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STADIUS
Center for Dynamical Systems, Signal Processing and Data Analytics

STADIUS Newsletter

DECEMBER 2025

Welcome to the December edition of the STADIUS Newsletter! Enjoy the Christmas break!



Research of the month: pyTensorlab:

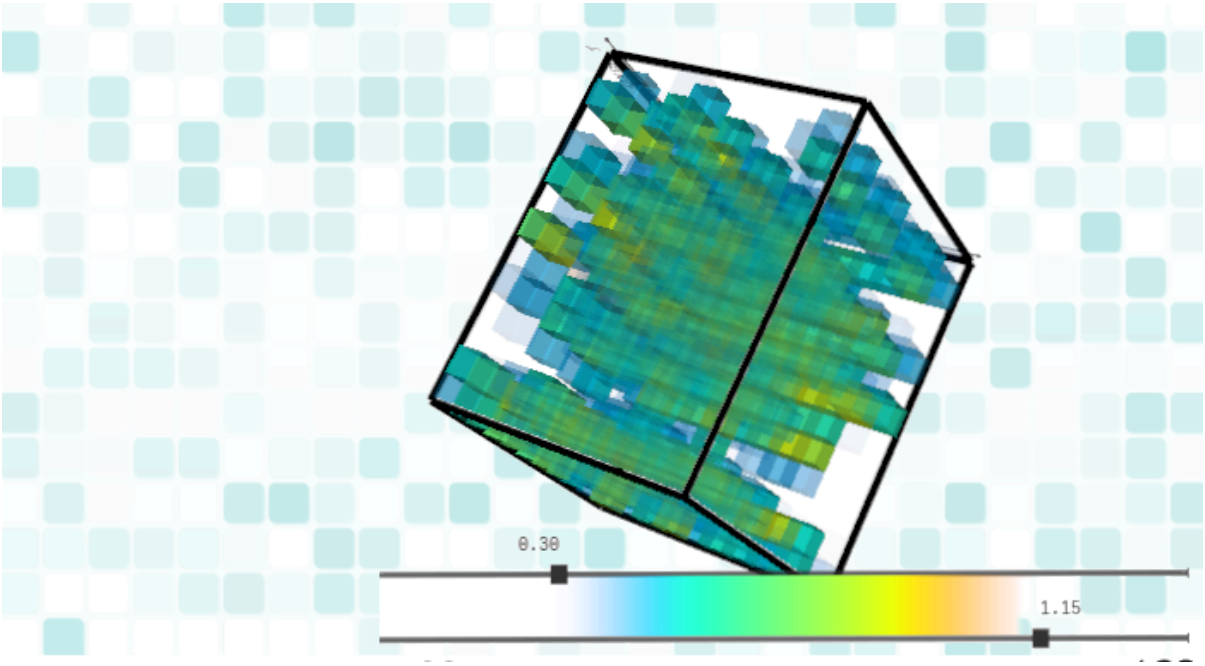
"pyTensorlab: a new Python toolbox for tensor computations"

On 6 December 2025, pyTensorlab was released: a Python version of the globally used Tensorlab package. This new toolbox brings advanced algorithms and tools for tensor analysis to a broad community of new users.

Traditional data representations such as flat tables or matrices are often insufficient for uncovering hidden structures, underlying sources or patterns. Complex datasets are therefore frequently represented as multiway arrays – think of (hyper)cubes of numerical values – or tensors. Tensors generalize matrices in a natural way and offer numerous advantages, including more **interpretable models** of data and significant opportunities for **compression**. For example, the melting temperature of complex metal alloys can be modelled using thousands of parameters while generating the full dataset would require more storage than exists worldwide. Similarly, tensor decompositions enable the elegant and reliable separation of amino acids in food samples.

With pyTensorlab, a new member has been added to the Tensorlab family. The package

provides not only **tensor decompositions** but also powerful functionality for complex optimization. Although other Python packages for tensor decompositions exist, pyTensorlab offers clear added value. User-friendly access to numerically robust software and our many years of experience with countless applications were key priorities. The package uses **advanced algorithms** and automatically **applies best practices**. Thanks to an extensive datatype system, users receive immediate feedback on correctness while writing their code. A comprehensive manual, accessible documentation and numerous demos (https://pytensorlab.net/docs/) help users navigate the wide range of algorithms, visualization tools and analysis methods.



pyTensorlab has been available since December 2025 via PyPI and https://pytensorlab.net. In addition, Tensorlab 3.0 offers a MATLAB package with similar functionality, including extended support for **structured data fusion** and block term decompositions. Tensorlab+ is a library for **reproducible tensor research** based on Tensorlab. It includes all algorithms, code and data required to reproduce and replicate published experiments, as well as tutorials and demos to help users apply the techniques in their own work.

All packages are freely available for non-commercial research.

Authors and contibutors

- **Ayvaz, Muzaffer** *(former — KULAK & STADIUS)*
- **Boussé, Martijn** *(former — STADIUS)*
- **De Lathauwer, Lieven** *(KULAK & STADIUS)*
- **Devogel, Andreas** *(former — STADIUS)*
- **Govindarajan, Nithin** *(STADIUS)*
- **Hendrikx, Stijn** *(former — STADIUS)*
- **Iannacito, Martina** *(former — KULAK & STADIUS)*
- **Seeuws, Nick** *(former — STADIUS)*
- **Sofi, Shakir** *(KULAK & STADIUS)*
- **Vermeylen, Charlotte** *(STADIUS)*
- **Vervliet, Nico** *(STADIUS)*
- **Widdershoven, Raphaël** *(STADIUS)*

Awards

Bart De Moor elected as an International Fellow of the Royal Swedish Academy of



Engineering Sciences (IVA), one of Europe's most prestigious engineering societies

We are proud to share that **Professor Bart De Moor** has been elected in 2025 as an **International Fellow of the Royal Swedish Academy of Engineering Sciences (IVA)**.
Founded in 1919, IVA is the world's oldest engineering academy, bringing together around 1,300 leading Swedish and international experts from academia, business, and the public sector. The Academy is chaired by **Marcus Wallenberg** and plays a central role in advancing science, technology, and entrepreneurship as drivers of societal progress.
Election as an International Fellow is a **highly selective honour**, recognizing individuals who have made outstanding contributions to engineering and technology on a global scale.
Visit this website to learn more about the Academy and meet the other Fellows

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Elisabeth Heremans receives Nokia Bell Scientific Award 2025

We are delighted to share that Elisabeth Heremans has been awarded the **Nokia Belgium Scientific Award 2025**, a prestigious prize that has been recognizing outstanding scientific talent for more than three decades. The award was presented on Wednesday in the presence of representatives from Nokia, FWO, and KU Leuven.
This marks the **second consecutive year** that the Nokia Bell Scientific Award goes to a researcher from ESAT, KU Leuven. In line with tradition, the prize was celebrated with a dedicated event at Nokia's premises featuring talks, demonstrations, and a networking reception with members of the Nokia Belgium and KU Leuven communities.

The accompanying photo captures the moment with (from left to right): **Emmanuelle Pierrard** (Nokia), **Elisabeth Heremans** (STADIUS), **Ingrid Van de Voorde** (Nokia), **Hans Willems** (FWO), and **Maarten De Vos** (STADIUS).

Events @ STADIUS

IBOF study day
Date and time: 06/01/2026, 11:00 - 17:00
Location workshop: ESAT, B91.200.

METT XI - 11th Workshop on Matrix Equations and Tensor Techniques
Date and time: from 07/01/2026, 09:30 to 09/01/2026, 20:00
Location workshop: ESAT Aula C
Location reception: Salons Arenberg Castle

For more information about STADIUS events please visit the STADIUS Event webpages.

Don't forget to check the website of VAIA for a wide choice of courses on (aspects of) AI: www.vaia.be

09/01/2026 – PhD defense – Antoine Passemiers
Promotor: Yves Moreau
Co-supervisors: Joris R. Vermeesch and Daniele Raimondi
Date and time: 09/01/2025; 17:00 -19:00
Location: ESAT, Aula R

Crash course for PhD researchers by Leonie Kayser: "Algebraic Geometry Tools for Polynomial Systems in Engineering"
Dates: Tuesday 20/01/'26, Thursday 22/01, Tuesday 27/01, and Thursday 29/01
Time: 10:00–12:00
Location: Aula van de Tweede Hoofdwet (01.02), Thermotechnisch Instituut

Learning What Matters: Scalable Data Mixing for LLMS
When: 12/02/2026; 14:00-15:00
Location: B00.35

STADIUS Colloquium Series

A short introduction to the AI Act and potential link with the MDR.
When: 20/01/2026, 11:00 – 12:30
Speakers: Eylem Karakaya, Shannen Verlee, Sultan Erdogan.
Location: Aula C



Eylem Karakaya has been a doctoral researcher at the Centre for IT and IP Law (CiTiP) of KU Leuven since October 2024. She is involved in the FLIPR project, and her doctoral research focuses on the use of AI in healthcare, with a particular emphasis on the MDR and the AI Act.

Sultan Erdogan is a researcher at KU Leuven (CiTiP), where she has been working under the supervision of Prof. Dr. Jan De Bruyne since September 2025. She holds a master's degree awarded by KU Leuven and is part of the Knowledge Center on Data & Societ

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We wish the best of luck to the researchers who are leaving STADIUS

Best of luck!

Over the past weeks, several colleagues have reached important milestones and are starting new chapters beyond STADIUS.

- **Paul Didier,** a researcher from Marc Moonen's group, successfully defended his PhD last month. He is now heading to Denmark to pursue new and exciting opportunities.
- **Jesper Brunnström**, also supervised by Marc Moonen, has recently completed his PhD and will be returning to Sweden to take on new professional challenges.

- At the end of this month, **Andras Formanek** from Yves Moreau's group will be leaving STADIUS as he moves on to his next endeavor.
- Finally, **Vincent Scheltjens** from Bart De Moor's group is concluding his PhD in the coming weeks.

We warmly thank them all for their contributions and wish them every success in the next steps of their careers.

Recently defended PhDs

Congratulations to the new PhD graduate!

- **4/12/2025 - Jesper Brunnström** *"Sound field estimation and control over continuous regions"* **Thesis**

  Promotor: Marc Moonen,
  Co-Promotors: Toon van Waterschoot, Jan Østergaard

Publications

Here's the monthly STADIUS Publications Digest, including new reports that have been added to the publications database. Please remember to have your own reports added in the publications database and make sure your entries are kept up to date (status submitted/accepted/published) at all times.

Contact Ida for new additions and updates; do not add/update database content yourself.

25-187
Damiano S., MacWilliam K., Lorenzoni V., Dietzen T., van Waterschoot T., ``The trajectoRIR Database: Room Acoustic Recordings Along a Trajectory of Moving Microphones'', Technical Report 25-187, ESAT-STADIUS, KU Leuven (Leuven, Belgium), 2025.
25-192
Evens B., *Splitting Methods for Nonmonotone Inclusion Problems*, PhD thesis, Faculty of Engineering, KU Leuven (Leuven, Belgium), Dec. 2025 Lirias number: 4257881.
25-193
Brunnstrom J., *Sound field estimation and control over continuous regions*, PhD thesis, Faculty of Engineering, KU Leuven (Leuven, Belgium), Dec. 2025, ? p. Lirias number: 4266420.
25-194
Damiano S., Dietzen T., van Waterschoot T., ``Frequency Tracking Features for Domain-Robust and Data-Efficient Deep Siren Identification'', Technical Report 25-194, ESAT-STADIUS, KU Leuven (Leuven, Belgium), 2025. Accepted for publication in *IEEE Transactions on Audio, Speech and Language Processing*. Lirias number: 4388580.



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