Arphioniq

STUDENT OPPORTUNITY
Internship · MSc Thesis · BSc Project

Injection-locked narrow-linewidth visible-range laser

Investigate a novel single-frequency laser architecture for neutral-atom qubit control

FORMAT *In-person*	**DURATION** *3–6 months*	**LOCATION** *Science Park Amsterdam (HoQ)*
LEVEL *MSc*	**DISCIPLINE** *Physics · Optics*	**START** *Flexible*

ABOUT ARPHIONIQ

Arphioniq is a photonics deep-tech spin-out of the University of Amsterdam, building scalable and field-deployable frequency-stabilised laser infrastructure — the enabling layer that lets photonic-based quantum computing and sensing systems move out of the lab and into the real world. Along with frequency stabilization, our patented platform also powers precision positional measurement for advanced manufacturing. You'd work directly alongside the founding team, contributing hands-on to the journey of transforming an innovative technology into a deep-tech product.

THE PROJECT

Quantum technologies are poised to transform many modern computing and sensing applications. Optically addressable modalities, such as neutral atoms, have shown a great potential but require specialized frequency-stabilized laser infrastructure, which remains one of the key bottlenecks for their large-scale deployment.

Arphioniq builds a novel frequency-stabilized laser infrastructure for optically-addressable quantum modalities. Control and manipulation of optically-addressable qubits require ultra-stable narrow-linewidth lasers. While such lasers are readily available in the telecommunication C-band, comparable performance remains a challenge for wavelength involved in qubit atomic transitions. In this project, you will explore a novel laser architecture based on self-injection locking to provide a proof-of-concept demonstration of the approach for developing a narrow-linewidth lasers for the extended visible range (400-1000 nm).

In the initial phase of the project, you will study current state-of-the-art of the self-injection locking lasers and develop an analytical/numerical model for the proposed architecture. You will utilize this model to study behaviour of the laser and determine a preliminary experimental configuration. In the next step, you'll get to build a lab prototype of the laser architecture utilizing fiberoptic components, laser diodes and control electronics. You will use the prototype to experimentally demonstrate viability of the core architecture. In the final step, you will further study and optimize the laser behaviour with regard to key components and parameters to cross-validate the developed theoretical model and provide a report covering the performance achieved and suggestions for future improvements.

WHAT YOU'LL BRING

- Enrolled in an MSc in physics, optics, photonics, electrical engineering or similar
- Relevant background in optics and photonics. Prior experience with laser technologies is a plus
- Hands-on with a "can-do" mentality, rigorous with data
- Fluent working English
- Able to work independently and in a small team

WHAT WE OFFER

- Real ownership of a problem contributing to an innovative project with real-world application
- Hands-on experience in the field of photonics and quantum technologies
- Close mentorship from founding team experts
- A seat in a fast-moving startup at Science Park Amsterdam
- Monthly stipend to compensate you for your effort

HOW TO APPLY

Send a short CV and a few lines on why this project fits you to **info@arphioniq.com**. Questions? Don't hesitate to reach out at the same address. Applications are reviewed on a rolling basis.