# ATLAS News

for the Collaborative Research Centre 1667

*Third Issue – December 2025*

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Deputy Spokesperson
CRC 1667 ATLAS

## Spreading the Word

*"This September, the CRC 1667 ATLAS had the honour of hosting two strong teams composed of students and young professionals from across the globe for the first international Satellite Design Workshop in Stuttgart to conduct design studies for a VLEO technology demonstrator over a single intense week. In providing their expert consultation to the participants, our team of doctoral researchers was able to advance their own understanding of the practical concurrent design challenges and of the remaining gaps in the science. Overall, the value of successfully holding interdisciplinary workshops to advance such novel concepts can hardly be overstated. Bringing together those who will shape the future of spaceflight does not merely spread interest in the topic of VLEO satellite technology, all the while providing hands-on experience, it also strengthens international networks between future leaders and decision makers worldwide. It is my hope that the SDW has left the participants with some great memories and a well-deserved sense of accomplishment, and I express my gratitude to them as well as the organisers and experts for making this a memorable first Satellite Design Workshop of hopefully many more to come!"*

## Contents



## What's New?

This autumn has been an eventful time for the Collaborative Research Centre 1667 ATLAS. September finally saw the long-awaited first international Satellite Design Workshop (SDW) take place at the Space Centre Baden-Württemberg (RZBW) on the University of Stuttgart's Vaihingen campus, with participants from around the world competing in two teams to design a Very Low Earth Orbit (VLEO) satellite mission. Learn how it went down in the section "Satellite Design Workshop".

In October, the ATLAS team held its second off-site retreat in Roggenburg. Find out what we have been up to in the section "Off-site Retreat".

Various guests from academia have graced the CRC with their presence and insights this autumn. Learn who stopped by for a visit in the section "Guest Lectures".

Amongst the guests of the CRC 1667 ATLAS were two delegations from research institutions in the Republic of Korea. Learn more about their visit and about South Korea's ongoing activities in VLEO under the section "Spotlight: South Korea in VLEO".

Find out more about how the CRC 1667 ATLAS contributes towards engaging the regional industry with the topic of Very Low Earth Orbit in the section "Fostering VLEO in the Industry".

While our satellites fly low, our young scientists are soaring high: Meet two ATLAS (post-)doctoral researchers who are already making their mark under "Awards and Honours".

Discover the newest scientific output of the Collaborative Research Centre in the section "Recent Publications".

## Satellite Design Workshop

On 22 September 2025, the very first international Satellite Design Workshop (SDW), hosted by the CRC 1667 ATLAS, concluded successfully. Over an intense seven days, 38 university students and young professionals from 15 countries conducted two parallel design studies to

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*Figure 1: The participants of the first international Satellite Design Workshop 2025.*

conceptualize a Very Low Earth Orbit satellite mission in two competing teams.

The approach of the Satellite Design Workshop, inspired directly by the well-established and highly popular Space Station Design Workshop format, was to have both teams conduct a Phase 0/A mission and system design study broadly following the standards in space mission and systems engineering set by the European Cooperation for Space Standards (ECSS). Prior to the workshop, participants were assigned specific roles within their teams and given material and work packages to prepare in advance. Once in Stuttgart, the workshop then kicked off with a series of crash-course-style lectures and team building exercises. This year's mission statement and list of requirements were then revealed on-site, after which the teams set to work, gradually outlining and fleshing out their respective mission concepts and satellite design through a series of concurrent engineering cycles, and submitting them to almost daily reviews before a panel of experts and critical "customers".

The mission statement that Team Blue and Team Green were given was "Conceptualize an Atmosphere-Breathing Electric Propulsion (ABEP) technology demonstrator!". Guidance and expert advice were provided by a dedicated team of researchers from the CRC 1667 ATLAS, complemented by partnering representatives from academia and industry. After a strenuous but rewarding week of teambuilding, focused concurrent engineering work and chasing various submission deadlines for the intermittent design reviews, both teams presented their impressive results in front of a large audience on 22 September.

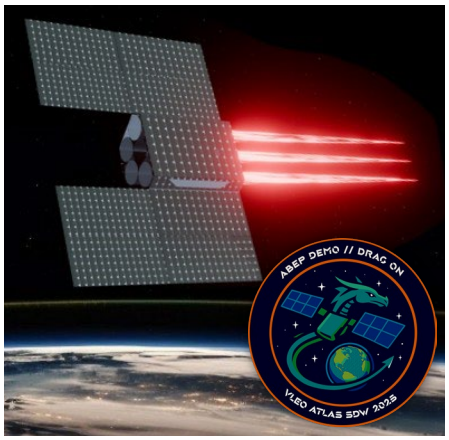


*Figure 2: Green Team's winning VLEO satellite mission design DragON, presented at the international Satellite Design Workshop 2025.*

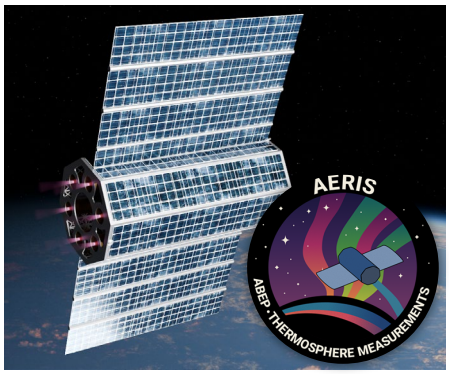


*Figure 3: Blue Team's runner-up VLEO satellite mission design AERIS - Air-Breathing Electric Propulsion for Research in the Ionosphere and Thermosphere Satellite, presented at the international Satellite Design Workshop 2025.*

At the concluding dinner event in the Höhencafé Killesberg, located in the picturesque Killesberg park in Stuttgart, one of the two excellent satellite mission concepts was announced as the winner of the design contest. Team Green's DragON was awarded first place by a narrow margin over Team Blue's AERIS (*Air-breathing Electric Propulsion for Research in the Ionosphere and Thermosphere Satellite*) VLEO satellite mission concept.

To the participants, the Satellite Design Workshop provided a once-in-a-lifetime experience in an international and interdisciplinary team setting, as well as hands-on training on mastering the challenges of space engineering. To the team of the Collaborative Research Centre 1667 ATLAS, the SDW is an ideal opportunity to put their latest findings into "action" and to identify the practical challenges of ultimately applying them in a Very Low Earth Orbit mission setting. Beyond that, the SDW contributes directly to firmly establishing the field of VLEO globally by directly immersing aspiring engineers and scientists in the topic and fostering both their interest and mutual networks. This year's SDW appears to have further garnered a certain level of interest from the public, with its close coverage on social media resulting in 30 000 views of the posting featuring the group photo alone.

The ATLAS speakers and management team would like to thank all participants, experts and members of the support

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team for making this a very memorable and successful first-ever international Satellite Design Workshop!

Follow the link provided below to learn more about the DragON and AERIS Air-Breathing Electric Propulsion (ABEP) VLEO satellite demonstrator missions. [1]

### *Links*

[1] Additional photos from Satellite Design Workshop 2025, posters and two-page executive summaries for DragON and AERIS VLEO satellite mission concepts: https://www.sfb1667.uni-stuttgart.de/news/Satellite-Design-Workshop-concluded/

## Off-site Retreat

On 06-08 October 2025, the ATLAS team conducted its second off-site team retreat at the Roggenburg monastery. Over these three productive days, the researchers from the individual projects and sub-groups updated their peers on the progression of their respective research activities, exchanged perspectives, identified and discussed current and future challenges, and actively sought solutions together.

A particular highlight were the presentations of the findings of the first ATLAS Summer School, which had been conducted in parallel to and around the SDW in September, during which the doctoral researchers had provided expert advice to the participants thereof. The Summer School encompassed a series of limited projects conducted by individual researchers or in small groups, which were encouraged to tackle VLEO-relevant projects of their own choosing. Their conclusions and lessons learnt were presented at the off-site retreat in and opened to discussion with all present members of the ATLAS team. These projects and the subsequent presentations intensified existing and new collaborations, opened and explored new avenues of research, and yielded insights into the day-to-day inner workings of individual ATLAS projects to the rest of the team. The projects conducted displayed a great variety both in topic and method, including explorations of key space hardware engineering and novel experimental concepts, research software development sprints, the tackling of design optimization problems, top-level VLEO science mission design studies, VLEO engineering process documentation and visualisation, and a foray into addressing major uncertainties inherent to the environment of the thermosphere.

A visit of Prof. Andrea Iannelli of the University of Stuttgart's Institute for Systems Theory and Automatic Control (IST) during the off-site retreat provided a valuable outside perspective and expert advice to the team particularly with regards to the modelling of uncertain systems.

## Guest Lectures

The CRC 1667 ATLAS was fortunate to be able to welcome several additional guests on campus this autumn, who shared their insights in dedicated presentations given in the framework of the ATLAS Academy lecture series and via direct exchanges.

Dr. Georgii Oblapenko from the Chair of Applied and Computational Mathematics at the Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen, visited the CRC ATLAS in October to present and share his expertise with the team on the topic of variable-weight Direct Simulation Monte Carlo Methods (DSMC), which play a prominent role in multiple research projects within ATLAS.

In early November, the CRC 1667 ATLAS welcomed PD Dr. Antje Nötzold to Stuttgart for an exchange on the topic of Very Low Earth Orbit (VLEO) through the lens of international politics and space security. As a renowned expert on the geopolitics of space at the Universität der Bundeswehr (UniBW) München and expert on international relations at TU Chemnitz, Dr. Nötzold gave a special guest lecture titled *Space as*


*Figure 4: ATLAS team members at the 2025 off-site retreat in Kloster Roggenburg*

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*Figure 5: PD Dr.-Ing. Antje Nötzold of UniBW München and TU Chemnitz presenting on the challenges of international politics and security in space.*

*Battleground - Geopolitics of Outer Space Security*, which garnered much interest from a large audience. The presentation was co-hosted by the ATLAS Academy in cooperation with the *Zukunftsoffensive Luft- und Raumfahrt Nachwuchs BW* of Faculty of Aerospace Engineering and Geodesy (Fac. 6) as part of the new lecture event series *The Aerospace Talks.*

## Spotlight: South Korea in VLEO

With research into the many facets of Very Low Earth Orbit utilisation surging in various hotspots around the globe, so do efforts to form international networks defined by open academic exchanges and collaboration in this area increase. This autumn, the CRC 1667 ATLAS was honoured to receive two separate delegations from research institutions conducting VLEO research within South Korea, each doing their part in helping the country achieve substantial prominence within the field.

Exemplifying the growning interest in the topic also within the commercial sector in Korea, Hanwha Aerospace Co. Ltd. has very recently unveiled a mock-up of a planned ultra-high resolution synthetic aperture radar satellite designed for deployment in VLEO at the Seoul International Aerospace and Defense Exhibition (ADEX) 2025. [2]

In late September, the CRC 1667 ATLAS welcomed two distinguished guests from the Korea Aerospace University (KAU) in Goyang to its premises in Stuttgart.

After first observing and co-adjudicating the Final Presentations of the concluding Satellite Design Workshop (SDW) on 22 September, Prof. Zizung Yoon from the Department of Smart Drones Engineering, and Prof. Jin-ho Roh, director of the new Institute for VLEO Space Technologies and Services, gave an inspiring special guest lecture in the framework of the ATLAS Academy lecture series on KAU's new VLEO research program "Sustainable VLEO Technology and Services". The presentation sparked lively discussions and interest from ATLAS researchers, who saw many parallels as well as significant potentials for collaboration considering the differing, in many ways complementary research foci of both programs.

The presentation and discussions were followed by a signing ceremony for a Memorandum of Understanding (MoU) on future research collaboration for VLEO technology between the KAU, represented by the Institute for VLEO Space Technology and Services, and the University of Stuttgart, represented by the CRC 1667 ATLAS. The memorandum was signed jointly by both guests together with the speaker and deputy speaker of the CRC, Profs. Stefanos Fasoulas and Sabine Klinkner. This agreement foresees a lively future collaboration between both programs, including academic exchanges, and the ATLAS team is looking forward to seeing it develop.

November saw a delegation from the Korea Aerospace Research Institute (KARI) from Daejeon visit the CRC 1667 ATLAS in Stuttgart. It comprised Dr. Choon Woo Lee, Dr. Hyunsu Lim, and Dr. Jeongheum Im, whose respective research interests intersect with a wide variety of topics being investigated both within the CRC ATLAS and elsewhere at the University of Stuttgart.

The three guests exchanged extensively with ATLAS researchers such as apl. Prof. Dr.-Ing. Georg Herdrich, who, together with members of his team, presented on their ongoing research on Atmosphere-Breathing Electric Propulsion (ABEP). This was followed by discussions with Prof. Dr.-Ing. Sabine Klinkner and members of her team on VLEO satellite systems research and operations.

The delegation's visit was rounded off by a special guest lecture held in the context of the ATLAS Academy, wherein the team members initially learned much about KARI's ongoing space exploration and research activities in general from Dr. Lee, followed by a deep dive into KARI's ongoing VLEO Satellite System Design Study given by Dr. Lim. The presentations were followed by very lively and productive discussions on various topics surrounding the many practical challenges


*Figure 6: Signing ceremony for the Memorandum of Understanding between the Korea Aerospace University (KAU) and the University of Stuttgart, represented by the Collaborative Research Centre 1667 ATLAS. From left to right: Prof. Zizung Yoon (KAU), Prof. Jin-Ho Roh (KAU), Prof. Fasoulas (ATLAS) and Prof. Klinkner (ATLAS).*

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*Figure 7: A delegation from the Korea Aerospace Research Institute visits the Collaborative Research Centre 1667 ATLAS. From left to right: Prof. Sabine Klinkner (ATLAS), Prof. Claas Olthoff (Institute of Space Systems - IRS), Dr. Jeongheum Im (KARI), Dr. Hyunsu Lim (KARI), Dr. Choon Woo Lee (KARI) and Prof. Fasoulas (ATLAS).*

surrounding VLEO spacecraft engineering and design.

### *Sources*

[2] Yang Nakgyu (The Asia Business Daily): Hanwha Systems Unveils Ultra-High-Resolution SAR Satellite Mockup for the First Time. URL: https://cm.asiae.co.kr/en/article/2025102011182470271 (published 2025-10-25).

## Fostering VLEO in the Industry

In an effort to keep the upward momentum in developing sustainable access to Very Low Earth Orbit going, the Collaborative Research Centre 1667 ATLAS is committed to raising awareness and interest in the topic not only through its public and educational outreach activities, but also by familiarising the aerospace industry and adjacent sectors as well as decision-makers with the many benefits and future market potentials of satellite operations in VLEO.

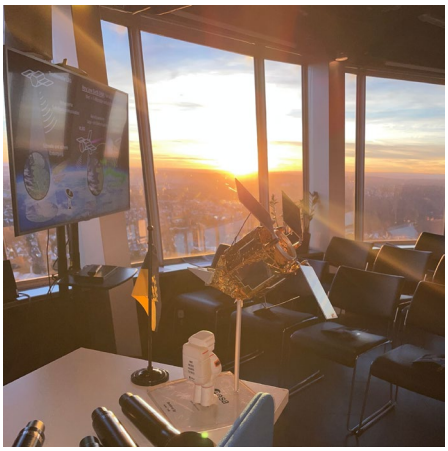

*Figure 8: View from within the event space atop Stuttgart's landmark historical television tower prior to the "VLEO – Chances for Baden-Württemberg" event organised by the ESA Business Incubation Centre (BIC) Baden-Württemberg of the Chamber of Industry and Commerce (IHK) Reutlingen in collaboration with the CRC 1667 ATLAS [Image: ESA-BIC Baden-Württemberg / IHK Reutlingen].*

On 04 November, an information and networking event titled *VLEO – Chancen für Baden-Württemberg* took place on top of Stuttgart's historical television tower (SWR Fernsehturm), hosted by the Chamber of Industry and Commerce (IHK) Reutlingen and featuring the CRC 1667 ATLAS. This event was directed primarily at representatives of the regional industry, agencies and politics for the purpose of informing them about state-of-the-art developments and providing an understanding of the up-and-coming topic of VLEO space utilisation and the challenges, opportunities and market potentials associated therewith.

Following a keynote presentation on the market potentials of VLEO by Daniel Welz of the IHK, Prof. Stefanos Fasoulas, Prof. Sabine Klinkner and Adam Pagan represented the CRC 1667 ATLAS, contributing expert insights through presentations and participation in a panel discussion. The latter was moderated by Dr. Stefan Engelhard of the IHK and helped voice a variety of perspectives from academia and industry in Baden-Württemberg and beyond. Further experts from the ATLAS team were also present, ready to answer questions and to engage in discussions on key technologies for VLEO and beyond with the guests.


*Figure 9: "Industry Meets SFB ATLAS", a regional industry networking event co-hosted by the Collaborative Research Centre (CRC) 1667 ATLAS, the Forum Luft- und Raumfahrt Baden-Württemberg e.V. (LR BW) and the ESA Business Incubation Centre (ESA-BIC) of the Chamber of Industry and Commerce (IHK) Reutlingen.*

The event offered a valuable opportunity to increase awareness of the commercial potentials of Very Low Earth Orbit and of the related research activities of the CRC ATLAS and other institutions and companies.

Broadening the scope, this event will be followed up by the *Industry Meets SFB ATLAS* information and networking event scheduled for Mid-January 2026 at the Space Centre Baden-Württemberg (RZBW). This larger event will be co-hosted by the CRC 1667 ATLAS, the Forum Luft- und Raumfahrt Baden-Württemberg e.V. as well as the ESA Business Incubation Centre Baden-Württemberg of the IHK Reutlingen.

Industry Meets SFB ATLAS 2026 will take place at the Raumfahrtzentrum Baden-Württemberg (RBZW) on the Vaihingen campus of the University of Stuttgart and will begin on Wednesday, January 14, 2026, with an evening networking event. At the main event on Thursday, January 15, participants are invited to a series of informative keynote speeches and panel discussions from academia, industry and agencies, as well as to open discussion rounds and additional opportunities for networking and direct exchange.

Participation in this event requires a confirmed registration, which can be

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requested via an online form by Monday, 15 December 2025 [3]. Please be aware that, as the event is primarily aimed at industry representatives based in the German state of Baden-Württemberg, keynotes and panel discussions will generally be held in German.

### *Learn More*

[3] Collaborative Research Centre 1667 ATLAS: Industry Meets SFB ATLAS. URL: https://www.sfb1667.uni-stuttgart.de/IndustryMeetsATLAS/.

## Awards and Honours

The Collaborative Research Centre 1667 ATLAS is proud to report that in the past few weeks, not one but two of our researchers have received prestigious and well-deserved awards honouring their academic achievements.

First, our doctoral researcher Franziska Tuttas has been selected as one of the Zia - Visible Women in Science & Humanities Fellows 2025 of the ZEIT publishing group!

The *Zia – Visible Women in Science & Humanities* Fellowship honours and coaches 25 exceptional early-career researchers each year — strengthening networks, fostering personal and professional development, and increasing visibility for women in science. [4]

At the CRC 1667 ATLAS, we are especially delighted to see Franziska's dedication and achievements recognized on a national level. She conducts her research in the field of rarefied gas flow simulation using the particle code PICLas, contributing essential insights to our understanding of gas–surface interactions in VLEO at the Institute of Space Systems (IRS).

*Figure 10: Franziska Tuttas, ATLAS researcher and Zia fellow of the new 2025/2026 cohort.*

Her parallel work in research software and data management at the Institute for Modelling Hydraulic and Environmental Systems (IWS) strengthens ATLAS-wide data structures and enables a more efficient, transparent collaboration across our consortium. Beyond her already impressive list of academic achievements, Franziska is an active member of the doctoral researchers' representation within the University of Stuttgart, volunteers as a lifeguard, and is regarded highly amongst her colleagues.

Following the virtual kick-off, Franziska attended the Zia opening event in Berlin from 07 to 10 November 2025, connecting with other fellows and inspiring role models. The ATLAS team congratulates her warmly on this achievement. We are looking forward to seeing the new perspectives and ideas she will bring to ATLAS.

We further commend the team of the Zia fellowship programme for the excellent organization and for promoting visibility, collaboration, and women's empowerment in science!


*Figure 11: Dr.-Ing. Constantin Traub (Faculty 6 and ATLAS post-doctoral researcher in Project A06), Dr. rer. nat. Marvin Wyrich (Faculty 5) and Dr. rer. nat. Shuo Wang (Faculty 4) (from left to right) were awarded the Christian and Dorothee Bürkert Prize, which was presented to them by Mariana Dierolf (right), Chairwoman of the Foundation. [Image: University of Stuttgart/Uli Regenscheit]*

The second ATLAS researcher that was recently honoured with an award is Dr.-Ing. Constantin Traub, who received the prestigious Bürkert University Prize for his outstanding doctoral dissertation titled “Differential Aerodynamic Forces as a Means to Control Satellite Formation Flight”.

Constantin conducted his doctoral research under the guidance of the Speaker of the CRC 1667 ATLAS, Prof. Dr.-Ing. Stefanos Fasoulas, whom he would support substantially in writing the original proposal and in subsequently getting the CRC off the ground and running. Having contributed to the European Union’s pioneering Horizon 2020 VLEO research programme DISCOVERER, Constantin is already regarded as a veteran researcher in satellite aerodynamics both within the ATLAS team and in the growing international VLEO research community.

Constantin's work introduces an integrated, holistic systems engineering methodology for the problem of aerodynamic control for satellites orbiting in formation. Accounting for all relevant physical and aerodynamic factors using a combination of analytical and numerical methods, he developed a planning tool for the optimization of satellite formations employing differential lift in

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terms of minimising orbital decay and investigated aerodynamically optimized VLEO satellite geometries. [5]

As a post-doctoral researcher, Constantin is now making important contributions to Prof. Fasoulas' Project A06, continuing to actively contribute to the field of VLEO research and committing himself to strengthening the community.

The Bürkert University prize is awarded annually to three researchers from all faculties at the University of Stuttgart, who have distinguished themselves by their outstanding doctoral dissertations. [6]

Would you like to learn more about our bright young scientists and their respective contributions to making sustainable VLEO utilisation a reality? This December, follow us on Instagram and LinkedIn using the links below to meet a new doctoral researcher every day in this year's ATLAS Advent Calendar!

### *Social Media Links*

Instagram: www.instagram.com/atlas_crc1667/

LinkedIn: www.linkedin.com/groups/13031383/

### *Sources*

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[5] Traub, C. (2023). *Differential aerodynamic forces as a means to control satellite formation flight.* Doctoral dissertation, University of Stuttgart. http://dx.doi.org/10.18419/opus-13281

[6] Christian and Dorothee Bürkert Foundation. URL: https://www.burkert-stiftung.com/en/homepage/.

## Recent Publications

With the Collaborative Research Centre 1667 ATLAS gradually nearing the conclusion of its second year, the rate at which findings are being published in journals is rapidly gaining momentum. No less than twelve publications related to ATLAS have passed peer review since the previous issue of this newsletter had been distributed this August. The published studies cover state-of-the-art research on key topics such as Atmosphere-Breathing Electric Propulsion (ABEP), gas-surface interactions investigated at different scales, and aerodynamic control problems and collision avoidance strategies in VLEO. [7-18]

Five of these articles were published or have been accepted for publication in the Special Collection of the CEAS Space Journal on Very Low Earth Orbit Satellites, which was created as a companion issue for the 2nd International Symposium on Very Low Earth Orbit Missions and Technologies in Stuttgart that was hosted by ATLAS in January 2025. These include an overview paper describing the motivations, structure and goals of the CRC 1667 ATLAS [17].

The ATLAS team is proud to report that one article, titled "A Machine Learning Framework for Scattering Kernel Derivation Using Molecular Dynamics Data in Very Low Earth Orbit" and published jointly in the journal Physics of Fluids by ATLAS researchers from the group of Prof. Johannes Roth of Project A01 at the Institute for Functional Matter and Quantum Technologies (FMQ) and the group of Dr.-Ing. Marcel Pfeiffer of Project A02 at the Institute of Space Systems (IRS) has further received the honour of being selected as Editor's Pick. The study describes how a machine learning model is trained on a set of detailed molecular dynamics simulation results to accurately and efficiently predict how impacting oxygen atoms bounce off satellite surfaces in VLEO environments. Improving the quality and computational efficiency of such predictions is essential for the design of drag mitigation measures, aerodynamic control schemes and ABEP intakes in VLEO. [18]

*Figure 12: Miklas Schütte, ATLAS researcher in Project A02 and first author of an article selected as Editor's Pick in* Physics of Fluids [18].

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