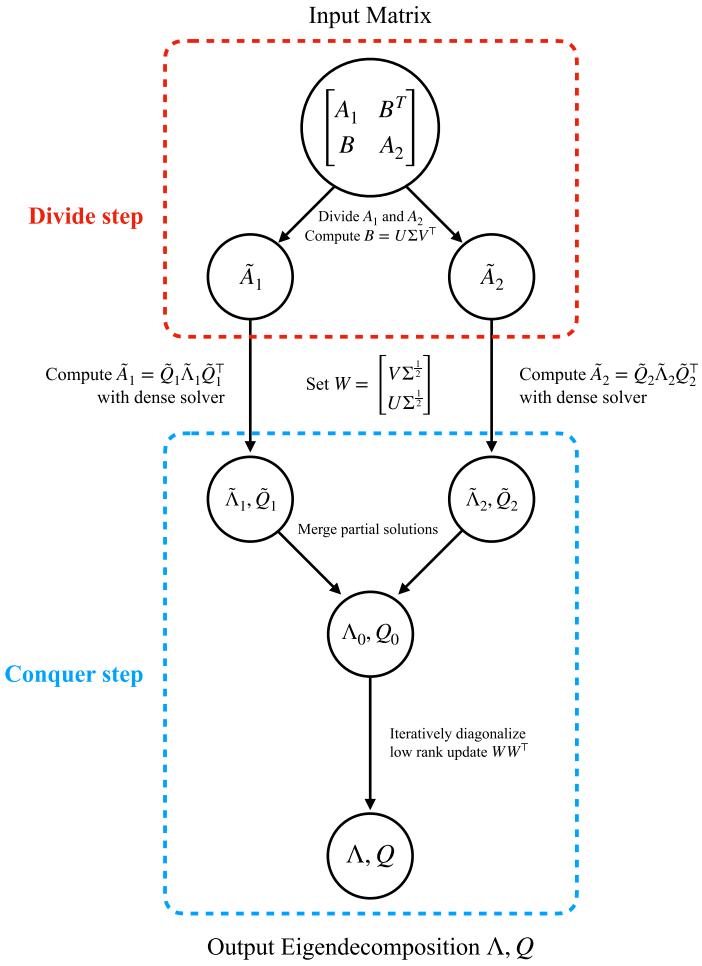
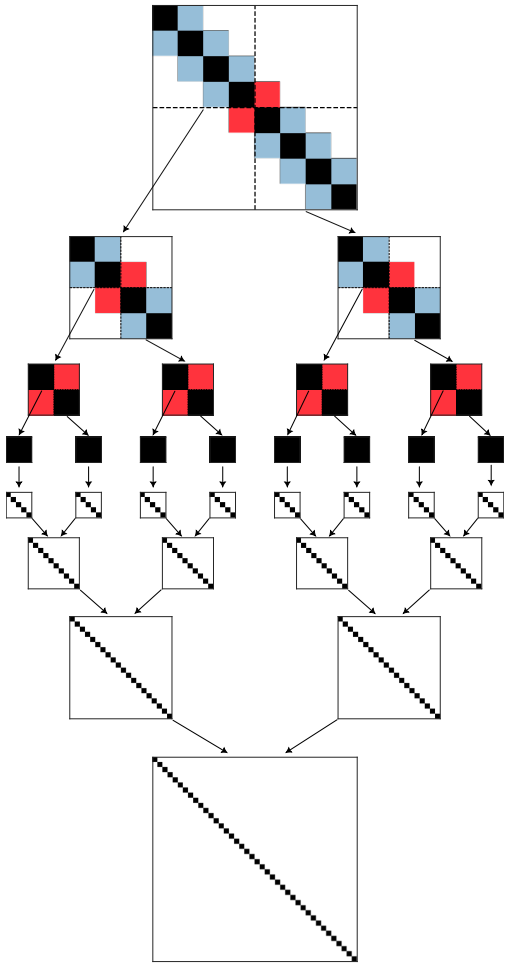
ETH zürich





BSc & MSc Computational Science and Engineering (CSE)

Annual Report 2023/2024

BSc & MSc CSE

BSc & MSc Computational Science and Engineering

Annual Report 2023 / 2024

August 2023 to July 2024

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rw.ethz.ch

Cover:
Block-tridiagonal divide and conquer algorithm for the eigendecomposition of banded/block-tridiagonal matrices — from the Bsc Thesis "Design and Implementation of Optimized Eigendecomposition Algorithms For Symmetric Block-tridiagonal and Symmetric Broad-arrowhead Matrices and their Applications in Ring-polymer Instanton Theory" of the Bsc CSE student Marcel Ferrari, 2024.

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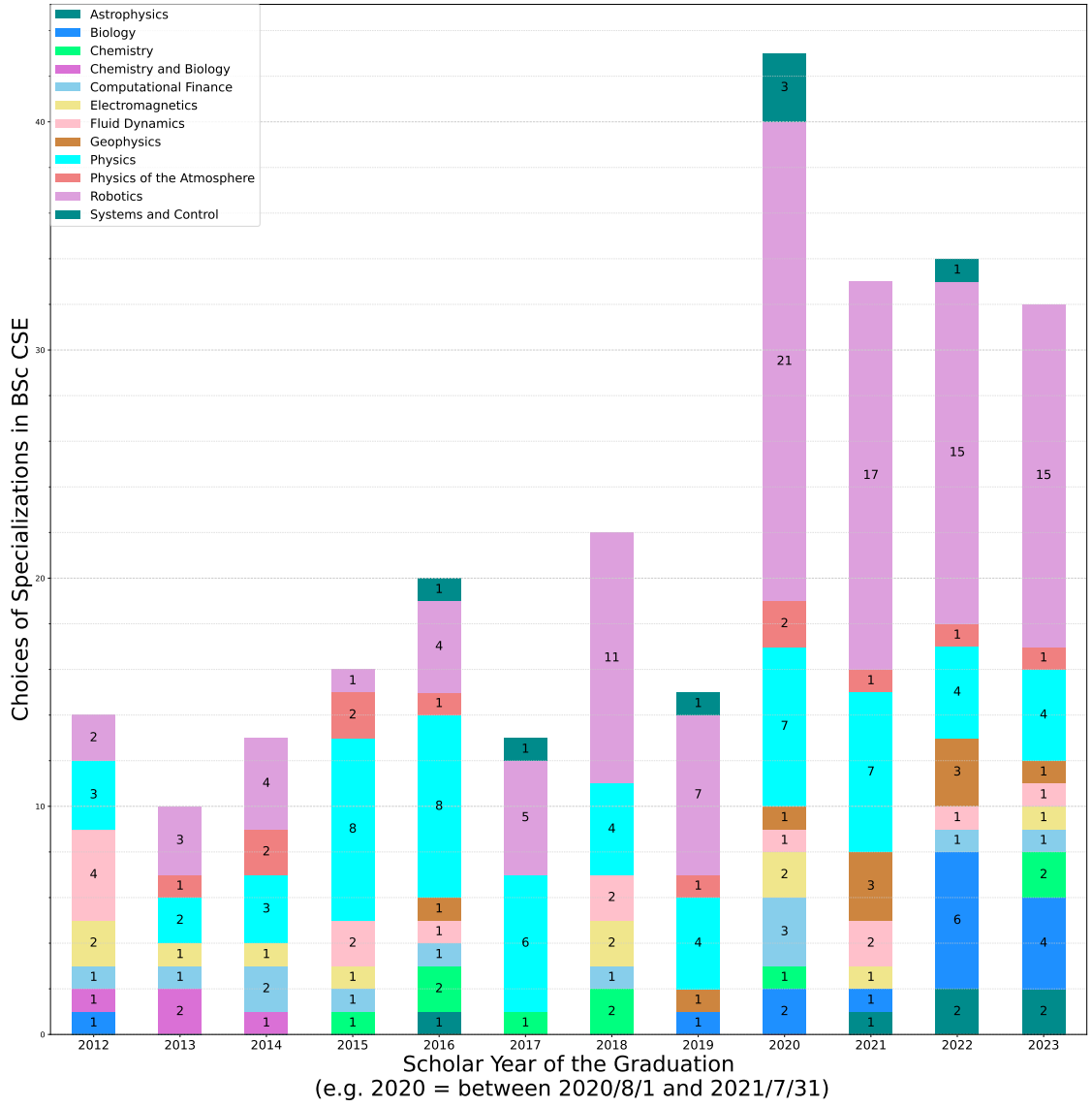
1 Teaching in BSc and MSc CSE

Teaching in Computational Science and Engineering

In the winter examination session 2023/24, 80.6% of the 69 participating students passed the first Basisprüfungsblock, 82.9% of the 36 participating students passed the exam block *G1* and 85.3% of the 37 participating students passed the block *G2*. The core lecture *Design of Parallel and High-Performance Computing* was chosen by 15 students, all of them passed. The core lecture *Software Engineering* that is now offered in the Fall Term, was chosen by 45 students, all of them passed. Popular lectures among the BSc CSE students in Fall 2023 were: *Information Systems for Engineers* (13), *Introduction to Computational Physics* (13), *Introduction to Neuroinformatics* (9), *Physically-Based Simulation in Computer Graphics* (9), *Numerical Solution of Stochastic Ordinary Differential Equations* (9).
In the *Case Studies Seminar* in Autumn 2023 a number of 54 BSc CSE and 21 MSc CSE students participated with success. The lecture *Probabilistic Artificial Intelligence* in Autumn 2023 was very poular among the MSc CSE students (27). Also popular were *Dynamic Programming and Optimal Control* (14), the core lecture *Advanced Numerical Methods for CSE* (14) and *Robot Dynamics* (10). The second core lecture offered in the Fall 2023 *Advanced Machine Learning* was chosen by 7 students of MSc CSE and all passed. 9 students of MSc CSE attended and passed the additional requirement *Programming Techniques for Scientific Simulations*.

In the summer examination session 2024, 80% of the 67 participating students passed the second Basisprüfungsblock, 88.2% of the 35 participants passed the exam *G3* and 67.5% of the 40 participants passed the block *G4* in its new format, which still seems to be the most difficult exam block of the curriculum. All 30 students attending *High-Performance Computing Lab for CSE* passed. The other core lecture in spring semester *Introduction to Machine Learning* was very popular (50) and had 90% success rate. A very popular lecture among the BSc CSE students in Spring 2024 was "Big Data for Engineers" (15). The *Case Studies Seminar* in Spring 2024 was succcesfully attended by 50 BSc CSE and 44 MSc students. Popular lectures among the MSc CSE students in Spring 2024 were: *AI in Scientific Computing* (36), *Computational Statistics* (13), *Introduction to Machine Learning* (10), *Recursive Estimation* (10), *Advanced CFD Methods* (8) and *Advanced Systems Lab* (6).

In each of the two semesters of the accademic year 2023/24, grades were awarded to MSc CSE students in about 90 scientific lectures and seminars across all the ETH departments.


Astrophysics
Biology
Chemistry
Chemistry and Biology
Computational Finance
Electromagnetics
Fluid Dynamics
Geophysics
Physics
Physics of the Atmosphere
Robotics
Systems and Control
Choices of Specializations in BSc CSE
Scholar Year of the Graduation
(e.g. 2020 = between 2020/8/1 and 2021/7/31)
2012
2013
2014
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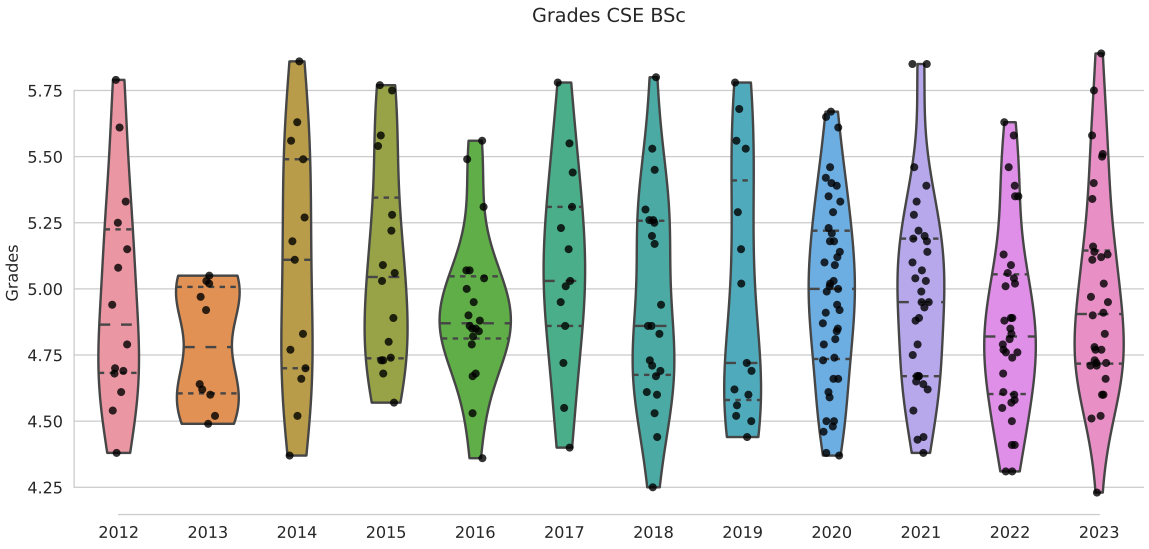
2016
2017
2018
2019
2020
2021
2022
2023


Grades CSE BSc
Grades
5.75
5.50
5.25
5.00
4.75
4.50
4.25
2012
2013
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2016
2017
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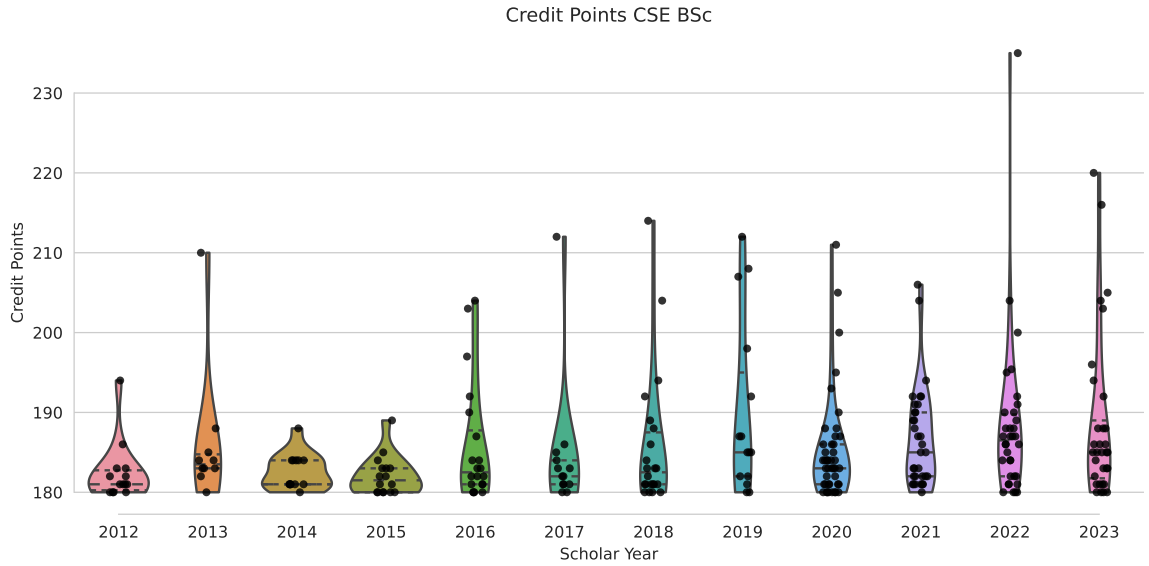
2019
2020
2021
2022
2023


Credit Points CSE BSc
Credit Points
230
220
210
200
190
180
2012
2013
2014
2015
2016
2017
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2019
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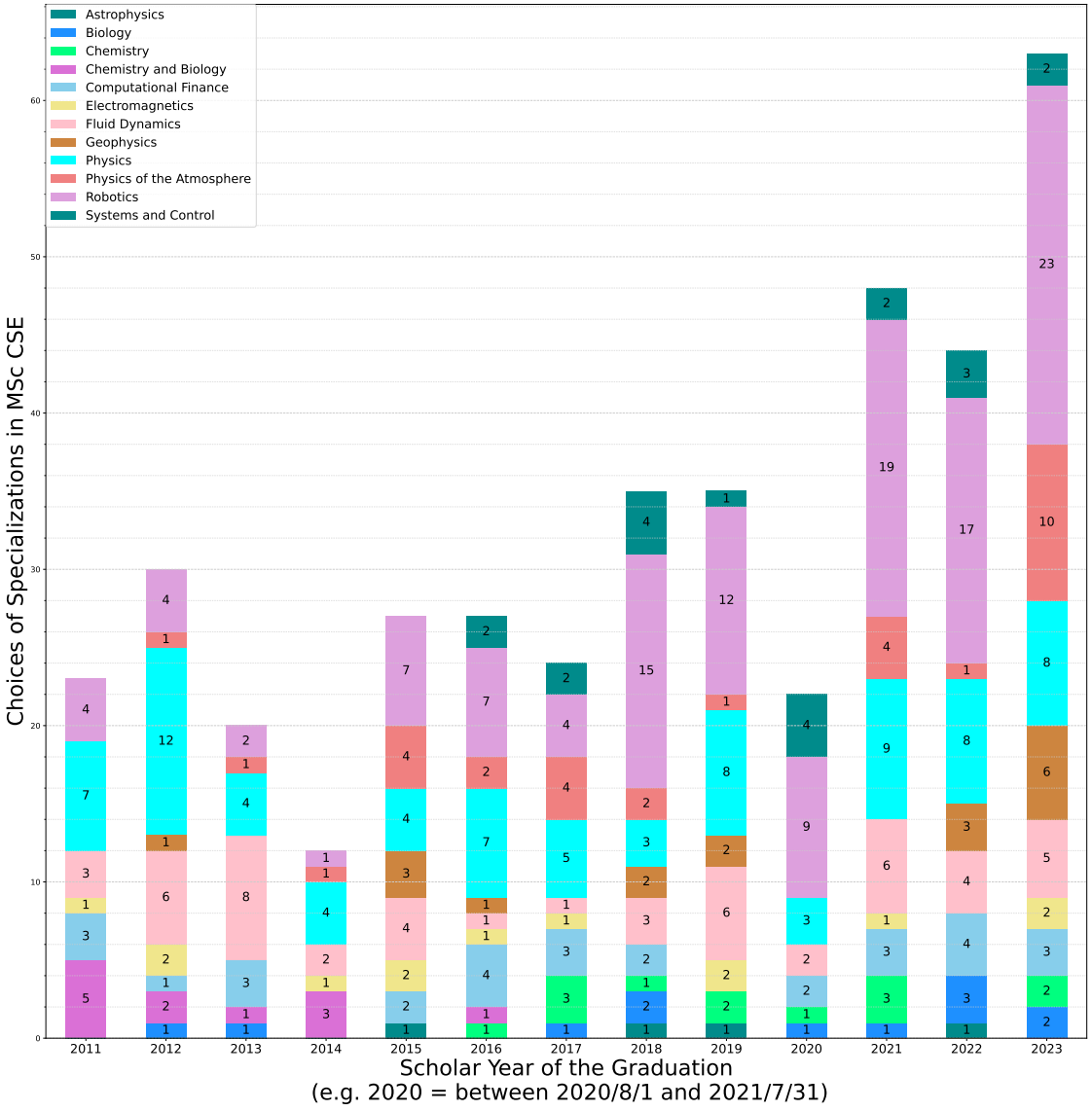
2021
2022
2023
Scholar Year


Astrophysics
Biology
Chemistry
Chemistry and Biology
Computational Finance
Electromagnetics
Fluid Dynamics
Geophysics
Physics
Physics of the Atmosphere
Robotics
Systems and Control
Choices of Specializations in MSc CSE
Scholar Year of the Graduation
(e.g. 2020 = between 2020/8/1 and 2021/7/31)
2011
2012
2013
2014
2015
2016
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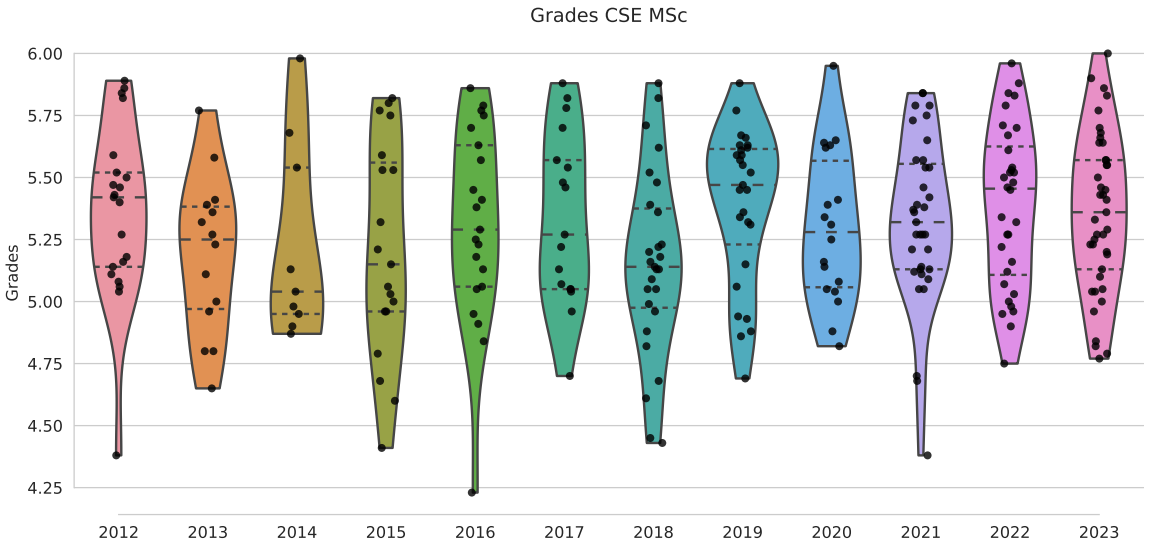
2020
2021
2022
2023


Grades CSE MSc
Grades
6.00
5.75
5.50
5.25
5.00
4.75
4.50
4.25
2012
2013
2014
2015
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2017
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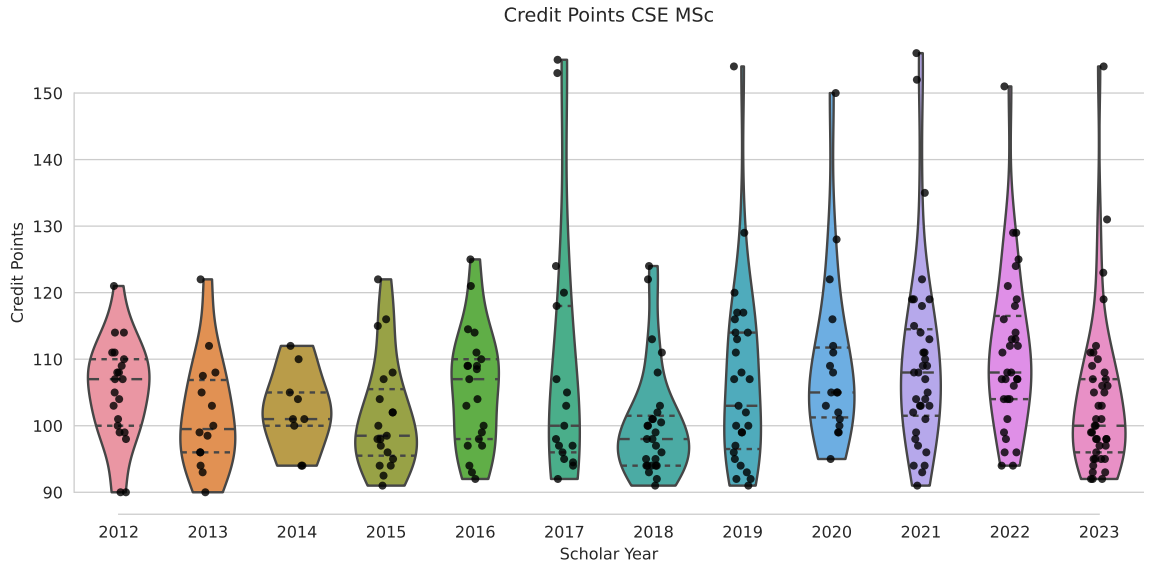
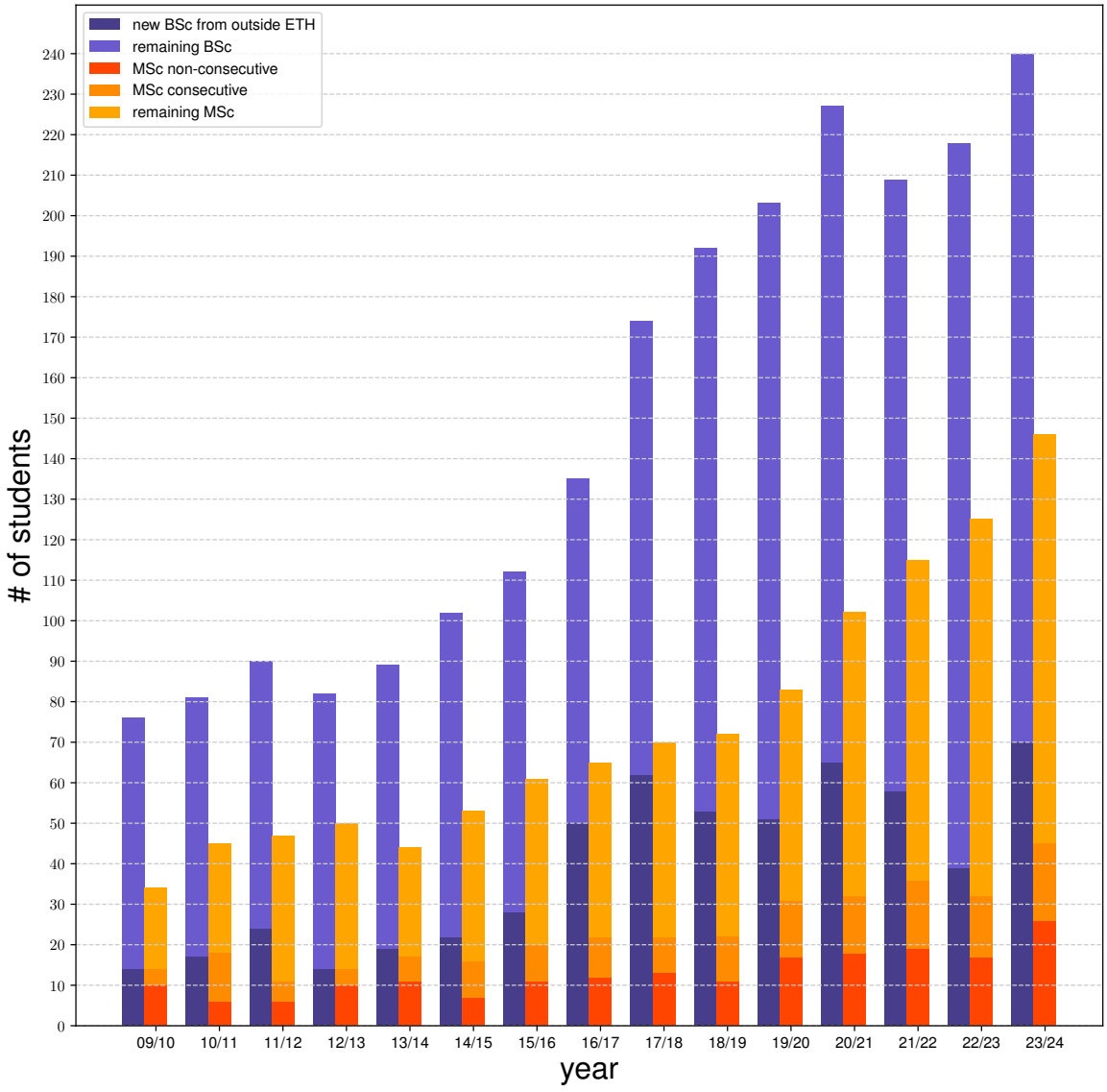
2021
2022
2023


Credit Points CSE MSc
Credit Points
150
140
130
120
110
100
90
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Scholar Year

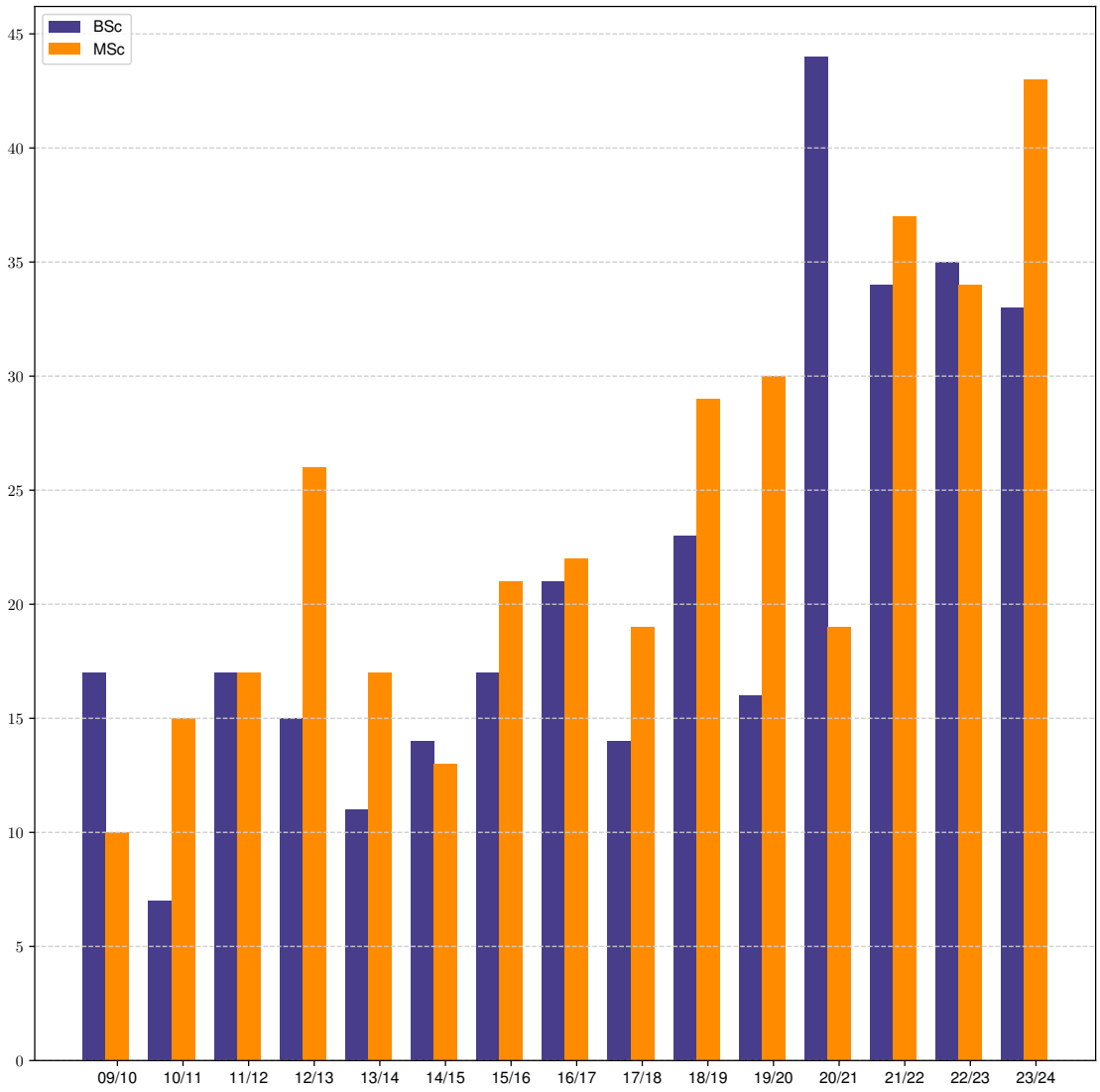
CSE Students and Theses 2

In September 2023, 70 new students started their CSE Bachelor studies in the first semester. A total of 45 students registered their begin of MSc CSE: 19 BSc CSE students entered the MSc CSE as a consecutive curriculum, while 26 students came from outside.
The total number of CSE students enrolled in Fall Term 2022 was 386 (headcount): 240 in the BSc program and 146 in the MSc program.

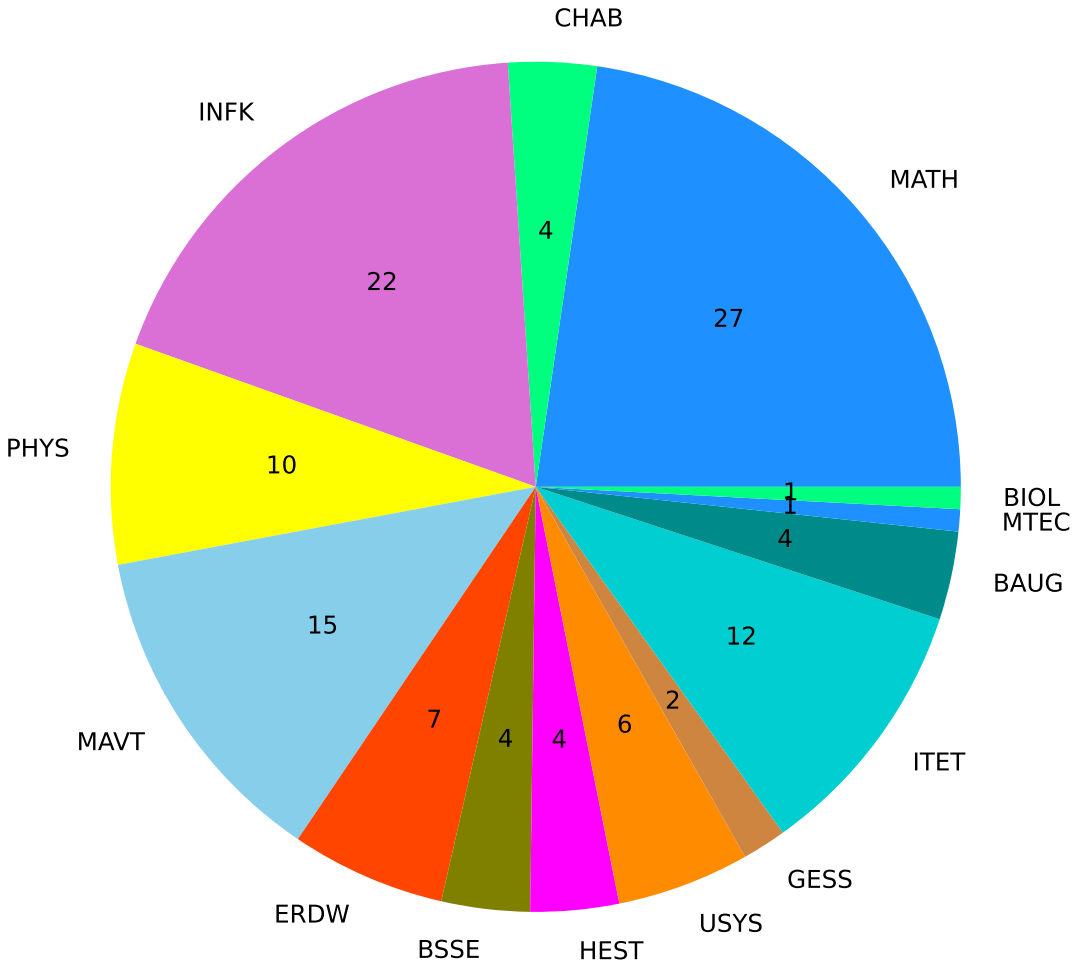


Number of CSE students in the curriculum; dark = number of new students

In the past academic year 76 students have successfully finished a CSE curriculum, 33 Bachelor students and 43 Master students, and have received a CSE degree, some with very good grades. In summer 2024 Yang Pan was awarded the **Willi Studer Preis** 2024 for the CSE Master Diploma with the highest grade in the past academic year. Mr Yang Pan was awarded also the **ETH Medal** his MSc thesis in CSE entitled: "Metric entropy limits on recurrent neural network learning for Lipschitz fading memory systems" supported by Professor Helmut Bölcskei.



Number of CSE graduates



In the academic year 2023-2024 there were written a total of **119** semester, BSc and MSc theses in CSE. The diagram above shows that the supervision of these works is spread over **14 departments** of ETH, while some of them seem to attract more students than others. The most popular departments this year were D-MATH with 27 theses, D-INFK with 22 theses, D-MAVT with 15 theses and D-ITET with 12 theses. On the following pages we mention the authoring students, the titles of the theses and the corresponding official supervisors from various departments at ETH.

BSc-Arbeiten

Samuel Anzalone
Inverse Problem with Neural Networks for Calibration in Finance
(Josef Teichmann, D-MATH)

Jonas Bachmann
Structure Preserving Lax-Wendroff Schemes for Low Mach Number Flows
(Roger Käppeli, D-MATH)

Simeon Barbey
Study on the efficiency and accuracy of high order finite volume WENO schemes
(Roger Käppeli, D-MATH)

Yann Billeter
Machine learning for diabatic potential energy surfaces
(Jeremy Richardson, D-CHAB)

Alexander Born
Anomalous Sound Detection in Presence of Domain Shifts in Operating Environments
(Olga Sorkine, D-INFK)

Sebastian Brovelli
Efficient and accurate tunneling splitting from instanton theory
(Jeremy Richardson, D-CHAB)

Lukas Martin Bühler
Building blocks for Finite Element computations in IPPL
(Andreas Adelmann, D-PHYS)

Francesco Cavalli
Next Best view planning for grasping with diffusion models
(Roland Siegwart, D-MAVT)

Johan Francisco Calle Axius
Implicit Fast Sweeping Methods for Non-Steady Hyperbolic Conservation Laws
(Roger Käppeli, D-MATH)

Marcel Ferrari
Design and Implementation of Optimized Eigendecomposition Algorithms For Symmetric Block-tridiagonal and Symmetric Broad-arrowhead Matrices and their Applications in Ring-polymer Instanton Theory
(Jeremy Richardson, D-CHAB)

Ramura Gassler
A Well-Balanced Finite Volume approach to solving multi-D near steady state Euler Equations
(Roger Käppeli, D-MATH)

Noah Estefano Gigler
Uncertainty Quantification of Option Price Extrapolation using Neural Networks
(Josef Teichmann, D-MATH)

Ioan Gorea
Extrusion-Contraction Upwind Schemes
(Ralf Hiptmair, D-MATH)

Sebastian Daniel Heckers
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(Stelian Coros, D-INFK)

Anna Evelyne Hutter
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(Taras Gerya, D-ERDW)

David Fridolin Jenny
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William Jones
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(Robert Sumner, D-INFK)

Laurenz Yuqi Keller
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(Niko Beerenwinkel, D-BSSE)

Michael Hans Klein
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(Patrick Jenny, D-MAVT)

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(Barbara Solenthaler, D-INFK)

Mingjie Li
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(Stelian Coros, D-INFK)

Sebastian Lochmann
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(Taras Gerya, D-ERDW)

Christopher Lompa
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(Stanisa Raspopovic, D-HEST)

Mingfei Lyu
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Tarzis Jon Maurer
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(Ralf Hiptmair, D-MATH)

Thibault Pierre Meier
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Simon Aaron Menzi
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(Dirk Helbing, D-GESS)

Jens Nielsen
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(Siyu Tang, D-INFK)

Philip Emil Pawlowsky
Madupite: A high-performance distributed solver for large-scale Markov decision processes
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Samuel Russo
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(Siddhartha Mishra, D-MATH)

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(Luca Benini, D-ITET)

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(Paul Tackley, D-ERDW)

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Rafael Antonio Steiner
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(Siddhartha Mishra, D-MATH)

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Christoph Michael Grötzbach
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(Eleni Chatzi, D-BAUG)

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(Christoph Schär, D-USYS)

Guillaume Francois André Draznieks
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(Christophe Coperet, D-CHAB)

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Dingran Feng
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Jonas Grütter
Particle-based Identification for robust simulation
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Katharina Rebekka Gutmann
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Konrad Otto Handrick
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(Sebastian Huber, D-PHYS)

Lothar Heimbach
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(Siddhartha Mishra, D-MATH)

Maximilian Robert Herde
Physics-based Residual Operator for a Grid-based Neural Surrogate Model
(Robert Katzschmann, D-MAVT)

Felix Iilles
Deep Hedging for Energy Futures
(Josef Teichmann, D-MATH)

David Fridolin Jenny
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(Bernhard Schölkopf, D-INFK)

Tom Niklaus Lausberg
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(Konrad Schindler, D-BAUG)

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Maël Charles Edouard Libéro Macuglia
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Marianna Marzetta
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(Benjamin Grewe, D-ITET)

Alice Francesca Mazzoleni
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(Roland Siegwart, D-MAVT)

Paul Ochs
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(Hans-Michael Kaltenbach, D-BSSE)

Florian Michel Pauschitz
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(Ghislain Fourny, D-INFK)

Philippe Marc Peter
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(Ralf Hiptmair, D-MATH)

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(Patrick Jenny, D-MAVT)

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Haitao Yu
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(Hans-Michael Kaltenbach, D-BSSE)

CSE Case Studies Seminar 3

The CSE Case Studies Seminar takes place each semester on Thursdays, 16 - 18 hours. Speakers from ETH, from other universities as well as from industry are invited to give a 2×45 minutes talk on an applied topic. The idea is to show the students a case study of an application problem containing the problem setting, the modelling, the mathematical approach and the simulation on a computer. In addition, such a case study should show what is going on in the field of CSE and what are the job perspectives for a CSE engineer. Apart these invited talks, each student has to give a 15 minutes presentation based either on one of the own projects or on a paper which can be proposed by the student or can be taken from a given list of possible interesting papers.

The association of the CSE students took the initiative to invite some speakers from the industry. This event took place for the first time on Spetember 28, 2023 and CSE students from all study semesters attended.

The titles of the other invited talks during the past academic year are given in the two following lists.

Case Studies Seminar HS23

16.11.23 Johan Robertsson
Geophysics, D-ERDW
Projection of Boundary Conditions for Immersive Wave Eperimentation

23.11.23 Stefan Kurz
Bosch Center for Artificial Intelligence (BCAI) and University of Jyväskylä (JYU)
Hybrid Modeling – How Physics-based and Data-driven Models Complement Each Other

30.11.23 Dennis Kochmann
Mechanik und Materialforschung, D-MAVT
Computational Methods for the Analysis and Discovery of Materials

07.12.23 David Schmidig
Second Spectrum by Genius Sports, Lausanne
How to Reconstruct Sports Realtime in 3D - High Performance Computing at the Service of the English Premier League and More

Case Studies Seminar FS24

29.02.24 Marina Krstic Marinkovic
Theoretical Physics, D-PHYS
Classical and Quantum Simulations of the Strong Interaction

21.03.24 Erick Schulz
Plexim, Zurich
Simulation of Power Electronics Systems

28.03.24 Benedikt Soja
Space Geodesy, D-BAUG
Application of Machine Learning for Geodetic Earth Observation

02.05.24 Jordan Aaro
Engineering Geology, D-ERDW
Numerical Simulation of Landslide Motion

30.05.24 Kjell Jorner
Digital Chemistry
Combining Computational Chemistry with Machine Learning

Student Talks in the Case Studies Seminar HS23

1. Marco Solanki (2023-10-05)
Own paper: Paul J. Tackley: Modelling compressible mantle convection with large viscosity contrasts in a three-dimensional spherical shell using the yin-yang grid, Physics of the Earth and Planetary Interiors, December 2008

2. Michael Klein (2023-10-05)
Thesis Bachelor: Investigations of a Hyperloop Pod Using a 1D Model

3. Luca Franceschetti (2023-10-05)
Selected paper Nr. 24: Evolution Dynamics of Biological Games

4. Armin Riess (2023-10-05)
Thesis Bachelor: A Test Suite for SPH Codes

5. Radovan Dabetic (2023-10-05)
Thesis Bachelor: Efficient Computation of Smoothness Indicators for WENO Reconstruction

6. Konrad Handrick (2023-10-05)
Own paper: Tillet, Kung, Cox: Triton: An Intermediate Language and Compiler for Tiled Neural Network Computations, MAPL

7. Jonas Bachmann (2023-10-05)
Thesis Bachelor: Structure Preserving Lax-Wendroff Schemes for Low Mach Number Flows

8. Nicolas Mueller (2023-10-05)
Selected paper Nr. 124: Modeling epidemics using cellular automata

9. Christopher Lompa (2023-10-05)
Own paper: Marek Zelechowski , Giacomo Valle and Stanisa Raspopovic: A computational model to design neural interface for lower-limb sensory neuroprostheses, Journal of NeuroEngineering and Rehabilitation 2020

10. Davide Del Curto (2023-10-05)
Selected paper Nr. 38: A simple rule for the evolution of cooperation on graphs and social networks

11. Benedict Armstrong (2023-10-12)
Selected paper Nr. 113: Julia: A Fresh Approach to Numerical Computing

12. Alexander Pietak (2023-10-12)
Selected paper Nr. 11: Efficient algorithms for the cosmological N-body problem

13. Tristan Gabl (2023-10-12)
Own paper: Jeff Bezanson, Alan Edelman, Stefan Karpinski, Viral B. Shah: Julia: A Fresh Approach to Numerical Computing, Society for Industrial and Applied Mathematics, 2017

14. Servaas Clerckx (2023-10-12)
Selected paper Nr. 137: Reciprocal n-Body Collision Avoidance

15. Raphael Graf (2023-10-12)
Selected paper Nr. 183: Implicit-explicit Runge-Kutta methods for time-dependent partial differential equations

16. Nicolas Mueller (2023-10-12)
Selected paper Nr. 320: Recovery of CT stroke hypodensity â€“ An adaptive variational approach

17. Marcel Ferrari (2023-10-12)
Own paper: N. Jakovčević Stor, I. Slapničar, J.L. Barlow: Forward stable eigenvalue decomposition of rank-one modifications of diagonal matrices, Linear Algebra and its Applications, 15 December 2015

18. Basil Zemann (2023-10-12)
Own paper: Alain Lehmann, Wilhelm Kleiminger, Hakim Invernizzi, Aurel Gautschi: Accelerated Benders Decomposition for Variable-Height Transport Packaging Optimisation, ArXiv, 02.08.2023

19. Tizian Warnking (2023-10-12)
Selected paper Nr. 172: Model-Driven Choice of Numerical Methods for the Solution of the Linear Advection Equation

20. Ramon Schoenholzer (2023-10-12)
Selected paper Nr. 190: Discrete differential forms for computational modeling

21. Woojin Ban (2023-10-19)
Selected paper Nr. 321: A New Parallel Algorithm for Minimum Spanning Tree(MST)

22. Haoanqin Gao (2023-10-19)
Selected paper Nr. 43: Particle-Based Fluid-Fluid Interaction

23. Damjan Jovanovic (2023-10-19)
Selected paper Nr. 262: Time-domain simulation of a guitar: Model and method

24. Florian Stuehlinger (2023-10-19)
Selected paper Nr. 13: Accurate Projection Methods for the Incompressible Navier-Stokes Equations

25. Sebastian Heckers (2023-10-19)
Selected paper Nr. 148: A Parallel Implementation of the Push-Relabel Algorithm for the Maximum Flow Problem

26. Ankush Majmudar (2023-10-19)
Selected paper Nr. 158: High-Performance and Tunable Stereo Reconstruction

27. Severin Nigg (2023-10-19)
Selected paper Nr. 110: A Memory-Efficient Method for Fast Computation of Short 15-Puzzle Solutions

28. Manuel Saladin (2023-10-19)
Selected paper Nr. 310: An Advection-Reflection Solver for Detail-Preserving Fluid Simulation

29. David Jenny (2023-10-19)
Selected paper Nr. 41: A Cache-aware Algorithm for PDEs on Hierarchical Data Structures Based on Space-filling Curves

30. Ioan Gorea (2023-10-19)
Selected paper Nr. 194: Splitting based finite volume schemes for ideal MHD equations

31. Valentin Vogt (2023-10-26)
Selected paper Nr. 4: A comparative study of some pseudorandom number generators

32. Dario Ackermann (2023-10-26)
Selected paper Nr. 66: Reverse Engineering Financial Markets with Majority and Minority Games Using Genetic Algorithms

33. Ramura Gassler (2023-10-26)
Selected paper Nr. 17: Simulating dynamical features of escape panic

34. Matteo Bolliger (2023-10-26)
Selected paper Nr. 244: Automated Neuron Reconstruction from 3D Fluorescence Microscopy Images Using Sequential Monte Carlo Estimation

35. Noah Gigler (2023-10-26)
Selected paper Nr. 96: A Bit-String Model for Biological Aging

36. Haitao Yu (2023-10-26)
Selected paper Nr. 42: Metropolis Light Transport

37. Eva Sarlin (2023-10-26)
Selected paper Nr. 104: A whole-Cell Computational Model Predicts Phenotype from Genotype

38. Louis Hurschler (2023-10-26)
Selected paper Nr. 92: Multi-GPU accelerated multi-spin Monte Carlo simulations of the 2D Ising model

39. Samuel Relling (2023-10-26)
Own paper: Maciej Świechowski, Konrad Godlewski, Bartosz Sawicki, Jacek Mańdziuk: Monte Carlo Tree Search: a review of recent modifications and applications, Springer 19.07.2022

40. Nick Hofstetter (2023-10-26)
Selected paper Nr. 47: Pricing early-exercise and discrete barrier options by fourier-cosine series expansions

41. Ilir Gashi (2023-11-02)
Selected paper Nr. 93: Non-contact, automated cardiac pulse measurements using video imaging and blind source separation

42. Tim Eicher (2023-11-02)
Selected paper Nr. 45: reCAPTCHA: Human-Based Character Recognition via Web Security Measures

43. Tobias Zimmermann (2023-11-02)
Selected paper Nr. 298: Fast and Furious: Detecting Stress with a Car Steering Wheel

44. Johan Calle Axius (2023-11-02)
Selected paper Nr. 74: Temporal Noise Control for Sketchy Animation

45. Luis Wirth (2023-11-02)
Selected paper Nr. 304: Real-time voxel rendering algorithm based on Screen Space Billboard Voxel Buffer with Sparse Lookup Textures

46. Nicola Lo Russo (2023-11-02)
Selected paper Nr. 123: Automatic Generation of Constructable Brick Sculptures

47. Philipp Schneeberger (2023-11-02)
Selected paper Nr. 82: Gaze Correction for Home Video Conferencing

48. Francesco Cavalli (2023-11-02)
Own paper: Wenlong Huang, Chen Wang, Ruohan Zhang, Yunzhu Li, Jiajun Wu, Li Fei-Fei: VoxPoser: Composable 3D Value Maps for Robotic Manipulation with Language Models, arXiv, July 2023

49. Enrico Miletto Granozio (2023-11-02)
Selected paper Nr. 149: An adaptive optical flow technique for person tracking systems

50. Mattia Lucca (2023-11-09)
Selected paper Nr. 233: A general reinforcement learning algorithm that masters chess, shogi, and Go through self-play

51. Timo Zuend (2023-11-09)
Selected paper Nr. 15: Programmable and autonomous computing machine made of biomelecules

52. Gioele Molinari (2023-11-09)
Own paper: E. Kaufmann, L. Bauersfeld, A. Loquercio, M. M?ller, V. Koltun and D. Scaramuzza: Champion-level drone racing using deep reinforcement learning, Nature, Vol 620, 31 August 2023

53. Lucas Benito Reichmuth (2023-11-09)
Selected paper Nr. 19: Quantum information and computation

54. Konstantinos Papathanasiou (2023-11-09)
Selected paper Nr. 150: Human-level control through deep reinforcement learning

55. Basil Ruch (2023-11-09)
Own paper: Lukas Hewing, Kim P. Wabersich, Marcel Menner, and Melanie N. Zeilinger: Learning-Based Model Predictive Control: Toward Safe Learning in Control, Annual Review of Control, Robotics, and Autonomous Systems (2020)

56. Alexander Rohwedder (2023-11-09)
Own paper: Fraiberger, Sinatra, Resch, Riedl, Barab?si: Quantifying reputation and success in art, Science Vol. 362, Issue 6416, 08.11.2018

57. Lily Watanabe (2023-11-09)
Own paper: Nikhil Garg, Londa Schiebinger, Dan Jurafsky, James Zou: Word embeddings quantify 100 years of gender and ethnic stereotypes, Proceedings of the National Academy of Sciences, April 17, 2018

58. Luca Conconi (2023-12-14)
Own paper: William L. Kath: Computational Modeling of Dendrites, Journal of Neurology July 2005

59. Luca Wolfart (2023-12-14)
Own paper: Ashley Lyons , Francesco Tonolini , Alessandro Boccolini , Audrey Repetti , Robert Henderson , Yves Wiaux4 and Daniele Faccio: Computational time-of-flight diffuse optical tomography, Nature Photonics

60. Thibault Meier (2023-12-14)
Selected paper Nr. 101: The effect of stepping on pedestrian trajectories

61. Philipp Stark (2023-12-14)

Selected paper Nr. 107: Optimized Spatial Hashing for Collision Detection of Deformable Objects

62. Tanja Srindran (2023-12-14)
Selected paper Nr. 40: Onion-like Network Topology Enhances Robustness against Malicious Attacks

63. Pascal Vogel (2023-12-14)
Selected paper Nr. 303: A Comparison of Line Extraction Algorithms using 2D Laser Rangefinder for Indoor Mobile Robotics

64. Sophia Esser (2023-12-14)
Own paper: PETER KUTZ, RALF HABEL, YINING KARL LI, JAN NOV?K: Spectral and Decomposition Tracking for Rendering Heterogeneous Volumes, ACM Transactions on Graphics, Vol. 36, No. 4, Article 111, Publication date: July 2017

65. Livio Vogler (2023-12-14)
Own paper: W. James and Charles Stein: Estimation with Quadratic Loss, Berkeley Symp. on Math. Statist. and Prob., 1961: 361-379 (1961)

66. Samuel Karsko (2023-12-14)
Selected paper Nr. 161: Current Challenges for Numerical Weather Prediction in Complex Terrain: Topography Representation and Parameterizations

67. Timo Schwab (2023-12-14)
Own paper: M. E. Caplan and C. J. Horowitz: Astromaterial Science and Nuclear Pasta, Reviews of Modern Physics, Volume 89, October?December 2017

68. Sebastian Brovelli (2023-12-14)
Selected paper Nr. 62: Generalized Biped Walking Control

69. Mingjie Li (2023-12-21)
Selected paper Nr. 89: A material point method for snow simulation

70. Stanislaw Piasecki (2023-12-21)
Own paper: Leiv Andresen, Adrian Brandemuehl, Alex H?nger, Benson Kuan, Niclas V?disch, Hermann Blum, Victor Reijgwart, Lukas Bernreiter, Lukas Schaupp, Jen Jen Chung, Mathias B?rki, Martin R. Oswald, Roland Siegwart, Abel Gawel: Accurate Mapping and Planning for Autonomous Racing, IEEE/RSJ International Conference on Intelligent Robots and Systems / 09.2020

71. Laurenz Keller (2023-12-21)
Own paper: Xiang Ge Luo, Jack Kuipers, Niko Beerenwinkel: Joint inference of exclusivity patterns and recurrent trajectories from tumor mutation trees, Nature Communications, 21 June 2023

72. Felicia Scharitzer (2023-12-21)
Selected paper Nr. 238: A Graph Signal Processing Perspective on Functional Brain Imaging

73. Djahan Lamei (2023-12-21)
Selected paper Nr. 120: Position based fluids

74. Nils Maletinsky (2023-12-21)
Selected paper Nr. 152: Fast and Efficient Compression of Floating-Point Data

75. Felix Ludwig (2023-12-21)
Selected paper Nr. 49: Topology of large scale engineering problem solving networks

Student Talks in the Case Studies Seminar FS24

1. Marco Solanki (2024-02-22)
Own paper: James Reinders, Ben Ashbaugh, James Brodman, Michael Kinsner, John Pennycook, Xinmin Tian: Data Parallel C++: Programming Accelerated Systems Using C++ and SYCL, Second Edition, Apress Berkeley, CA (2023)

2. Luca Conconi (2024-02-22)
Own paper: Ali Borji - OpenAI: A Categorical Archive of ChatGPT Failures, Arxiv - 6 Feb 2023

3. Nicola Lo Russo (2024-02-22)
Own paper: Neal Jean, Marshall Burke, Michael Xie, W. Matthew Davis, David B. Lobell, Stefano Ermon: Combining satellite imagery and machine learning to predict poverty, Science, 2016

4. Robin Sieber (2024-02-22)
Thesis Bachelor: Benchmarking Distributed Inexact Policy Iteration for Large-Scale Markov Decision Processes

5. Luca Franceschetti (2024-02-22)
Thesis Bachelor: Comparison of Different Graphs in Hidden Markov Models Describing Lymphatic Spread of Head and Neck Cancer

6. Marcel Ferrari (2024-02-22)
Own paper: Marcel Ferrari, Francesco Cavalli, Hussein N. el Harake, Christopher Lompa, Nicola Lo Russo: Arrowhead Factorization of Real Symmetric Matrices and its Applications in Optimized Eigendecomposition, Submitted to Proceedings of the PASC Conference (ACM Digital Library)

7. Yannick Ramic (2024-03-07)
Selected paper Nr. 326: RoboCut: Hot-wire Cutting with Robot-controlled Flexible Rods

8. Chanel Dobler (2024-03-07)
Selected paper Nr. 64: A New Vectorization Technique for Expression Templates in C++

9. Cedric Zeiter (2024-03-07)
Selected paper Nr. 39: A cryptographic watermarking technique for multimedia signals

10. Patrick Dowd (2024-03-07)
Own paper: Brenden M. Lake and Marco Baroni : Human-like systematic generalization through a meta-learning neural network, Nature 2023

11. Florian Stuehlinger (2024-03-07)
Selected paper Nr. 175: Detection, tracking and event localization of jet stream features

in 4-D atmospheric data

12. Alexandre Faroux (2024-03-07)
Selected paper Nr. 126: A data-driven agent-based model of congestion and scaling dynamics of rapid transit systems

13. Dario Ackermann (2024-03-07)
Own paper: Huiwen Wang, Yanwen Zhang, Jichang Zhao: Enhancing the SVD compression losslessly, Journal of Computational Science, 10th of November 2023

14. Panagiotis Minos (2024-03-07)
Selected paper Nr. 214: Designing Unreinforced Masonry Models

15. Seraina Nebiker (2024-03-07)
Thesis Bachelor: Learning designs in the framework of genetic algorithms

16. Luis Wirth (2024-03-07)
Own paper: Mathieu Desbrun, Eva Kanso, Yiying Tong: Discrete Differential Forms for Computational Modeling, In book: Discrete Differential Geometry (pp.287-324) March 2008

17. Felicia Scharitzer (2024-03-07)
Own paper: Mathieu Desbrun, Eva Kanso, Yiying Tong: Discrete Differential Forms for Computational Modeling, In book: Discrete Differential Geometry (pp.287-324) March 2008

18. David Jenny (2024-03-07)
Thesis Bachelor: Navigating the Ocean of Biases: Political Bias Attribution in Language Models via Causal Structures

19. Valentin Vogt (2024-03-14)
Selected paper Nr. 167: The numerical relativity breakthrough for binary black holes

20. Pavel Lenskii (2024-03-14)
Own paper: Chris Yu, Henrik Schumacher, Keenan Crane: Repulsive Curves, https://doi.org/10.1145/343942

21. Ramura Gassler (2024-03-14)
Selected paper Nr. 18: Cellular Automation Approach to Pedestrian Dynamics - Theory

22. Noah Gigler (2024-03-14)
Selected paper Nr. 27: Emergence of cooperation and evolutionary stability in finite populations

23. Jana Fuchs (2024-03-14)
Selected paper Nr. 128: Self-regulatory information sharing in participatory social sensing

24. Nicolas Mueller (2024-03-14)
Selected paper Nr. 169: LBIBCell: a cell-based simulation environment for morphogenetic problems

25. Manuel Saladin (2024-03-14)
Selected paper Nr. 98: Mixed Finite Elements for Variational Surface Modeling

26. Nicolas Mueller (2024-03-14)
Selected paper Nr. 302: A Computational Model of Interactions Between Neuronal and Astrocytic Networks: The Role of Astrocytes in the Stability of the Neuronal Firing Rate

27. Radovan Dabetic (2024-03-14)
Selected paper Nr. 205: High order WENO and DG methods for time-dependent convection dominated PDEs: a brief survey of several recent developments

28. Matteo Bolliger (2024-03-14)
Selected paper Nr. 16: Metapopulation dynamics of bubonic plague

29. Lukas Buehler (2024-03-14)
Thesis Bachelor: Building blocks for Finite Element computations in IPPL

30. Lara Vrabac (2024-03-14)
Thesis Bachelor: Circular Coil Magnetic Field and Vector Potential Calculation Approach Using Gauss-Legendre Quadrature

31. You Wu (2024-04-11)
Selected paper Nr. 234: Programming CUDA and OpenCL: a case study using modern C++ libraries

32. Mattia Lucca (2024-04-11)
Selected paper Nr. 135: Mastering the game of Go with deep neural networks and tree search

33. Moyang Li (2024-04-11)
Own paper: Moyang Li, Peng Wang, Lingzhe Zhao, Bangyan Liao, Peidong Liu: USB-NeRF: Unrolling Shutter Bundle Adjusted Neural Radiance Fields, International Conference on Learning Representations (ICLR), 2024

34. Jonathan Fornera (2024-04-11)
Selected paper Nr. 119: STELLA: A Domain-specific Tool for Structured Grid Methods in Weather and Climate Models

35. Ciril Humbel (2024-04-11)
Own paper: Ludovic R?ss, Ivan Utkin, Thibault Duretz, Samuel Omlin, Yuri Y. Pod-

ladchikov: Assessing the robustness and scalability of the accelerated pseudo-transient method, Geoscientific Model Development, July 25, 2022

36. Harini Vijayshankar (2024-04-11)
Selected paper Nr. 334: Critical learning periods in deep networks

37. Timo Schwab (2024-04-11)
Own paper: Christian R. Trott , Damien Lebrun-Grandie, Daniel Arndt , Jan Ciesko, Vinh Dang , Nathan Ellingwood , Rahulkumar Gayatri, Evan Harvey , Daisy S. Hollman, Dan Ibanez, Nevin Liber , Jonathan Madsen, Jeff Miles, David Poliakoff , Amy Powell, Sivasankaran Rajamanickam , Mikael Simberg , Dan Sunderland, Bruno Turcksin, Jeremiah Wilke: Kokkos 3: Programming Model Extensions for the Exascale Era, IEEE Transactions on Parallel and Distributed Systems, Vol. 33, No. 4, April 2022

38. Timo Zuend (2024-04-11)
Selected paper Nr. 111: Hebbian Self-Organizing Integrateand-Fire Networks for Data Clustering

39. Tim Sauter (2024-04-11)
Selected paper Nr. 341: Stochastic Wasserstein Autoencoder for Probabilistic Sentence Generation

40. Tanja Srindran (2024-04-11)
Selected paper Nr. 314: Price of Anarchy in Transportation Networks: Efficiency and Optimality Control

41. Haoanqin Gao (2024-04-11)
Selected paper Nr. 212: Program Generation for Small-Scale Linear Algebra Applications

42. Tobias Zimmermann (2024-04-11)
Selected paper Nr. 269: High-order computational fluid dynamics simulations of a spinning golf ball

43. Ritvik Ranjan (2024-04-11)
Selected paper Nr. 283: Whole-History Rating: A Bayesian Rating System for Players of Time-Varying Strength

44. Pascal Vogel (2024-04-18)
Selected paper Nr. 52: How Long Is the Coast of Britain? Statistical Self-Similarity and Fractional Dimension

45. Lucas Benito Reichmuth (2024-04-18)
Selected paper Nr. 141: SoCo: A Social Network Aided Context-Aware Recommender

46. Tim Eicher (2024-04-18)

Selected paper Nr. 23: Evolution in population dynamics

47. Nils Maletinsky (2024-04-18)
Selected paper Nr. 197: A tutorial on fast fourier sampling, IEEE Signal Processing Magazine

48. Dilara OEzev (2024-04-18)
Selected paper Nr. 160: Microsoft COCO: Common Objects in Context

49. Lily Watanabe (2024-04-18)
Own paper: Olivia Guest, Frank J. Kanayet, Bradley C. Love: Gerrymandering and computational redistricting, Journal of Computational Social Science, 2019

50. Alexander Pietak (2024-04-18)
Selected paper Nr. 30: Modelling the recent common ancestry of all living humans

51. Thibault Meier (2024-04-18)
Selected paper Nr. 8: Metapopulation dynamics

52. Alitzel Macias Infante (2024-04-18)
Selected paper Nr. 28: Quantification of modeling uncertainties in a large ensemble of climate change simulations

53. Tina Ho (2024-04-18)
Own paper: Hisashi Ohtsuki, Christoph Hauert, Erez Lieberman and Martin A. Nowak: A simple rule for the evolution of cooperation on graphs and social networks, nature, 25 May 2006

54. Alexander Born (2024-04-18)
Selected paper Nr. 37: Evolution of cooperative strategies from first principles

55. Samuel Karsko (2024-04-18)
Selected paper Nr. 22: Rapid evolution drives ecological dynamics in a predator-prey system

56. Livio Ziltener (2024-04-18)
Own paper: Matthew Goldman, Justin M. Rao: Asymmetric Misperception of Risk by Experienced Agents, April 12 2013

57. Mingfei Lyu (2024-04-25)
Selected paper Nr. 146: The Global Patch Collider

58. Tizian Warnking (2024-04-25)
Selected paper Nr. 312: Attention Is All You Need

59. Konstantinos Papathanasiou (2024-04-25)

Own paper: Hado van Hasselt and Arthur Guez and David Silver: Deep Reinforcement Learning with Double Q-learning, AAAI Conference on Artificial Intelligence 2016

60. Sebastian Brovelli (2024-04-25)
Selected paper Nr. 163: Influence of scene structure and content on visual search strategies

61. Yang Yu (2024-04-25)
Own paper: Jie Cheng, Yingbing Chen, Qingwen Zhang, Lu Gan and Ming Liu: Real-Time Trajectory Planning for Autonomous Driving with Gaussian Process and Incremental Refinement, ICRA 2022

62. Maximilian Guidi (2024-04-25)
Own paper: Michael Heinzinger et. al : Contrastive learning on protein embeddings enlightens midnight zone, NAR Genomics and Bioinformatics, 11 June 2022

63. Samuel Relling (2024-04-25)
Own paper: S Kajita, T Kinjo, T Nishi: Autonomous molecular design by Monte-Carlo tree search and rapid evaluations using molecular dynamics simulations, Nature 2020

64. Faveo Hoerold (2024-04-25)
Own paper: Shigang Li, Torsten Hoefler: Near-Optimal Sparse Allreduce for Distributed Deep Learning, PPoPP ?22, April 2?6, 2022, Seoul, Republic of Korea

65. Felix Ludwig (2024-04-25)
Selected paper Nr. 20: Pathway Databases: A Case Study in Computational Symbolic Theories

66. Nick Hofstetter (2024-04-25)
Selected paper Nr. 168: A new genetic algorithm for global optimization of multimodal continuous functions

67. Alexander Rohwedder (2024-04-25)
Own paper: Organick, L. et al.: Random access in large-scale DNA data storage, nature biotechnology, 06.03.2018

68. Christopher Lompa (2024-04-25)
Thesis Bachelor: Bayesian Optimization for Vagus Nerve Stimulation

69. Eva Sarlin (2024-04-25)
Own paper: Amodio,M., van Dijk, D., Srinivasan,K. et al. : Exploring single-cell data with deep multitasking neural networks, Nature Methods, November 2019

70. Carla Lopez Zurita (2024-05-16)
Selected paper Nr. 198: On the low-rank approximation by the pivoted Cholesky decomposition

71. Tristan Gabl (2024-05-16)
Selected paper Nr. 81: Automatic player behavior analysis system using trajectory data in a massive multiplayer online game

72. Basil Zemann (2024-05-16)
Own paper: B. P. Abbott et al.* (LIGO Scientific Collaboration and Virgo Collaboration): Observation of Gravitational Waves from Binary Black Hole Merger , arXiv, 11.02.2016

73. Chen Li (2024-05-16)
Selected paper Nr. 5: Quantum Computation

74. Leran Lyu (2024-05-16)
Thesis Bachelor: Simulation Study of the Pinning Effect of N2 Gas Pore on Grain Boundary Migration

75. Djahan Lamei (2024-05-16)
Selected paper Nr. 95: A Fast Pairlist-Construction Algorithm for Molecular Simulations under Periodic Boundary Conditions

76. Benedict Armstrong (2024-05-16)
Own paper: Shin-Jin Kang ? Young Bin Kim ? Taejung Park ? Chang-Hun Kim: Automatic player behavior analysis system using trajectory data in a massive multiplayer online game, Multimedia Tools and Applications Volume 66 2013

77. Ilir Gashi (2024-05-16)
Selected paper Nr. 138: Using Noise to Speed up Markov Chain Monte Carlo Estimation

78. Jingjing Li (2024-05-16)
Own paper: J. Brannick, R. C. Brower, M. A. Clark, J. C. Osborn, C. Rebbi: Adaptive Multigrid Algorithm for Lattice QCD, Phys.Rev.Lett.100:041601,2008

79. Zhenyan Zhao (2024-05-16)
Thesis Bachelor: Noisy Simulation of Gaussian Boson Sampling

80. Linus Ziegler (2024-05-16)
Selected paper Nr. 284: Experimental Demonstration of Force Driven Quantum Harmonic Oscillator in IBM Quantum Computer

81. Ramon Schoenholzer (2024-05-16)
Selected paper Nr. 151: Unified Particle Physics for Real- Time Applications

82. Severin Klapproth (2024-05-16)
Own paper: Junyi Zou, Eugenia Kim, and Antoine J. Cerfon: Fast convolution with free-space Green?s functions, 16.03.2021

83. Raphael Graf (2024-05-23)
Selected paper Nr. 307: Forward-mode Differentiation of Maxwellâ€™s Equations

84. Mike Schmid (2024-05-23)
Own paper: Charles G. Gunn: Projective geometric algebra: A new framework for doing euclidean geometry, 18 Aug 2020

85. Arsh Kumbhat (2024-05-23)
Own paper: Xiaowei Jin, Shengze Cai, Hui Li, George Em Karniadakis: NSFnets (Navier-Stokes flow nets): Physics-informed neural networks for the incompressible Navier-Stokes equations, Journal of Computational Physics, 1 February 2021

86. Severin Nigg (2024-05-23)
Own paper: Boling Yang, Patrick E. Lancaster, Siddhartha S. Srinivasa, and Joshua R. Smith: Benchmarking Robot Manipulation With the Rubik?s Cube, IEEE, 28. January 2020

87. Pranjal Mishra (2024-05-23)
Selected paper Nr. 292: Interactive Robotic Manipulation of Elastic Objects

88. Mingjie Li (2024-05-23)
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