoint injection systems in aero-engines on the example of a liquid jet in a gaseous crossflow", *In 11th Triennial International Conference on Liquid Atomization and Spray Systems*, Paper Number 042, Vail, Colorado (2009)
- ICMF 2007** M. García, E. Riber, O. Simonin and T. Poinso. "Comparison between Euler/Euler and Euler/Lagrange LES approaches for confined bluff-body gas-solid flow", *In Proceedings of the 6th International Conference on Multiphase Flow*. CD-Rom - S3_Fri_A_62 - Leipzig (2007)
- CTR'06** E. Riber, M. García, V. Moureau, H. Pitsch, O. Simonin and T. Poinso. "Evaluation of numerical strategies for LES of two-phase reacting flows", *In Proceedings of the Summer Program 2006*, 197-211 (2006)
- ECCOMAS'05** M. García, Y. Sommerer, T. Schönfeld and T. Poinso. "Evaluation of Euler/Euler and Euler/Lagrange strategies for large-eddy simulations of turbulent reacting flows", *In ECCOMAS Thematic Conference on Computational Combustion*. Lisbon (2005)

Reviewed Preprint

- eLife 2023** M.K. Chardon, Y.C. Wang, M. García, E. Besler, J.A. Beauchamp, M. D'Mello, R.K. Powers, C.J. Heckman. "Supercomputer framework for reverse engineering firing patterns of neuron populations to identify their synaptic inputs", *eLife* September 28, 2023

Preprint

- bioRxiv** M.K. Chardon, Y.C. Wang, M. García, E. Besler, J.A. Beauchamp, M. D'Mello, R.K. Powers, C.J. Heckman. "Supercomputers and reverse engineering of motoneuron firing patterns", *bioRxiv* December 11, 2022

Invited Conference

- VKI Lecture Series** N. Gourdain, L.Y.M. Gicquel, M. Montagnac, O. Vermorel, M. Gazaix, G. Staffelbach, M. García, J.-F. Boussuge and T. Poinso. "High performance computing of industrial flows: Application to aeronautic and propulsion challenges - invited conference", *In VKI Lecture Series on High Performance Computing of Industrial Flows*, Von Kármán Institute, Brussels (2009)

Conference Abstract

- ASME 2014** R. Paoli, O. Thouron, J. Picot, D. Cariolle, M. García. "Large-eddy simulations of contrail-to-cirrus transition in the atmosphere", *Abstract for American Society of Mechanical Engineers (ASME) 4th Joint US-Europe Fluids Engineering Division Summer Meeting*, August 3-7, Chicago (2014)

Technical Reports

- ECP AM'20** M. García and T. Munson. U.S. Department of Energy. 2020 Exascale Computing Project Annual Meeting (Executive Summary Report). Rpt # ECP-I-PO-RPT_2020_00003. May, 2020. Report published by OSTI
- ECP AM'20** M. García and T. Munson. U.S. Department of Energy. 2020 Exascale Computing Project Annual Meeting - Final Feedback Form Results. Rpt # ECP-I-POD_2020_00102, Argonne National Laboratory, Apr 14, 2020.
- ATPESC** Multiple Exascale Computing Project Milestone Reports for the Argonne Training Program on Extreme-Scale Computing (ATPESC) (2017-2019): ADTR01-02, ADTR01-52, ADTR01-129, ADTR01-130, ADTR01-131, ADTR01-132, ADTR01-133, ADTR01-134, ADTR01-135, ADTR01-136, ADTR01-137, ADTR01-138, ADTR01-139, ADTR01-140, ADTR01-143, ADTR01-179
- 2009** M. García. "Partitionnement parallèle du maillage". Projet ANR CAMPAS, Deliverable L5 CR/CFD/09/119, CERFACS (December 2009)
- 2009** F. Jaegle, J.-M. Senoner, M. García, C. Jimenez, B. Cuenot, and T. Poinso. "Comparison of Euler-Euler and Euler-Lagrange methods for liquid jet injection in a crossflow". TR/CFD/09/104, CERFACS (December 2009)
- 2009** E. Riber, V. Moureau, M. García, T. Poinso, and O. Simonin. "Evaluation of numerical strategies for Large Eddy Simulation of particulate two-phase recirculating flows". TR/CFD/07/135, CERFACS (December 2007)
- 2007** M. García. "Interpolateur parallèle de solutions". Projet ANR CAMPAS, Deliverable L3 CR/CFD/07/149, CERFACS (July 2007)
- 2003** M. García. "Analysis of precision differences observed for the AVBP code". TR/CFD/03/84, CERFACS (2003)

Posters

- 2021 M.K. Chardon, C. Wang, M. García, R. Powers, C.J. Heckman. "Supercomputers, Neuron Simulations and Reverse Engineering of Neuron Firing Patterns", *Poster Session: Theory Data Analysis Tools, Poster Number 4013*, 7th Annual BRAIN Initiative Investigators Meeting, June 15-17, 2021 (Virtual Event)
- 2021 M. García, T. Stan, M. D'Mello, J. Pritz, V. De Andrade, R. Vescovi, V. Sampathkumar, N. Kasthuri, C.J. Heckman, M.K. Chardon. "Machine Learning Applied to Feline Spinal Cord Microtomography Images", *Poster Session Hall A - Subsession A1, Biology*, 2021 APS/CNM Users Meeting, May 3-14, 2021 (Virtual Event)
- 2019 M. García. "Argonne Training Program on Extreme-Scale Computing 2019", *Application Development / Hardware & Integration / Facilities / Industry Poster Session*, 2019 Exascale Computing Project Annual Meeting, January 14-17, 2019, Houston, USA
- 2018 M. García. "Argonne Training Program on Extreme-Scale Computing 2018", *Application Development/Co-design, Hardware & Integration, Facilities Poster Session*, Exascale Computing Project 2nd Annual Meeting, February 6-8, 2018, Knoxville, USA
- 2017 M. García. "Argonne Training Program on Extreme-Scale Computing 2017", *Poster Session*, Argonne Exascale Computing Project Town Hall, January 24, 2017, Lemont, USA
- ISC 2015 J. Kodavasal, K. Harms, P. Srivastava, S. Som, S. Quan, K. Richards, and M. García. "Performance Enhancement of an Internal Combustion Engine CFD Simulation on IBM BG/Q", *ISC High Performance*, July 12-16, 2015, Frankfurt, Germany

Web Articles / Blogs

- VERIFI** Web article: *VERIFI code optimization yields three-fold increase in engine simulation speed* (2015)

ATPESC Material:

- Web article: *Argonne Training Program on Extreme-Scale Computing to mark its 10th anniversary* (2022)
- Web article: *Argonne training program prepares researchers for scientific computing in the exascale era* (2019)
- Blog: *Preparing the Next Generation of Supercomputer Users* (2019)
- Web article: *Leaning into the supercomputing learning curve* (2017)
- Video: *2016 ATPESC: training a new generation of supercomputer users* (2016)

Other

SC15 A. Insley, J. Kodavasal, X. Chai, K. Harms, M. García and S. Som. "Gasoline Compression Ignition: Optimizing Start of Injection Time", *SC 15 Visualization Showcase presentation*, Nov. 18, 2015, Austin, TX, USA.

DOE NSB'15 J. A. Insley, J. Kodavasal, Xi. Chai, K. Harms, M. García and S. Som. "Gasoline Compression Ignition: Optimizing Start of Injection Time", presented as an interactive kiosk at the *National Science Bowl*, April/May 2015, Washington, DC.

Selected Invited Talks

ATPESC 2022	Peek inside the feline spinal cord with X-rays and machine learning superpowers Dinner Talk	08/05/2022
EDU 2021	Argonne EDU Mini-Semester Program: Computing Across the Sciences Computational Science Presentation	12/15/2021
2021	CELS Coffee Time Lectures Series Back-to-Back: NU, Argonne and UChicago efforts to understand the spinal cord	03/31/2021
2020	CELS Summer Student Lectures Series Machine Learning for Neurobiology and Biomedical Applications	06/11/2020
ATPESC 2019	ATPESC 2019 Opening Presentation Introduction to the ATPESC	07/28/2019
ATPESC 2018	ATPESC 2018 Opening Presentation Introduction to the ATPESC	07/29/2018
ATPESC 2017	ATPESC 2017 Opening Presentation Introduction to the ATPESC	07/30/2017
2017	ALCF Postdocs Career Lunch Talks My Journey of becoming a staff at ALCF	02/21/2017
VERIFI'16	VERIFI 2016 Workshop Hands-on Session (step-by-step)	06/23/2016
GSW'12-16	ALCF Getting Started Videoconferences (GSW) Speaker in multiple videoconferences over the years	2012-2016
Argonne Outloud'15	Argonne Outloud - Public Lecture Series Catch a Rising Science Star	09/10/2015
SCSW'15	Science Careers in Search of Women 2015 Women in Computing Panel	04/16/2015
VERIFI'14	VERIFI 2016 Workshop Hands-on Session (step-by-step). Mira Job Submission	11/13/2014
WIST FFF 2014	Women in Science and Technology First Friday Forum 2014 Panelist	03/13/2014
DOE CSGF'11	2011 DOE Computational Science Graduate Fellowship Annual Conference HPC Workshop - Pursuing Computational Science Research at the Argonne Leadership Computing Facility (with P. Messina and N. Romero)	07/20/2011

Service

Community Leadership

- 2022 **INCITE 2023 Computational Readiness Review Committee**, *Lead*
- 2021 **INCITE 2022 Computational Readiness Review Committee**, *Lead*
- 2020 **INCITE 2021 Computational Readiness Review Committee**, *Deputy Lead*
- 2020 ECP AM **2020 Exascale Computing Project Annual Meeting**, *Program Co-Chair*
- 2019 ECP AM **2019 Exascale Computing Project Annual Meeting**, *Program Chair*
- ATPESC **2016-2019 Argonne Training Program on Extreme-Scale Computing**, *Program Director*
- NAWCN'18 **Northwestern-Argonne Workshop on Computational Neuroscience**, *Workshop Co-Chair*
- 2016 **Margaret Butler Symposium Committee**, *Co-Chair*
- FY13 - FY15 **Argonne Director's Review Committee (DRC) for the Laboratory Directed Research and Development (LDRD) for the Director's Competitive Grants (DCG)**, *Member, Vice-Chair and Chair*

Committee Membership

- ATPESC **Argonne Training Program on Extreme-Scale Computing (ATPESC)**
2016-2024 *Review Committee, Member*
- SBIR/STTR **Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) FY2024**
FY24 *Phase I Review Committee, Member*
- INCITE CR **INCITE Computational Readiness**
2011-2023 *Review Committee, Member*
- IPDPS 2022 **International Parallel and Distributed Processing Symposium (IPDPS 2022)**
Technical Program Committee, Member Experiments Track
- 2020 **ALCC 2021-2022**
Review Committee, Member
- IPDPS 2021 **International Parallel and Distributed Processing Symposium (IPDPS 2021)**
Technical Program Committee, Member Experiments Track
- SC20 **International Conference for High Performance Computing, Networking, Storage, and Analysis (SC20)**
Technical Program Committee, Member State of the Practice Area
- SC20 **International Conference for High Performance Computing, Networking, Storage, and Analysis (SC20)**
Student Volunteers Program, Reviewer
- SC19 **International Conference for High Performance Computing, Networking, Storage, and Analysis (SC19)**
Student Volunteers Program, Reviewer
- PCI'19 **Petascale Computing Institute**
Organizing Committee, Member & Argonne Host-Site Representative
- IPDPS 2019 **International Parallel and Distributed Processing Symposium (IPDPS 2019)**
Technical Program Committee, Member Experiments Track
- 2016-2019 **Argonne University Partnerships Program**
Technical Advisory Committee, Member
- SC18 **International Conference for High Performance Computing, Networking, Storage, and Analysis (SC18)**
Technical Program Committee, Member State of the Practice Area
- 2018 ECP AM **2018 Exascale Computing Project Annual Meeting**
Organizing Committee, Member
- SPI'17 **Scaling to Petascale Institute**
Organizing Committee, Member & Argonne Host-Site Representative
- GSW'12-16 **ALCF Getting Started Videoconferences**
Organizing Committee, Member
- SBIR/STTR **Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) FY2017**
FY17 *Phase I Review Committee, Member*

- VERIFI'16 **Virtual Engine Research Institute and Fuels Initiative (VERIFI) 2016 Workshop**
Hands-on Session Organizer
- 2014-2015 **Margaret Butler Symposium**
Speaker and Planning Committee, Member
- 2014 **Argonne CORAL Proposal Evaluations**
Programming Environment Committee, Member
- VERIFI'14 **VERIFI 2014 Workshop**
Hands-on Session Organizer
Community Service
- OH 2023 **Argonne Open House 2023, Activity Lead** (Peek Inside Supercomputer Racks)
- 2022 IGED **Argonne's Annual Introduce a Girl to Engineering Day (IGED)**, *Mentor*
- 2022 NSB **2022 Illinois Middle School Regional Science Bowl**, *Scorekeeper/Recognizer*
- HOC 2021 **Hour of Code**, *Speaker in two STEM Chat presentations during Computer Science Education Week (~60 students)*
- 2021 **Madonna Foundation Career Panel**, *Panelist* (60 students)
- PEARC21 **Practice & Experience in Advanced Research Computing 2021**, *Mentor - Resume Clinic* (4 students)
- 2021 **Virtual Career Fair for 6th-8th Grade Students at Barnard Elementary School**, *Presenter*
- SCSW 2021 **Science Careers in Search of Women 2021**, *Mentor - Scientist Small Group Session* (Group 6)
- 2021 **ALCF/NVIDIA GPU Hackathon**, *Mentor - Team SIGMA*
- 2021 NSB **2021 Illinois Middle School Regional Science Bowl**, *Scorekeeper/Recognizer*
- 2011-2021 **ALCF Computational Performance Workshops**, *Support Staff*
- 2017-2021 **ALCF Simulation, Data and Learning (SDL) Workshops**, *Support Staff*
- HOC 2020 **Hour of Code**, *Speaker in four STEM Chat presentations during Computer Science Education Week (~200 students)*
- 2020 **APS/CELS Town Halls - A common vision for the future**, *Participant*
- 2020 IGED **Argonne's Annual Introduce a Girl to Engineering Day (IGED)**, *Day-Staff*
- 2011-2019 **ALCF Data Center and Machines Room**, *Tour Guide for supercomputers: Intrepid, Mira, Theta*
- 2019 **AI for Science Town Halls**, *Participant*
- OAR CY2016 **Operational Assessment Review (OAR) Strategic Results Section**, *Principal Author*
- SC16 **International Conference for High Performance Computing, Networking, Storage, and Analysis (SC16)**,
Argonne Representative
- IXPUG2016 **Intel Xeon Phi User Group Annual Meeting (IXPUG2016)**, *Session Chair, Top Ten Tutorial*
- SCSW'12 **Science Careers in Search of Women 2012**, *Machines Tour Guide and Student Luncheon Volunteer*
- Grace Hopper
2011-2013 **Grace Hopper Celebration for Women in Computing**, *Argonne representative*
- 2011-13 IGED **Argonne's Annual Introduce a Girl to Engineering Day**, *Mentor*
- 2008-2009 **French R&D Combustion initiate INCA (Initiative en Combustion Avancée) website**, *Designer, developer and webmaster*
- 2007-2009 **CERFACS - Aviation and Environment Team website**, *Designer, developer and webmaster*
- 2006-2008 **FP6 CORDIS European project AETHER website**, *Designer, developer and webmaster*
- 2006-2007 **FP6 European project ECCOMET (Efficient and clean combustion experts training) website**, *Designer, developer and webmaster*
- 2004-2007 **FP6 European Marie Curie RTN project FLUISTCOM (Fluid-structure interaction for combustion systems) website**, *Designer, developer and webmaster*
- 2002-2009 **CERFACS - Computational Fluid Dynamics Team website**, *Designer, developer and webmaster*

Significant Project Involvement

2020-present **Aurora Early Science Program (ESP)**, Catalyst for Martin Berzins (Univ. of Utah) project
 2018-present **Aurora NRE Applications Working Group**, Member
 2018-present **Aurora NRE Compilers/MKL/MPI Working Group**, Member
 2014-present **Install and maintain software on BG/P, BG/Q and other ALCF systems**
 2017-2022 **Matlab licenses on Cooley**, Technical Representative
 2018 **CORAL-2 Technical Evaluation Team**, Member
 2015-2017 **CORAL NRE Compiler Working Group**, Member
 2015-2016 **Theta Early Science Program (ESP)**, Catalyst for Alexei Khokhlov (The Univ. of Chicago) project
 2014 **CORAL Programming Environment Sub Team**, Member
 2011-2018 **ALCF Support Staff replying to user tickets, report on internal meetings about project progress**, Member

Main Collaborations

2011-present **Catalyst Role**
 Catalyst and single point of contact for INCITE, ALCC and Director's Discretionary projects. PIs with whom I collaborated with are: Prof. George Karniadakis (Brown University), Susan Kurien (LANL), William George (NIST) and Prof. Adam Burrows (Princeton University), among others.

2019-present **Shirley Ryan Ability Lab (SRALab)**
 Collaborating with Northwestern Research Scientists from the Shirley Ryan Ability Lab to work in the development of biomechanical models that accurately represent the mechanical actions of the upper extremity muscles with the help of deep learning methods and image segmentation techniques.

2017-present **Northwestern University**
 Collaborating with Northwestern neuroscientists from The Heckman Laboratory (Department of Physiology, Northwestern University) to use computational resources to develop a model of a motoneuron pool to study the mechanisms underlying spinal cord stimulation.

2015-2020 **Argonne Training Program on Extreme-Scale Computing**
 Collaborating with multiple renowned computer scientists and HPC experts from U.S. National Laboratories, Universities, and Industry who served over the years as lecturers during the two-weeks of the training program committed to provide continuous learning, personal growth, and professional development for more than 500 doctoral students, postdocs, and computational scientists participants since 2013.

2011-2017 **Convergent Science, Inc.**
 Collaborating with Convergent Science, Inc., a world leader in CFD software, to use supercomputers to conduct engine simulations. My work focuses on improving CFD solver CONVERGE™ to run efficiently on HPC systems like Mira. Prepared Award Submission for 2016 R&D 100: 776815927768. Software/Services: *CONVERGE Version 2.3: Computational Fluid Dynamics Software*.

Advising and Mentoring

Ph.D. Committees

2021 **Ph.D. Defense Committee - Sibó Li (University of Illinois at Chicago)**, Member
Title: Investigation of Aircraft Icing Based on Numerical Modeling and Machine Learning Methods

2020 **Ph.D. Preliminary Defense Committee - Sibó Li (University of Illinois at Chicago)**, Member
Title: Investigation of Aircraft Icing Based on Numerical Modeling and Machine Learning Methods

Postdocs

2022-present Mentor for **Geng Liu** - Leadership Computing Facility, Argonne National Laboratory
 2018-2019 Mentor for **Matthieu Chardon** - Feinberg School of Medicine, Northwestern University
 2017-2019 Mentor for **Gina Magnotti** - Energy Systems Division, Argonne National Laboratory
 2015-2016 Mentor for **Preeti Malakar** - Leadership Computing Facility, Argonne National Laboratory
 2013-2016 Co-Advisor for **Janardan Kodavasal** - Energy Systems Division, Argonne National Laboratory

Staff

2012 Mentor for **Avanthi Lalitha Mantrala** - Leadership Computing Facility, Argonne National Laboratory

NAISE Summer Students

2019 Advisor - **Josh Pritz** - *Optimizing Neural Network Performance for Image Segmentation*

2019 Advisor - **Nicole Camburn** - *Using Computational Methods as an Alternative to Manual Image Segmentation*

Computer Skills

Prog. Lang. Fortran; notions in C.
Parallel MPI; notions in OpenMP.
Debug & Profile Darshan, HPCToolKit, TAU, notions in Allinea DDT, Totalview, core-processor, mpiP, gdb, gprof, ssrun, Scalasca.
System Unix, Linux, Mac OS X, Windows.
Viz notions in Paraview, VisIt, Tecplot, Ensignt, Fieldview.
Codes AVBP, METIS, ParMETIS, HDF5, Code_Saturne, OpenFoam, Converge, HSCD, Fornax, Uintah.
Web HTML, PHP, CSS, Wordpress, Cvent, RegOnline.
Other LaTeX, Word, Excel, PowerPoint, Globus, Petrel, Tableau, GitHub, Cobalt, modules, Spack, vi, Bash, BATS, modules, Box, Slack, Confluence, BlueJeans, JIRA, SurveyMonkey, Dayforce, Virgin Pulse, Workday.
User GPFS, HPSS, Lustre; 3D and 5D Torus, Aries Dragonfly topology; IBM XL and Intel compilers.

Languages

Spanish	Mother tongue	
English	Written, read and spoken fluently	<i>Daily use in the working environment (2010-present)</i>
French	Written, read and spoken fluently	<i>Daily use in the working environment (2002-2010)</i>
Italian	Read and spoken fluently; good written	<i>Daily use in the family environment (1999-present)</i>
German	Notions	

Personal Interests

- **Reading** (whenever I have a second...)
- **Cooking** for family & friends
- I also love **Art**, **Architecture** and how both intermix
- **Traveling** to different cities and countries
- **Swimming** in winter and **running** in summer