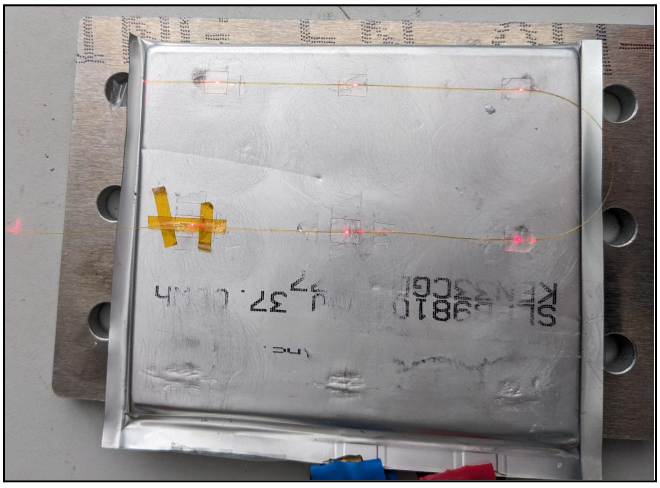
## A Typical Day of My Internship

What better way to learn about the RISE program than to show a typical day as a student researcher? From Monday to Friday, I woke up at 7:30 AM and started my day with breakfast in my apartment, which often consisted of a bowl of cereal or a "Brötchen": one of Germany's classic bread rolls. At 8:10 AM, I started my ~17-minute walk through the city of Goslar to the Energie Forschungszentrum Niedersachsen (Energy Research Centre of Lower Saxony). On my commute, I walked through the beautiful cobblestone streets which included fantastic examples of half-timbered houses and other German architectural delights, as seen in this image that I took during my walk to work through the market square.

Once I arrived at work, I would place my homemade lunch in the fridge in the staff room, fill up my water bottle, and plug my laptop into a computer monitor in my shared office space (pictured, left) to begin working. My project was focused on applying fibre optic sensors on lithium-ion battery cells to investigate the relationship between strain, battery state of charge, and temperature. Therefore, much of my time was split between setting up the experimental apparatus and then interpreting the data after the experiments were completed.

On some days, I spent much of my time preparing the fibres; this meant delicately unspooling the glass fibres, which had diameters of only a few microns across, and then polishing them and inspecting the flat interface surface on a light microscope. Once the fibres were prepared, I then installed them onto the lithium-ion batteries, as seen in this image to the right, and started experiments in the lab's climate chamber.



Most of my work consisted of data analysis in MATLAB; here, I compiled sensor data from the various sensors, including the strains from multiple fibres, resistance temperature detectors, a humidity sensor, and electrical information (current and voltage supplied to or provided by the batteries during charge/discharge). Using all of this data, I then plotted it in various ways in an attempt to understand the strain behaviour of the batteries, and how this relates to their state of charge, internal temperature, and degradation due to continued cycling. My proficiency in programming and design of experiments increased substantially through this internship experience.

After work, I typically stopped at the grocery store on my walk back home and cooked myself some supper and lunch for the next day. Goslar is such a beautiful pedestrianized city that I often went for long walks around the town just to enjoy the architecture and surrounding nature. I also occasionally played sports (badminton, ultimate frisbee, and beach volleyball) in the nearby city of Clausthal with my coworkers or TU Clausthal students.

What was most exciting about the internship was being able to so easily take the Deutsche Bahn (Germany's railway service) to so many nearby cities and countries on the weekends and meet up with fellow RISE interns. On these weekend trips, I got to visit Berlin, Heidelberg, Hannover, Hamburg, Dresden, Prague, Amsterdam, Copenhagen, and London. This image on the right shows me in Prague with some fellow RISE interns that I became great friends with (two Canadians and one American).

## Advice for Prospective RISE Interns

Without reservation, I would highly recommend applying for this program. I gained so much experience, both academic and soft skills, that resulted in a summer of immense personal growth. The biggest piece of advice I would give to prospective interns is to attempt to learn as much German as possible, even if it is easy to get by with only English. While I am still not proficient in German, it was tremendously helpful (and respectful) to know the most basic words and phrases to be able to communicate at stores, restaurants, and on public transit.