

Dear readers, Dear members and friends of the cluster SE²A,

with this issue, we would like to change our newsletter to a SE²A magazine format, which is published twice a year. As before, hot news and announcements will be published on our website and on Twitter.

With this 1st issue of the SE²A magazine we would like to inform you about current cluster events, awards for SE²A Members, our scientific engagement as well as the new infrastructure E²AGLE.

Another important step in the research agenda in SE²A was the successful start of the second internal cluster phase with many new projects and new participation of researchers. We would like to extend a warm welcome to all new scientists in the cluster and hope to see you at the SE²A Conference in August.

Enjoy reading and with best regards,

Prof. Dr.-Ing. Jens Friedrichs
(Spokesperson SE²A)

Dr. Doris Pester
(SE²A-Managing-Director)

LATEST NEWS

January 2023

New Junior Research Group "Long-Range Aircraft Configurations and Technology Analyses"

Dr. Stanislav Karpuk from the [Institute of Aircraft Design and Lightweight Structures](#) will conduct research on the topic of long-range aircraft design within the Cluster of Excellence SE²A.

The JRG will investigate the potential of future airframe and propulsion technologies for the next-generation commercial aircraft. The group will continue developing tools and methods for multi-fidelity analysis, design, and optimization of aircraft and will answer several configurational questions of potential long-range commercial aircraft.

Together with two doctoral researchers, Dr. Stanislav Karpuk will work on the project for the following 2.5 years.



February 2023

SE²A General Assembly

On February 13, the SE²A General Assembly was held in the NFF auditorium. Prof. Jens Friedrichs, spokesperson of the cluster, gave a review of the past years of the first internal project funding phase, which ended in 2022. He also gave an outlook on the upcoming period:

In the 2nd internal funding phase, more than 50 doctoral researchers will start in 35 new projects and a new junior research group. Priv.-Doz. Gabriele Raabe provided information about the updated doctoral researcher's program.

With the start of the new phase, we would like to say goodbye and express our sincere thanks for their work as board members and ICA coordinators in SE²A to Prof. Sabine C. Langer (ICA A), Prof. Rolf Radespiel (ICA B), and Prof. Jörg Seume (ICA C). We would like to express our special thanks for the active involvement of these board members in the successful application for the Cluster of Excellence. We are looking forward to continuing our fruitful work together in the cluster!

SE²A doctoral researcher Tobias Müller at DIG1T-Studio



Tobias Müller works at the [Institute for Environmental Economics and World Trade](#) at Leibniz University Hannover and is a doctoral researcher at the SE²A Cluster of Excellence.

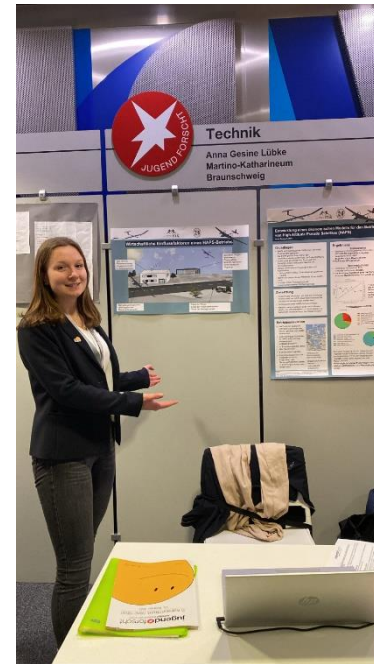
Recently, he contributed to LUH's DIG1T-Studio project by presenting his current SE²A research project “Hydrogen in sustainable aviation: Macroeconomic impacts and state intervention”. The two research questions addressed by the project are: (1) What are the macroeconomic impacts of hydrogen-powered aviation compared to continuing conventional air transport? (2) What are the effects of state interventions on the hydrogen market?

In his contribution, he explains why it is relevant from a climate change perspective to research on alternative propulsion solutions for aircrafts and therefore, he points out the importance of the research of the Cluster of Excellence SE²A.

[Click here](#) to watch the video.

March 2023

SE²A research club changING at "Jugend Forscht"



The changING research club of the Cluster of Excellence SE²A deals with transferring knowledge of current scientific questions to pupils from schools in the Braunschweig region. In particular female students should be given the opportunity to deal with technical issues and to strive for a technical career.

ChangING participant Anna Lübke (Martino-Katharineum Braunschweig) worked on a project at the [Institute of Flight Guidance](#) at TU Braunschweig and achieved the first place in the subject area technology at the „Jugend Forscht“-competition. This allowed her to participate in the "Landesrunde" in Clausthal in March.

There, she managed to reach the third place. Anna's project was based on high altitude unmanned platforms operating in the stratosphere (High Altitude Pseudo Satellites - HAPS). She developed an economic model for the operation of HAPS for comprehensive mobile network coverage.

We are happy about the great success. Congratulations, Anna!

[Click here](#) for more information about the project. [Here](#) you can find more information about changING and latest news are also available on [Instagram](#).

April 2023

Future Day at the Cluster of Excellence SE²A

Jungen-Zukunftstag
Boys' Day

Girls' Day
Mädchen-Zukunftstag

In total, about 70 pupils made their way to the Hermann-Blenk-Straße at TU Braunschweig campus "Forschungsflughafen" in order to have an exciting and practical insight into the topic of aviation and future mobility concepts.

Pupils, mostly female, from grades 5-10 had the chance to learn about current research questions at the following institutes: Institute of Jet Propulsion and Turbomachinery (IFAS), Institute of Flight Guidance (IFF), Institute for Fluid Mechanics (ISM) and the Institute of Aircraft Design and Lightweight Structures (IFL). For example, the pupils from higher grades had the chance to get to know flight simulators, to learn about their practical use, and to try a simulation themselves.



Dr. Doris Pester welcomes the participants at NFF

For the younger participants, the topic of "crash safety" was on the agenda. After they had been given theoretical knowledge, they had to transfer this input to practice: A little passenger, represented by a chicken egg, was to be protected from a collision. For this purpose, they had materials such as cardboard and balloons at their disposal. It was particularly exciting when the little passengers were transported to heights of 5, 7, or even 10 meters to put their constructions to the ultimate test. Fortunately, each dropped egg was well protected from breaking.

We are happy that we were able to see so many female pupils at our "Zukunftstag" and we hope to have inspired the researchers of tomorrow for the topics of sustainable aviation!



Pupils on one of the flight simulators, trying to land the plane at Hanover airport.

[Click here](#) for more information and photos about the Future Day at the Cluster of Excellence SE²A and [here](#) for more insights of the Future Day at TU Braunschweig.

A visit from the Minister for Science and Culture

On April 13, Falko Mohrs, Lower Saxony's Minister for Science and Culture, visited the research airport of TU Braunschweig and was also introduced to our research within the SE²A cluster.

We are very pleased that Prof. Jens Friedrichs, SE²A Spokesperson, and Prof. Angela Ittel, President of the TU Braunschweig, had the opportunity to give the Science Minister of Lower Saxony an interesting insight into our important and relevant research.

[Click here for more information](#)



From left to right: Prof. Jens Friedrichs, Dr. Thorsten Kornblum (Mayor Braunschweig), Mark Schmidt (Head of DLR "Mitte"), Prof. Angela Ittel, Carola Meyer (Managing Director research airport), Falko Mohrs, Prof. Arno Kwade (Institute for Particle Technology).

May 2023

SE²A doctoral researcher Christopher Blech wins "Hirschvogel Prize" for his dissertation

Former SE²A doctoral researcher Dr. Christopher Blech has been honoured on Mechanical Engineering Day 2023 in May.

He won the "Hirschvogel Prize" for the best dissertation of 2022 at the [Faculty of Mechanical Engineering](#). He wrote his thesis on the topic "Wave-resolving aircraft cabin noise prediction" at the Institute for Acoustics.

Congratulations!



On the picture you can see Dr. Christopher Blech next to Jasmine Holfeld from the Hirschvogel Foundation (on the left), Prof. Markus Böl (Institute of Solid Mechanics) and Prof. Sabine C. Langer (Institute for Acoustics).

[Click here](#) for more information about his dissertation and the Mechanical Engineering Day 2023.

June 2023

New Laboratory at SE²A – E²AGLE

The Electric Aircraft Ground Lab Environment (E²AGLE) is approved by DFG and MWK and enlarges the available research infrastructure at the Cluster of Excellence SE²A. The cluster is not only researching on batteries for aviation, but also on electrical systems for electric flying.

With the help of E²AGLE, the topological possibilities of electrical systems and the resulting questions of aircraft propulsion systems can be fundamentally investigated.

The E²AGLE is divided in two subsystems within the cluster, one at TU Braunschweig ([Institute for Electrical Machines, Traction and Drives](#)), and one at Leibniz University Hannover ([Institute for Drive Systems and Power Electronics](#)). The two sites are also addressing different research questions:

The subsystem at TU Braunschweig will investigate a central electrical system topology in which all energy sources are connected to a common electrical system. The subsystem located at Leibniz University is researching decentralised electrical

system topologies. The aim is to compare the two research results, in order to derive technical recommendations for action.



From left to right: Prof. Markus Henke, Prof. Regine Mallwitz, Prof. Jens Friedrichs /Foto: Dirk Ferch

To emphasise the importance of the E²AGLE-Laboratory, we want to refer to Falko Mohrs', Lower Saxony Minister for Science and Culture, words:

"There is no doubt that E²AGLE will contribute to generating highly relevant and exciting research results for the further development of air transport"



More Information [here](#).

RESEARCH

The Cluster of Excellence "Sustainable and Energy-Efficient Aviation" is an interdisciplinary research center with the purpose of investigating technologies for a sustainable and eco-friendly air transport system. Scientists from aerospace, electrical, energy and chemical engineering are working on the reduction of emissions and noise, as well as recycling and life-cycle concepts for airframes and improvements in air traffic management. Technische Universität Braunschweig, the German Aerospace Center (DLR), Leibniz University Hannover (LUH), the Braunschweig University of Art (HBK) and the National Metrology Institute of Germany (PTB) have joined forces in this extraordinary scientific undertaking.

The Cluster organisation is structured in three Integrated Cluster Areas (ICAs) reflecting the mission-critical research demands and following a coherent and coordinated roadmap. The three ICAs resulting from our assessment of critical research demand are:



ICA A: Assessment of the Air Transport

The goal of this cluster area is the development of comprehensive criteria and metrics for sustainable air transport that can serve as a basis for decision-making and future scenarios. [More information](#)



ICA B: Flight Physics and Vehicle Systems

This cluster area takes an in-depth look at technologies that have the potential to significantly reduce the power required from the propulsion system. [More information](#)



ICA C: Energy Storage and Conversion

Even with major advances in aircraft drag and propulsion efficiency, carbon emissions can only be reduced, while carbon-free aviation requires new concepts for the energy supply. The cluster looks at advanced lithium-sulfur chemistry for solid-state batteries as well as load bearing batteries. [More information](#)

SE²A EVENTS AND EVENT ANNOUNCEMENTS

SE²A Conference

This year's SE²A Conference will take place from August 29th-31st in Goslar. We want to build on the results and findings achieved so far in our cluster projects as a starting point for new networking between the projects in the 2nd SE²A research phase. We are looking forward to an exciting exchange in August. Please note the details that will reach you by mail within the next weeks.



SE²A Sustainable and Energy-Efficient Aviation
Cluster of Excellence

CONFERENCE

29th to 31st August 2023

Summer School on Advanced Sustainable Aviation Technologies

Prof. Jens Friedrichs, spokesperson of SE²A, from TU Braunschweig together with colleagues from the partner universities TU Delft and Tampere University, set

The world is facing an enormous challenge in transferring aviation into a more sustainable and greener transport mode.

up a summer school from August 14-15, 2023. Theoretical input will be provided by experts from TU Braunschweig, DLR, Tampere University, University of Cambridge and Airbus, who are active players in research for sustainable aviation. These lectures are followed by hands-on projects in Braunschweig.

Here, participants can deepen their research ideas in the view of different disciplines and establish international contacts for future professional perspectives.

We are happy that students from a wide variety of universities and countries such as TU Delft, Sheffield Hallam University, TU München or University of Cambridge have registered and looking forward the scientific exchange.

[Click here for more information](#)

Welcome to SE²A!

Finally! With a kickoff-meeting, SE²A welcomed about 40 of the new SE²A doctoral researchers, who will conduct research and further their education in the diverse projects of the Cluster of Excellence in the coming years. But the meeting was not only about getting to know each other and network: Prof. Jens Friedrichs, spokesperson of the cluster, opened the event and provided insights into the goals and challenges of the Cluster of Excellence's research topics. Dr. Doris Pester, CEO of the Cluster, also welcomed the many new faces with topics such as the collaboration and internationalization in SE²A.



SE²A doctoral researchers at the kickoff-meeting on June 19th at the Automotive Research Centre Niedersachsen

PD Dr. Gabriele Raabe, SE²A board member and responsible person of the SE²A doctoral researchers programme, presented the own SE²A programme, that is conducted with support of Tatjana Szalkau. The program not only provides individually tailored continuing education and networking for each researcher, but also includes a series of events on practical topics, such as publishing in scientific journals, and facilitates interdisciplinary exchange.

A buffet of contributions from the doctoral researchers then provided an opportunity to exchange ideas over snacks and drinks, before Dr. André Bauknecht, SE²A board member and responsible person of the SE²A Equal Opportunity Programmes, explained the wide range of opportunities offered by SE²A's gender equality measures.

The event was rounded off by Maximilian Rolinck, elected PhD representative of the first cohort, who gave insights into his stay abroad as part of the SE²A-funded Stays Abroad program, as well as the diverse opportunities that the program brings not only for personal experience but also for networking within the worldwide research community!

We want to say thank you to everyone who participated, especially to the on the event elected new PhD-representatives Yannik Hüpel and Florian Siebert and all PhD-volunteers who will take part in the organization of the programme for SE²A doctoral researchers: Dominik Wittenberg, Jörn Serrer, Valerio Mosca and Lennart Kösters.

SE²A Female Programmes

Establishing equal opportunities and gender equality is a top priority for TU Braunschweig and SE²A. Programmes are available at different qualification levels. Please have a look on some of the [currently open programmes](#).

SE²A Female Programmes

SE²A International Female Programme - Research Internships

Target group: Female academics from abroad who graduated with a Master's degree

Aim: Increasing the number of female researchers at the SE²A cluster & offering the opportunity to experience first-hand research environment

SE²A International Female Programme - International Master's projects

Target group: Female students from abroad who are about to start their Master's thesis

Aim: Giving foreign female students the opportunity to write their thesis in context of a student position at the cluster & offering them insights into research practice

Start Science Programme

Target group: Female students who are interested in an employment as a student assistant

Aim: Increasing the number of females to develop a topic for their graduation thesis & qualify for doctoral studies

Open positions at SE²A

We are currently offering vacancies in various areas of aviation research! You can find more information by [clicking here](#).

Our SE²A managing office team has new colleagues

We warmly welcome three new colleagues in the SE²A Managing Office: Johanna Göschel M.A. is joining us as the new Integrated Cluster Area B Coordinator, Marisa Kauert will be the new project assistance, and Evelyn Heimbs maintains Controlling at the Cluster of Excellence. Welcome to the team!

[Click here](#) to find the contacts of the Managing Office.

SE²A EVENTS AND EVENT ANNOUNCEMENTS

Paper of the Month

In our seminar "Paper of the Month", SE²A doctoral researchers have the opportunity to present their high ranking SE²A-publication, to learn about the projects of their colleagues in the Cluster, and to exchange ideas. Please keep in mind that the presentation date in 2023 is every last Thursday of the Month.

We are always pleased to hear from you if you are interested in presenting your high-ranking SE²A publication. Please reach out to the [Managing Office](#) for more



SE²A Paper of the Month

- Let your colleagues know
- Discuss high quality Cluster Research
- Establish interdisciplinary exchange

Every last Thursday of the month at 4:30 pm



information. The latest presentation will be held by Alexander Barke on 6th of July (postponed from June).



SE²A Paper of the Month June 2023

Green batteries for clean skies: Sustainability assessment of lithium-sulfur all-solid-state batteries for electric aircraft

Journal of Industrial Ecology (2022)
doi.org/10.1111/jiec.13345

Alexander Barke - Walter Cistjakov - Dominik Steckermeier
Christian Thies - Jan-Linus Popien - Peter Michalowski - Sofia Pinheiro Melo - Felipe Cerdas - Christoph Herrmann - Ulrike Krewer - Arno Kwade - Thomas S. Spengler

June 29th, 2023 - 4:30 pm - Presentation & Discussion
We welcome you to participate!



Charge → Discharge

- Li-ion metal anode
- Solid electrolyte separator
- Solid state cathode
- Aluminum current collector
- Binder
- Carbon black
- Sulfur
- Solid electrolyte

Summer School for Advanced Sustainable Aviation Technologies | 14 - 25 August 2023 | Online and on site



TU Delft and Tampere University, set up a summer school from August 14-15, 2023. Theoretical input will be provided by experts from TU Braunschweig, DLR, Tampere University, University of Cambridge and Airbus, who are active players in research for sustainable aviation. [More Information](#)

SE²A Conference 29 – 31 August | Goslar



This year's SE²A Conference will take place from August 29th-31st

DLRK 2023 | 19 - 21 September 2023 | Stuttgart



The congress is the central event of the German-speaking aerospace community. As a multidisciplinary event, the DLRK offers all participants a platform to present significant findings, progress and developments in the aerospace industry. [More information](#)

The SE²A-Magazine will be published twice a year. For further information please visit our website: <http://www.tu-braunschweig.de/se2a>

More about SE²A



[Contact information](#)

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