

Industrial Internship: Advanced Silicon Photonics

Data traffic is exploding! At Lumiphase, we are on a mission to create the fastest and most energy-efficient communication chip the world has ever seen – to enable global IT infrastructure to handle this massive increase in data.

We are a young and dynamic deep-tech startup, based in the Zürich area, Switzerland. Lumiphase was founded in 2020, after nearly 10 years of research within IBM. We are growing rapidly, and we provide an agile environment for working at the forefront of cutting-edge technology to build products that will have a strong impact on our society.

Our internships

Our team hosts interns for 6-12 months, beginning in Spring and Autumn every year. Upon joining, you will work in tight interaction with one of the Lumiphase R&D teams to develop novel processes. Every year, we have internships in many different areas. This year, we offer internships in:

- Design / Simulations
- Packaging / Reliability
- Testing / Characterization
- Fabrication
- Software / Data Science

More info can be found on our Website's Career page.

What we are looking for

We are seeking a highly motivated candidate with a strong interest in difficult topics in the field of micro- and nano-scale photonics. What you should bring:

- A superior academic record.
- Strong interest (and ideally prior experience) in experimental hands-on work with delicate semiconductor components, advanced assembly equipment, and/or electrical and optical measurement equipment;
- Drive to solve difficult technical challenges with practical applications in industry in mind;
- Excellent communication skills and the desire to contribute within a dynamic deep tech startup;

To start your internship with us, you need to be enrolled in, or completed, a bachelor or master's program in micro-engineering, mechanical engineering, physics, electrical engineering, materials science, or similar.

Why Lumiphase?

We have developed a unique technology to bring a material with extremely strong Pockels coefficient into a scalable silicon photonics platform. Having this physical effect available in integrated photonic circuits has been a scientific and technological breakthrough, which enables the realization of advanced photonic structures and completely new applications, e.g. for photonic AI networks and quantum computing. At Lumiphase, we are bringing this new technology to market, while at the same time developing new scientific and technological concepts. The internship projects are placed at the heart of our R&D activities and will ensure that our groundbreaking semiconductor chips can realize their full performance potential with appropriate electrical, optical and mechanical integration solutions.

How to apply?

Please submit your application via this link <u>Lumiphase Corporation - INT</u>. For any questions you can write us at <u>talents@lumiphase.com</u>



Project 1: Packaging technologies for photonics integrated circuits.

During this internship or master thesis project, you will work in tight interaction with R&D engineers to develop novel processes for the packaging of our photonics devices. The daily work is technology-driven and includes:

- Process development and optimization for high-precision alignment of optical fibers to semiconductor devices;
- Designing and assembling customized hardware and micro-assembly tools;
- Performing (electro-)optical measurements using fiberoptical characterization setups;
- Analyzing and reporting experimental results.

What you should bring:

- Strong interest, and possibly prior hands-on experience, in working with delicate semiconductor components, advanced assembly equipment, and electrical and optical measurement equipment.
- Python coding skills for measurements and data evaluation;
- Experience in using CAD design software;

Project 2: Reliability testing for photonic integrated circuits

During this internship project, you will perform both conceptual and practical lab work, to get a broad background in industrial-driven R&D activities. The daily includes:

- Development of new test methods and their integration in setups for electrical and electrooptical characterization of integrated photonic devices.
- Measurement, data analysis and reporting of experimental results.
- Implementation of an interface for live monitoring of reliability test data.
- Design of PCBs employed in custom test setups.
- Performing various practical lab tasks, such as setting up new instrumentation, developing new test and calibration routines, installation of hardware components and samples into custom electro-optical setups.

What you should bring:

- Strong interest, and possibly prior hands-on experience in working with delicate semiconductor components and electrical and optical measurement equipment.
- Python coding skills for experimental work and data evaluation. Prior experience with databases like SQL is advantage.
- Experience in using PCB design software







Project 3: Known-good-die selection implementation

During this master's or internship project, you will work in tight interaction with Lumiphase product engineering to implement a complex algorithm to classify fabricated dies as good or fail based on several individual measurements and yield models. You will develop industry-standard Python code, automating complex manual work, and giving you a broad background in industrial coding activities. The work during the internship includes:

- Coding the core functionalities of the known-good-die selection process;
- Ensure the usability of the code in a production environment by use of version control
- utilities (GIT, DevOps) and proper documentation;
- Test the code functionalities during development by defining proper unit-testing routines.

What you should bring:

- Good programming skills in Python, preferably with good knowledge of Pandas, PySpark, GIT, and SQL;
- Working with state-of-the-art cloud data platforms like DataBricks;
- Good statistical knowledge and experience to visualize data in a meaningful way;

Project 4: Data Engineering on Databricks (Python)

During this internship project or master thesis you will implement high-quality pipelines to ingest raw data from various sources into the platform and perform the required data engineering steps to enable data analysis.

The work during the internship includes:



• Building, testing, deploying and monitoring ingestion and transformation pipelines written in Pyspark;

• Working on our state-of-the-art, cloud-based data platform, built with the latest Azure Databricks features (Delta lake, Unity Catalog, Delta Live Tables, Streaming, etc.);

• Data modelling for analytics needs in interaction with the Lumiphase engineers;

- Improve our deployment procedures for both pipelines and cloud in frastructure using Azure DevOps and Terraform;
- Improve our cloud and data architecture in exchange with one of our technology partners.

What you should bring:

- Good programming skills in Python, preferably with good knowledge of Pandas, PySpark, GIT, and SQL;
- Working with state-of-the-art cloud data platforms like DataBricks;
- Good statistical knowledge and experience to visualize data in a meaningful way;



Project 5: Characterization Techniques for Silicon Photonics

During this internship project or master thesis you will analyze the performance of Pockelsenhanced silicon photonics circuits. The work during the internship includes:

- Electro-optical and/or electrical simulations of photonic devices using advanced simulation tools (e.g., Lumerical);
- Working on a customized electrical/optical setup, including the design and assembly of hardware components;
- Performing (electro-)optical measurements using fiber-optical characterization setups;
- Analyzing experimental data, including the development of scripts, data visualization, and error analysis.

What you should bring:

- Strong interest in simulation and experimental work with integrated photonics and nano/microelectronics;
- Good programming knowledge;
- Drive to solve difficult technical challenges with practical applications in industry in mind;

Project 6: Fabrication of Integrated Silicon Photonic Structures

During this internship project, you will work in tight interaction with the Lumiphase R&D team to develop new fabrication processes for integrated photonic active and passive components. The work during the internship includes:



- Development of new process modules in a research cleanroom environment;
- Performing standard structural characterization techniques (AFM, SEM, Optical microscopy, etc.);
- Analyzing experimental data, including the development of scripts, data visualization, and error analysis.

What you should bring:

- Scientific and technological interest in nanofabrication and working in a cleanroom environment;
- Good data analysis knowledge, attitude to create thorough technical documentation;
- Drive to solve difficult technical challenges with practical applications in the industry;

Project 7: Integrated Silicon Photonic Structures

During this master's or internship project, you will work in tight interaction with the Lumiphase R&D team to develop a waveguide-based, passive photonic component in an advanced, integrated photonic platform. The work during the internship includes:

- Simulations of photonic structures using advanced simulation tools (e.g., Lumerical, etc.);
- Generation of photonic mask designs;
- Analyzing experimental data, including the development of scripts, data visualization, and error analysis.

What you should bring:

- Scientific and technological interest in simulation and experimental work in cutting-edge integrated photonics;
- Good programming knowledge;
- Drive to solve difficult technical challenges with practical applications in the industry;



