DEPARTMENT OF MATHEMATICS
AND COMPUTER SCIENCE

SDU

DEPARTMENT OF MATHEMATICS
AND COMPUTER SCIENCE

SDU Department of Mathematics and Computer Science (IMADA) was founded in 1972. IMADA has 12 professors, 90 researchers and staff, and 600 students. Everyday, we break new frontiers in algorithms, optimisation, analysis, data science and statistics. We collaborate with the best researchers and industry around the world.

We strive towards establishing partnerships, creating impact and providing the best education in a field that has never been more relevant and important than today.

Contact

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More information

Home to and member of:

AI

Danish Society for Artificial Intelligence

DIO
Digital Innovation Office

BDV BIG DATA VALUE ASSOCIATION

Technology Denmark

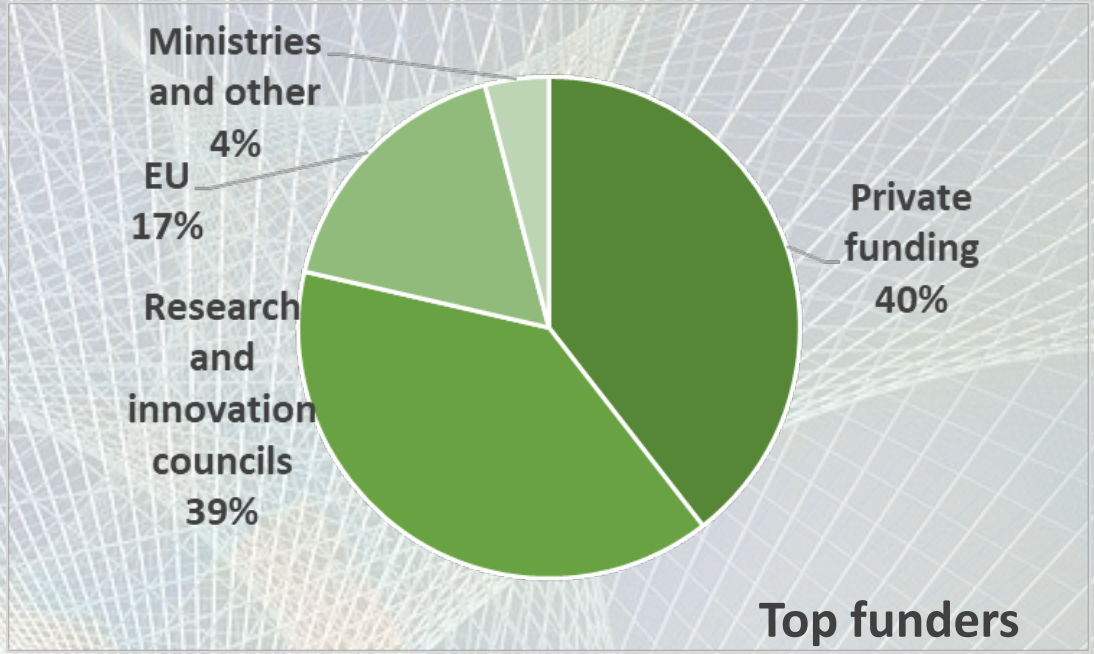
Danish Hub for Cybersecurity

Microservices Community

INFORMATICS EUROPE

External Funding

In the last five years IMADA has been heavily funded from external sources with a total of **100M** DKK received in **80 externally funded grants.**



Private Foundations
Villum Foundation
Novo Nordisk Foundation
Nordea Fondet
Carlsbergfondet
Tuborgfondet
Lundbeckfonden
Tryghedsgruppen
Industriens Fond

Public Research and Innovation Bodies
Innovation Fund Denmark
Independent Research Fund Denmark
Danish National Research Foundation

European Union
Horizon 2020
Erasmus+
FP7
Interreg
Life Long Learning

Ministries and other
Ministry for Science and Higher Education
Ministry of Defence
Ministry of Children and Education
Ministry of Culture
Region of Southern Denmark
DeIC -Danish e-Infrastructure Cooperation

Cases

FeatureCloud is a novel artificial intelligence (AI) platform, based on a groundbreaking new cloud infrastructure to integrate local AI globally without the need for any transfer of primary medical data – totally anonymous by default.

Drones4energy aims to build a collaborative, autonomous, and continuously operating drone system that will be offered to powerline operators to inspect the power grid accurately, frequently, and autonomously.

EuroPLEx will train a new generation of researchers in Theoretical Particle Physics. The main core of EuroPLEx research aims at a deeper understanding of strongly interacting matter. This will be pursued by numerical simulations of the underlying fundamental theories.

EOSC-Nordic facilitates the coordination of European Open Science initiatives within the Nordic and Baltic countries to establish these as frontrunners in the take-up of the EOSC concept, principles and approach. EOSC-Nordic brings together a strong consortium of 24 partners relevant for implementing open science policy.

Research groups

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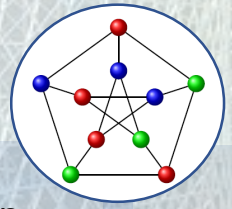
Algorithms

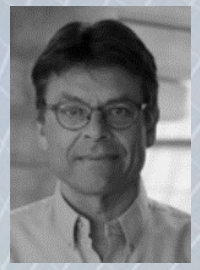


Algorithms are at the core of Computer Science. In addition to offering expertise in concrete application areas, a solid background in algorithms makes it easy to enter other subareas of Computer Science.

IMADA's algorithms group has heavy impact in many areas, including cheminformatics, cryptology, data structures, external memory, fixed parameter tractability, graph theory, online algorithms, and optimization, with publications in top journals and conference proceedings.

Key words: Cheminformatics, Online Algorithms, Graph Algorithms.
Partners: Top international universities and regional industry.
Supported by: Independent Research Fund Denmark, Villum Foundation.

Contact



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More information

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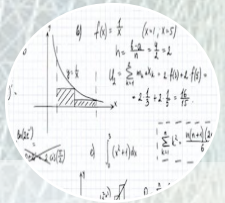
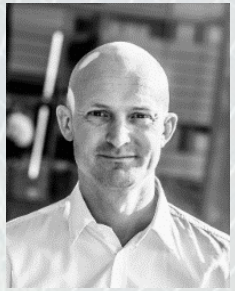
Analysis



Our group conducts research in modern analysis, an area of pure mathematics which combines analytic and algebraic methods to study complex systems, their symmetries and global characteristics. We cover a wide range of topics within the overall area of mathematical analysis, with emphasis on operator algebras, group theory and non-commutative geometry. Our research is currently supported by the Independent Research Fund Denmark via the projects 'Automorphisms and Invariants of Operator Algebras' and ‘Classical and Quantum Distances’. Moreover we do research in the philosophy of mathematics informed by case studies in, e.g., analysis.

Key words: Classical Groups and Quantum Groups, L^2- Cohomology, K-Theory, KK-Theory, Noncommutative Dynamical Systems and Geometry,
Partners: University of Copenhagen
Supported by: Villum Foundation and Independent Research Fund Denmark, Horizon 2020 Marie Skłodowska-Curie Fellowship

Contact



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Computational Science

Modern science is computational science. We use computers to simulate models of reality, thus exchanging the classic laboratory with a digital one. In some fields, this is the most efficient way to test solutions, e.g. aerodynamics of aircrafts, market models and electric circuit simulations. In other fields it is the only way: when trying to understand the basic “rules” of our universe, numerical simulations provide the only window into many rich and unexplored phenomena in the world of elementary particle and nuclear physics.

The Computational Science Section consists of the groups Computational Quantum Field Theory and Numerical Analysis.

Key words: Lattice field theory, Computational mathematics, High-resolution shock simulations, HPC
Partners: German Aerospace Center (DLR), Volkswagen Group Research, Newtec Engineering A/S, CERN, nVidia, Google, CRAY.
Supported by: Lundbeckfonden, Independent Research Fund Denmark, EU Horizon 2020

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More information

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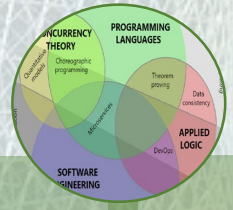
Concurrency and Logic



In the Concurrency and Logic (CL) group at SDU, we are interested in the challenges brought by modern digital systems, such as big data systems, the Internet of Things, and data clouds: software, data, and systems are getting increasingly larger and complex, pushing beyond the limits of developing and analysing them manually.

In our group, we develop theory and tools that automate crucial steps of the development and analysis processes, enhancing their efficiency and reliability.

Key words: Choreographic programming, Microservices, DevOps, Cybersecurity, Cloud/Edge computing, AI, reasoning and theorem proving
Partners: Imperial College London, Univ. of Oslo, Univ. Lisbon, Univ. of Bologna, INRIA, Univ. of Edinburgh, Imola Informatica, NTNU, Equinor and EU Braunschwig.
Supported by: Villum Foundation, Danish Center for Cybersecurity, Independent Research Fund Denmark and European Union

Contact

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Data Science and Statistics

Our group combines expertise in different aspects of computer science (data mining, machine learning, optimization, artificial intelligence, visualization), statistics (extreme value theory, Bayesian inference, multivariate analysis), and bioinformatics (analysis of biological networks and large-scale biomedical data).

We develop data-driven techniques and apply them in practice to gain insights and to create knowledge and value in collaboration with other academic fields and with companies from both private and public sector.

Key words: Machine learning, data mining, cluster analysis, anomaly detection, visualization, AI, bioinformatics, and statistics
Partners: Top international universities and regional industry and municipalities.
Supported by: Villum Foundation, Industriensfonden, H2020, Trygfonden, and others

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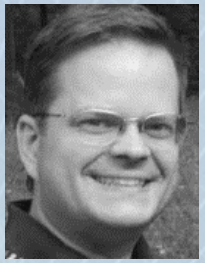

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More information

Centres

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SDU eScience Centre

The SDU eScience Center was created in 2013 at IMADA. Its 15+ staff provides the management, administration and technical support to keep the National HPC Centre, SDU running in a way that maximizes the research output of the supercomputer ABACUS2.0.

ABACUS2.0 provides access to **industry** and **academia** that have computational needs out of the ordinary focusing on matters such as:

- Simulation and optimization
- Big data workloads
- Predictive behavior

Contact

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More information

In collaboration with:

DeiC

AARHUS UNIVERSITY

AALBORG UNIVERSITY DENMARK

Centres

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Laboratory for Coherent Education and Learning

Laboratory for Coherent Education and Learning (LSUL) is a strategic collaboration in research, innovation and education between University of Southern Denmark's Faculty of Natural Science University College Lillebaelt and University College South Denmark. It:

- Brings together students, researchers and practitioner in STEM (Science, Technology, Engineering and Mathematics) education.
- Provides students and teachers tools and skills for identification of questions and concrete real-life problems.
- Is interdisciplinary, aiming addressing large societal challenges e.g. energy efficiency, resource usage analyses and the environment.

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More information

In collaboration with:

LSUL SDU UCSYD

Education

IMADA has more than 600 students and offer a variety of full-time study programmes within Mathematics, Computer Science and Didactics:

- Full-time Bachelor and Master programmes in Applied mathematics, Computer science, Mathematics, and Mathematics-Economics.
- Master programme in Data science
- Part-time Master programme in Computer science
- Professional Master programmes in Science teaching and Mathematics
- PhD programmes in Computer science, Mathematics, Statistics, and Science and Mathematics Teaching
- Cooperation with businesses

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More information

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