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To whom it may concern

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Bachelor's / Master's Thesis Position

Development of a Didactic Ellipsometer Setup for Teaching and Research

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Background

Ellipsometry is a powerful optical characterization technique used to determine thin-film thicknesses and complex refractive indices with high precision. Despite its broad relevance in materials science, micro- and nanotechnology, and photonics, the underlying physical principles are often difficult to grasp when using commercial "black-box" instruments. A modular, transparent, and well-documented ellipsometer setup can significantly enhance conceptual understanding and hands-on learning in academic teaching while remaining relevant for basic research applications.

Objective

The objective of this Bachelor's or Master's thesis is the design, construction, and characterization of an ellipsometer setup with a strong didactic focus. The system is intended to clearly illustrate the fundamental principles of ellipsometry, polarization optics, and data evaluation, and to be suitable for use in laboratory courses and demonstrations.

Tasks

- Conceptual design of a modular ellipsometer setup (light source, polarizer, analyzer, sample stage, detector)
- Optical alignment and characterization of the experimental setup
- Development of a measurement and evaluation workflow that transparently links raw data to ellipsometric parameters (Ψ , Δ)
- Implementation of simple data analysis and visualization tools (e.g. Python or MATLAB)
- Documentation of the setup with a focus on clarity, reproducibility, and teaching usability
- Evaluation of measurement accuracy using well-defined reference samples

Profile / Requirements

- Enrollment in a Bachelor's or Master's program in Physics, Optical Engineering, Nanotechnology, or a related field
- Interest in experimental optics, instrumentation, and teaching-oriented development
- Basic knowledge of optics and polarization is desirable
- Programming or data analysis experience is an advantage but not required
- Structured, careful, and independent working style

What We Offer

- Hands-on experience in building and understanding an optical measurement system from first principles
- A strong link between fundamental physics, practical implementation, and teaching applications
- Close supervision and clearly defined milestones
- An excellent opportunity to contribute to sustainable teaching infrastructure
- A solid foundation for further experimental or educationally oriented research projects

Start date: by arrangement

Type: Bachelor's or Master's thesis

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