

Internship position in high-power fiber lasers

BLOOM Lasers company in collaboration with Institut Fresnel

BLOOM Lasers presentation

BLOOM Lasers is a high technology company located in Pessac (33), France. The company develops, manufactures, and sells nanosecond and picosecond pulsed lasers, primarily for applications in microelectronics. The company is collaborating with Institut Fresnel in Marseille to study degradation mechanisms induced by UV light on optical components.

Internship subject: Improving high power UV lasers by reducing contamination effects

- Project background

The company's current products reach 100W of UV optical power and rank among the highest-end on the market, offering customizable pulses in terms of shape, duration, and repetition rate.

However, intense UV light is extremely aggressive for optical components, especially when focused on small surfaces. This effect is today the main limitation in terms of product lifetime for all high-power UV lasers on the market. For this reason, studying UV-induced degradation effects and finding strategies to limit them is crucial and could have a strong impact on a large range of industrial laser applications.

Typical UV-induced degradation mechanisms include coating damage, bulk damage, and laser-induced contamination (LIC). LIC occurs when high-intensity laser light interacts with residual particles, hydrocarbons, or outgassed materials near the beam path, causing them to deposit or polymerize on optical surfaces. This contamination layer increases absorption, which accelerates local heating and can trigger damage or reduced performance of optics.

The Institut Fresnel has been involved on the research of laser induced damage in optical components for more than 3 decades, supporting the evolution of laser technology. As one of the current identified limitation is LIC, the Institut Fresnel has started in recent years an extensive research work on the contamination process of optical surfaces under intense laser radiation. This type of study is challenging because it requires an in-depth understanding of multiple fields, ranging from laser physics and interactions with materials to knowledge of organic and inorganic chemistry,

- Subject of the internship

The student will use a high-power UV laser source to make contamination experiments. The principle of such experiment is to send the UV beam inside a sealed “burn-box” through the tested optics in presence of potential contamination sources. Changing the experimental parameters will help us to learn more about the sensitivity of the contamination process to the experimental conditions (atmosphere, temperature, beam focusing, polishing/coating on the optics and contaminant source). Studying the contaminated samples will also help us to understand better the nature of the contaminant. Finally, we intend to test some innovative solutions to reduce the LIC effect, for example using nanostructured coatings.

- **Working environment**

The internship will be achieved at the Institut Fresnel in Marseille. The supervisors will be Laurent Gallais (researcher at Institut Fresnel) and Julien Didierjean (R&D director at BLOOM Lasers). Depending on the tests results, missions could be organized to visit BLOOM Lasers in Bordeaux and achieve tests at BLOOM facilities.

What profile are we looking for?

- ✓ **Education:** Student in optics/photonics finishing a master degree or equivalent
- ✓ **Technical skills:** Solid knowledge in optics and hands-on experimental experience
- ✓ **Languages:** Fluent English is highly appreciated
- ✓ **Soft skills:** Excellent communication and summarizing abilities, team spirit, rigor, and the capacity to solve technical problems

What we offer

- ✓ **Contract:** 6 months internship
- ✓ **Salary:** 1000€ / month
- ✓ **Working hours:** 35 hours per week
- ✓ **Start date:** The intern is expected to start around February-March 2026, but the schedule can be adapted based on the student's availability

Contact BLOOM Lasers

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