Deutscher Akademischer Austauschdienst
German Academic Exchange Service

Abschlussbericht

über Ihre Stipendienzeit

Nachname, Vorname*	[redacted]
[redacted]	[redacted]
Stipendienprogramm	RISE Worldwide
Förderzeitraum	06/2025 - 08/2025
Gastland/-ort	Tromsø, Norway
Gastinstitution	UiT, Arctic University of Norway

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Hinweise:

Der Abschlussbericht ist **spätestens zwei Monate nach Förderende** einzureichen. Er soll Hinweise auf die Situation des Studienfaches im Gastland und die Arbeitssituation an der Hochschule/dem Gastlabor/der Praktikumsstelle enthalten. Insbesondere sollten Sie über die Ergebnisse des Aufenthaltes im Hinblick auf Erfolge und ggf. Hindernisse berichten. Besuche von Fachtagungen und Konferenzen sind ebenfalls von Interesse sowie Anregungen, die der Verbesserung der Arbeit des DAAD dienen.

Kurzstipendiatinnen und -stipendiaten (bis zu einer Förderdauer von 6 Monaten) sollten ergänzend auf folgende praktische Aspekte des Aufenthalts eingehen: Vorbereitung des Aufenthalts, Kontaktaufnahme zur Gastinstitution, Visum/Aufenthaltsgenehmigung, Zahlungsverkehr, Zimmersuche und Miethöhe, Freizeitgestaltung, nützliche Adressen im Gastland. Mit Annahme des Stipendiums (lt. Ziffer 10 der „Allgemeinen Bedingungen für Stipendiatinnen und Stipendiaten des DAAD im Ausland“) haben Sie sich bereit erklärt, dass dieser Bericht ohne Nennung Ihres Namens und Ihrer Kontaktdaten an künftige Stipendiatinnen und Stipendiaten des DAAD zur Information weitergegeben werden kann. Wenn Sie Ihren Namen und Ihre E-Mail-Adresse jedoch gerne mitteilen möchten, um eine eventuelle Kontaktaufnahme zu ermöglichen, tragen Sie Ihre Kontaktdaten bitte oben ein. Aus Gründen des Datenschutzes bitten wir Sie, in Ihrem Abschlussbericht keine personenbezogenen Daten Dritter zu nennen. Dazu gehören alle Informationen, die sich auf eine identifizierte oder identifizierbare natürliche Person beziehen, z.B. Namen, Kontaktdaten, Position im Institut, etc.

Weitere Einzelheiten zur Berichtspflicht sind ggf. in den "Besonderen Bedingungen" enthalten.

Bitte laden Sie den Bericht im PDF-Format über das DAAD-Portal unter dem Menüpunkt **„Berichte – Abschlussbericht“** hoch.

Verlauf des Vorhabens *(Textfeld erweitert sich nach Eingabe automatisch; Formatierungen sind jedoch nicht möglich. Für eine bessere Strukturierung können Sie dieses Formular als Deckblatt nutzen und den Bericht als Anlage beifügen.)*

While a multitude of factors contributed to my acceptance into the UiT Photonics Group, the most decisive was the support of the DAAD RISE program, that of which I applied for in December 2024. In submitting applications so early—immediately after the conclusion of my third semester—the process unfolded very smoothly. Through DAAD, I applied to three projects, of which I was ultimately matched with a nanophotonics placement at UiT – The Arctic University of Norway. I was quite happy with the selection.

This opportunity aligned well with both my academic trajectory and my aspirations in seeking early involvement in computational and applied physics research. From the very beginning, my intention was to

seek projects that were technically ambitious and personally transformative. DAAD not only facilitated this search, but also provided the financial and logistical framework that made it feasible for me. I was notified of my acceptance in late February 2025, and soon after this confirmed my commitment to the program. In hindsight, I am deeply grateful for my acceptance: the internship shaped both my academic development and my professional outlook in ways I could not have anticipated. It exposed me as well to the beauty of the Norwegian naturescape which I wouldn't have seen otherwise.

UiT is the northernmost university in the world, and acts as a central member of the University of the Arctic network. With roughly 16,000 students across eight faculties, UiT maintains a strong international profile and a reputation for leading research in photonics, optical communication, and emerging quantum technologies. In my case, I coupled my involvement with their photonics group.

My internship was hosted within the Department of Physics and Technology under the Faculty of Science and Technology, specifically in the Photonics Group led by Professor Olav Gaute Hellesø. The group's research spans nanophotonics, optical trapping, Raman spectroscopy, and quantum applications. UiT's emphasis on interdisciplinarity, and on integrating undergraduate interns as active, independent participants in cutting-edge research, resonated with my aspirations from the outset.

Preliminary to my involvement at UiT, I struggled to find an affordable housing option on the island (Tromsø) for my arrival. I managed to work out a solution with the university student housing administration, which allowed me a comfortable, yet quite small, single dorm with a shared kitchen for 650 euro a month. In comparison to other offers, this was very acceptable. As a US national whose stay duration was less than 90 days, I only required my residence permit to temporarily live there, and did not require a student visa. My passport and German residence permit were enough, alongside my statutory health insurance.

During my twelve weeks at UiT, I worked as a research assistant under Professor Olav Gaute Hellesø. My primary responsibility was the complete automation of an optical tweezing setup coupled to a Raman spectrometer capable of measuring the Raman fingerprint of individual extracellular vesicles. This system, used extensively for the classification of nanoscale biological particles such as extracellular vesicles and liposomes, required a framework that would allow stable, reproducible, and efficient operation.

The project required a balance of applied and computational physics. I was tasked with creating software tools to control the instruments programmatically, building a user-friendly interface for experimenters, and ensuring stable operation of delicate optical systems. Through this process, I developed practical knowledge of hardware control, multithreading, and image analysis—skills that extend well beyond the scope of my undergraduate coursework. These tasks and project prepared me very well for the coming semesters, where I am now able to involve myself in two different masters level programs at my university in image processing and deep learning.

A second project followed naturally from the first: the development of a method to estimate particle radii directly from their Brownian motion once released from the optical trap. By implementing statistical analysis of mean-squared displacement, I designed an approach that linked diffusivity to particle size,

enabling automated characterization of sub-micron particles. This culminated in the drafting of a first-author paper, tentatively titled *"Mean-Squared Displacement Analysis: Diffusivity and Radii Estimation of Individual Extracellular Vesicles."*. I am very happy with the outcome of this manuscript thus far, and with more information to be coming my way, I am excited to see it published hopefully later this year.

Although the technical aspects of these projects were demanding, the learning environment made them achievable. I was consistently encouraged to experiment, propose solutions, and treat each obstacle as a learning opportunity rather than a setback. In the end, it was this mindset that mediated my success.

The work environment at UiT was personally one of the most rewarding aspects of the internship. From the very start, I was treated as a colleague rather than merely a student. My office was shared with master's and Ph.D. students, and despite being the youngest by a long shot, I was included in both professional and social spheres of the group. Informal discussions, invitations to lunch, and collaborative problem-solving became routine. It was an extremely welcoming environment overall and there was never a moment of apparent exclusion.

My supervisor in particular was instrumental in shaping my experience. His openness to questions and willingness to dedicate time to discussions gave me confidence to pursue ambitious solutions. I was also able to collaborate with several postdoctoral fellows and senior researchers, who generously offered their expertise whenever I required access to specialized instruments or feedback on my methods.

The collegial atmosphere extended beyond the laboratory. Access to the employee gym—courtesy of my supervisor—encouraged me to maintain a healthy balance between work and well-being, while social interactions with colleagues created a welcoming environment that eased the challenges of living abroad in Tromsø.

Reflecting on the internship, I view it as one of the most formative experiences of my academic career to date. The combination of technical challenge, independence, and mentorship provided exactly the environment I needed to mature as an up and coming researcher.

Technically, I gained hands-on experience in programming for hardware control, statistical physics applied to biological systems, and advanced image analysis. I also learned the importance of writing modular, scalable code—an insight that will serve me throughout my studies. This was learned the hard way, having to rewrite a lot of my code in the process, but was needed. Professionally, I grew in confidence, developing the ability to communicate my methods clearly to colleagues from diverse backgrounds and to present results to the department at large.

Equally important, I experienced first-hand the collaborative and international nature of research. Despite cultural differences and varying levels of seniority, I always felt included as a genuine contributor. This sense of belonging strongly reinforced my commitment to pursuing a research career.

There were, of course, technical challenges: diffraction-limited imaging, negatively buoyant particles, and localization errors all demanded persistence and my patience. Yet in retrospect, these difficulties were

precisely what made the experience so valuable. They demonstrated that setbacks are not failures, but mere steps towards true achievement.

My DAAD-funded internship at UiT was transformative in both academic and personal terms. It provided me with advanced technical skills, exposure to high-level research, and above all the confidence to see myself as a capable contributor to science. The Photonics Group fostered an environment of respect, collaboration, and intellectual curiosity that made it possible for me to learn and contribute simultaneously.

As I look forward, I now feel better prepared to bridge theory with experimentation, and more certain of my desire to pursue graduate studies in physics. I am deeply grateful to DAAD for making this experience possible, and I would wholeheartedly recommend such opportunities to future undergraduates. UiT proved to be an ideal setting for early research immersion, and this internship stands as a defining step in my academic development.