HC LA HEIDELBERG CENTER PARA AMÉRICA LATINA

UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386

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1st Heidelberg-Chile Workshop on Scientific Computing

March 25 to 28, 2025

The workshop is organised by Heidelberg University's Interdisciplinary Center for Scientific Computing and the Heidelberg Center Latin America in Santiago de Chile, jointly with the Institute for Mathematical and Computational Engineering of our strategic partner Pontificia Universidad Católica de Chile.

Heidelberg Center Latin America
hcla.uni-heidelberg.de/es

Interdisciplinary Center for Scientific Computing Heidelberg University
uni-heidelberg.de/en/study/all-subjects/scientific-computing

Institute for Mathematical and Computational Engineering Pontificia Universidad Católica de Chile
imc.uc.cl/

Research Topics
Numerical Analysis
Optimization
Computational Biology
Machine Learning

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The Heidelberg Center Latin America - HCLA
Center of Excellence in Research and Teaching, is Heidelberg University's offshore campus in and for Latin America.

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Las Hortensias 2340
Providencia, Santiago de Chile

Tuesday
March 25
Optimization

9:00 - 9:30
Registration and Welcome

09:30 - 10:00
A posteriori error estimates for bang-bang optimal control problems
Francisco Fuica Villagra, Pontificia Universidad Católica de Chile

10:00 - 10:30
Joining prediction and optimization: prescriptive scenario generation for energy management with storage
Rodrigo A. Carrasco, Pontificia Universidad Católica de Chile

10:30 - 11:00
Preconditioned Solution of Structured Saddle-Point Problems in PDE-Constrained Optimization Roland Herzog, Heidelberg University

11:00 - 11:30
Coffee break

11:30 - 12:00
Optimization-based Model Validation
Ekaterina Kostina, Heidelberg University

12:00 - 12:30
Nonlinear Fenchel Conjugates
Roland Herzog, Heidelberg University

12:30 - 13:00
A mathematical model for the study of fracture mechanics in underground rocks Jaime H. Ortega, Universidad de Chile

13:00 - 14:00
Lunch break

14:00 - 14:30
Numerical methods for Real-Time Optimal Control
Ekaterina Kostina, Heidelberg University

approx. 15:00 - 17:30
Coffee & Science
"PhD-Fair, Posters/Talks by PhD/Master students"

18:00 - 18:30
Opening cocktail, HCLA garden.

Wednesday
March 26
Numerical Analysis

09:30 - 10:00
Fast multigrid methods on GPU
Guido Kanschat, Heidelberg University

10:00 - 10:30
Generalized hybrid discretizations
Norbert Heuer, Pontificia Universidad Católica de Chile

10:30 - 11:00
Numerical methods for reverse osmosis simulations in water desalination channels
Manuel Solano, Universidad de Concepción

11:00 - 11:30
Coffee break

11:30 - 12:00
Multiscale Spectral Generalised Finite Elements: Efficient Localised Model Reduction
Robert Scheichl, Heidelberg University

Machine Learning

12:00 - 12:30
Green Machine Learning by Accelerating Deep Neural Architectures
Holger Fröning, Heidelberg University

12:30 - 13:00
Multimodal Artificial Intelligence in Radiological Report Processing and Generation
Denis Alejandro Parra Santander, Pontificia Universidad Católica de Chile

13:00 - 13:30
Scientific machine learning for astrophysics
Dr. Tobias Buck, Heidelberg University

13:30 - 14:00
Lunch break

14:30 - 15:00
Symmetries in Deep Learning models: from groups to types
Mircea Petrache, Pontificia Universidad Católica de Chile

15:00 - 15:30
Bayesian Machines: Unlocking the Potential of Bayesian Neural Networks for Enhanced Uncertainty Reasoning
Holger Fröning, Heidelberg University

15:30 - 16:00
Error bounds for fixed point iterations in reinforcement learning
Roberto Cominetti, Pontificia Universidad Católica de Chile

Thursday
March 27
Numerical Analysis

09:30 - 10:00
Finite element tensor product complexes
Guido Kanschat, Heidelberg University

10:00 - 10:30
Boundary Element Methods for Acoustic Wave Propagation
Elwin van 't Wout, Pontificia Universidad Católica de Chile

10:30 - 11:00
Title TBC
Jaime H. Ortega, Universidad de Chile

11:00 - 11:30
Coffee break

11:30 - 12:00
Algorithmic Treatment of Implicitly Switched ODEs
Andreas Sommer, Heidelberg University

12:00 - 12:30
Space-time finite element method for parabolic obstacle problems
Thomas Fuehrer, Pontificia Universidad Católica de Chile

12:30 - 13:00
Energy stability computation in fluid systems using finite element methods
Federico Fuentes, Pontificia Universidad Católica de Chile

13:00 - 13:30
HDG methods for Hamiltonian PDE systems
Manuel Sanchez, Pontificia Universidad Católica de Chile

13:00 - 14:00
Lunch break

Time TBC
Framework programm
(outside HCLA)

Friday
March 28
Computational Biology

09:30 - 10:00
Liquid crystal modeling of the human heart's muscle fibers
Nicolás Alejandro Barnafi Wittwer, Pontificia Universidad Católica de Chile

10:00 - 10:30
Mathematical Methods in Neurostimulation
Eduardo Cerpa, Pontificia Universidad Católica de Chile

10:30 - 11:00
Stochastic homogenization of the Keller-Segel chemotaxis system
Anastasios Matzavinos, Pontificia Universidad Católica de Chile

11:00 - 11:30
Coffee break

11:30 - 12:00
How do energy constraints modulate the performance of biological neurons?
Mircea Petrache, Pontificia Universidad Católica de Chile

12:00 - 12:30
Computational biomedical discovery from spatial omics data
Jovan Taneski, Heidelberg University

12:30 - 13:00
Title TBC
Simon Anders, Heidelberg University

13:00 - 14:00
Lunch break

14:00 - 14:30
Machine-learning approaches in single-cell genomics
Carl Herrmann, Heidelberg University

14:30 - 15:00
Fully nonlinear poroelasticity: efficient solution and applications in biomedicine
Nicolás Alejandro Barnafi Wittwer, Pontificia Universidad Católica de Chile

15:00 - 15:30
Models to unveiling abundance-dependent metabolic phenotypes of microbial communities
Vicente Acuña, Universidad de Chile

15:30 - 16:00
Inverse Problem for some Biological Models
Mauricio Sepùlveda, Universidad de Concepción

16:00 - 16:30
From data to function: Integrative Bioinformatics and Systems Biology of non-coding RNAs
Vinicius Maracaja, Universidad de Chile

16:30 - 17:00
A recipe for enabling the exploration of conformational landscapes in AlphaFold2 while preserving high model quality
Cesar A. Ramirez-Sarmiento

Wrap-up and Closing remarks