Karlsruhe Institute of Technology

KSOP
Karlsruhe School of Optics & Photonics

KSOP Master Program / Europhotonics Optics and Photonics Lab

Lab Information

Summer term 2023

Michael Hetterich | Karlsruhe, 13 April 2023

Optics and Photonics Lab

- The students will get a first hands-on experience in basic optics and measurement techniques in the ‘Optics and Photonics Lab’ (**O&PL**). A wide range of optical experiments has been selected from the advanced laboratory courses of the KSOP departments to extend the student’s theoretical knowledge from the fundamental courses. This Lab comprises the two modules **O&PL I** in the winter term and **O&PL II** in the summer term.

- **Objectives of Optics and Photonics Lab**:

  The students learn how to prepare and carry out experiments, analyze the obtained data as well as how to summarize and discuss their results in a scientific report. They are also introduced to the **principles of good scientific practice** as a compulsory part of the course.

Karlsruhe School of Optics & Photonics (KSOP)
Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

Optics and Photonics Lab I and II

KSOP
Karlsruhe School of Optics & Photonics

- The **Optics & Photonics Lab Courses** are offered by various KIT institutes and departments.
- Collect **Lab Units (1 LU ~ ½ day work)** by successful completion of individual labs. Depending on the workload there are labs between 1 and 8 LU.
- You must **specify, which courses you are interested in** (without guarantee that these courses will be assigned to you). You will be informed by e-mail about your lab schedule after registration, Lab Introduction & Safety Briefing (see below).
- In the assignment of labs, preference will be given to Europhotonics students.
- COVID-19 regulations: **Masks not compulsory but still recommended.**

Regulations for *KSOP students*:

- In total, you have to collect at least **15 lab units** in **2 semesters** (or more, if necessary)
- For students who have already started the lab in winter term 2021/22: Still only 10 LU (COVID-19 crisis).
- At least **3 LU in Physics labs** and at least **5 LU in Electrical Eng. labs.**
- New: Online course “Good Research Practice” counts as 1 LU

Karlsruhe School of Optics & Photonics (KSOP)
Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

Regulations for *Europhotonics students*:

KSOP
Karlsruhe School of Optics & Photonics

- In total, you have to collect at least **10 LU** in **one semester** (or more, if you are still in Karlsruhe)
- At least **one Physics** lab and at least one **Electrical Eng.** lab
- New: Online course “Good Research Practice” counts as 1 LU

Two possible combinations for Europhotonics students (choose one of these):

Combination I:

- **One LTI lab** (4 sub-labs): Nanotechnology / Lighting Technology / Solar Energy**: 8 LU**
- **One Physics lab** (labs number 1–8, 27, see below)**: 2 LU**
- Compulsory **online course “Good Research Practice”** (see below)**: 1 LU**

Combination II:

- **Optics Design Lab** (lab number 18, see below): **5 LU**
- **One Physics lab** (labs number 1–8, 27, see below)**: 2 LU**
- Compulsory **online course “Good Research Practice”** (see below)**: 1 LU**
- **One arbitrary additional lab (2 LU or more)**

Karlsruhe School of Optics & Photonics (KSOP)
Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

To do list (before you start the lab), part I

Organization of Lab / contact person:

Priv.-Doz. Dr. **Michael Hetterich**
Physics Department, building 30.23, room 5-15b
michael.hetterich@kit.edu → **Use e-mail whenever possible**
phone: +49 721 608 43402

- Login to ILIAS (https://ilias.studium.kit.edu) and **register for the course**

  4044123 – KSOP Optics & Photonics Lab II

  as soon as possible (**preferentially directly after this introduction**)

  ILIAS path:
  Repository > Organisationseinheiten > KIT-Fakultät für Physik > SS 2023 > 4044123 – KSOP Optics & Photonics Lab II

- Direct link after login:
  https://ilias.studium.kit.edu/ilias.php?ref_id=2081849&cmdClass=ilrepositorygui&cmdNode=x1&baseClass=ilrepositorygui

To do list (before you start the lab), part II

KSOP
Karlsruhe School of Optics & Photonics

- All details of the lab courses can be found **online on ILIAS (up to date info)**, but also in the **Module Manual** (not always up to date)
- ILIAS will be used to organize activities within the lab and to inform you about any changes concerning the implementation of the lab.
- Individual labs can be easily **evaluated** using ILIAS.
- In addition, register for the separate ILIAS course "**Good Research Practice**". This has to be done as a compulsory part of the O&PL !

Karlsruhe School of Optics & Photonics (KSOP)
Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

To do list (before you start the lab), part III

KSOP
Karlsruhe School of Optics & Photonics

- **Write individual (!) e-mails to michael.hetterich@kit.edu after this Lab Introduction & Safety Briefing until 17 April, specifying**
  - **your full name (specify which parts are family name(s) / first name(s))**
  - **your matriculation number**
  - **your KIT (!) e-mail address in the form u…@student.kit.edu (Your KIT e-mail will be used for lab assignments etc., so please check it on a regular basis!)**
  - **your preferred lab partner (labs typically carried out in teams of 2)**
  - **a list of labs and a separate list of 3 labs in excess you would like to do (not guaranteed, other labs may be assigned to you)**
  - **if you are a KSOP or Europhotonics student**
  - **that you have attended the online safety briefing**
- **Also write this e-mail if you continue the O&PL from a previous semester! No lab assignments without this e-mail!**
- **Mandatory Lab Introduction & Safety Briefing** before the start of the O&PL (*online, after this Lab Introduction*)

Karlsruhe School of Optics & Photonics (KSOP)
Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

General information

- **The procedure of the labs is your responsibility!**

- If you are not able to show up at a lab (illness, other major problems):

  Inform the supervisor of the individual lab and your lab partner **as soon as possible** to ask for the lab to be postponed. Once the lab is postponed, please inform me via e-mail.

Karlsruhe School of Optics & Photonics (KSOP)
Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

Special labs

KSOP
Karlsruhe School of Optics & Photonics

- ***Nanotechnology/~~Optoelectronics~~/Lighting Technology/Solar Energy Lab (all labs at Light Technology Institute LTI)***
  - Please choose max. ONE of the LTI labs in your e-mail ("Optoelectronics" not available).
  - There is a special introduction session for these labs that is **mandatory** for those who want to do LTI labs!

    Date for introduction session: 19 April, 2:00–3:00 pm, LTI (Campus South, building 30.34), seminar room R119, level 1 (in presence)

- ***Backscattering in Optical Fibers/Ring Resonator Filters/BPM-simulations of Integrated Optical Waveguides/Optical Detectors/Laser Diodes & LEDs (all labs at IPQ)***
  - Additional introduction & safety briefing required, **mandatory** for those who want to do IPQ labs!

    The date for this introduction session will be announced separately.

- ***Optics Design Lab (only offered in summer term)***
  - Will be offered for max. ~20 students (preference given to Europhotonics students).
  - 6 dates (introduction + 5 labs).
  - **Special introduction needed. Details will be announced separately.**

Karlsruhe School of Optics & Photonics (KSOP)
Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

Optics & Photonics Lab: Offered labs

Please note: Not all labs are offered, only the labs listed below !

KSOP
Karlsruhe School of Optics & Photonics

LAB	Title	Department	Lab Units	Contact
0	**Good Research Practice (compulsory!)**	**ILIAS**	**1**	michael.hetterich@kit.edu
3	Diffusive invisibility cloak	Dep. of Physics, APH	2	philip.scott@kit.edu
4	Laser resonator	Dep. of Physics, APH	2	philip.scott@kit.edu
5	Optical Tweezer	Dep. of Physics, APH	2	hao.jia@student.kit.edu
6	Magneto-optical Kerr effect – MOKE	Dep. of Physics, PHI	2	christoph.suergers@kit.edu
7	Laser spectroscopy	Dep. of Physics, PHI	2	christoph.suergers@kit.edu
8	Fabry–Pérot interferometer	Dep. of Physics, PHI	2	christoph.suergers@kit.edu
10	Nanotechnology laboratory	LTI	8	klaus.trampert@kit.edu
11	Lighting Technology lab	LTI	8	klaus.trampert@kit.edu
12	Solar-Energy laboratory	LTI	8	klaus.trampert@kit.edu
13	Backscattering in optical fibers	IPQ	2	carsten.eschenbaum@kit.edu
14	Ring resonator filters	IPQ	2	carsten.eschenbaum@kit.edu
15	BPM-simulations of integrated optical waveguides	IPQ	2	carsten.eschenbaum@kit.edu
16	Optical detectors	IPQ	2	carsten.eschenbaum@kit.edu
17	Laser Diodes and LEDs	IPQ	2	carsten.eschenbaum@kit.edu
18	Optics Design Lab	ETIT, ITIV	5	lintao.fan@kit.edu
21	Femtosecond spectroscopy in solution	Chemistry, IPC	2	andreas.unterreiner@kit.edu
22	Vibrational Raman spectroscopy	Chemistry, INT	2	sergei.lebedkin@kit.edu
23	Biological fluorescence microscopy	ZOO	3	franco.weth@kit.edu
24	Optical Coherence Tomography (OCT)	IBT	2	miriam.weiss@kit.edu
25	Image processing for Smart Optical Systems (ISOS)	ETIT, ITIV	2	dejenie.gemeda@kit.edu
26	Fluorescence Angiography	IBT	2	simon.hoffmann2@kit.edu
27	Fluorescence correlation spectroscopy (FCS)	Dep. of Physics, APH	2	amirhossein.sedeh@kit.edu

Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

Lab “Good Research Practice”

KSOP
Karlsruhe School of Optics & Photonics

- **Compulsory for all Europhotonics and KSOP students**
- Online course on ILIAS
- Access path on ILIAS:
  Repository > Interfakultative Einrichtungen > KIT-Bibliothek
  > Online Course: Good Research Practice
- Link: https://ilias.studium.kit.edu/goto.php?target=crs_1751678&client_id=produktiv
  (Please first log in at the top right. Only then you can access the course content !)
- **Module 1: Protecting Science**
  - Structure of scientific system in Germany
  - Definition of research misconduct, self-monitoring of science
  - Guidelines for Safeguarding Good Research Practice (DFG, German Research Foundation)
- **Module 2: Learning How to Do Research**
  - Focusses on specific phases during your studies
  - Case studies
  - Pitfalls for students in research (practical training, courses, theses), practical orientation

Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

Optics and Photonics Lab I and II

KSOP
Karlsruhe School of Optics & Photonics

Procedure of individual lab courses:

1. After lab has been assigned to you via e-mail, contact supervisor to get **preparation material** / clarify **place** and **time** of lab course!
2. **Prepare well**!
3. **Lab work**
   - Short **interview**, supervisor checks if your are properly prepared
   - Carrying out experiments
4. Create **lab report**: interpretation / data analysis / discussion
5. **Evaluation** by supervisor

Your own responsibility !

Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

How to prepare a lab

- ILIAS or supervisor: preparation material
- Read the instructions
- If necessary, use additional books
- Read the questions carefully
- Answer questions for the preparation
- Write a short summary about the topic and the requested tasks (computer)
- Inform yourself about the location
- Be on time!

Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

How to write the report

KSOP
Karlsruhe School of Optics & Photonics

- Ask the supervisor what to do (sometimes no report is needed)
- Sometimes a short written preparation is needed, bring it with you at the lab date, the supervisor wants to check it.
- Use a cover page with:
  - names, matriculation numbers
  - title and date of the lab
  - name/e-mail of your supervisor
- Explain what you did and why!
- Objective/Setup/Theory/Results and Analysis/References
- **Copying (parts of) reports is forbidden! Should this occur, the individual lab will be marked as failed and has to be repeated or replaced by another lab.**

No plagiarism !
Scientific report / document !

Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

Lab instructions

- Follow the instructions of your supervisor
- Sometimes a USB flash drive is useful to save data
- For Campus North: bring your **passport** for registration at entrance (KIT shuttle, ~30 min! travel time + registration + time to find institute)
- Try to use the time in the labs to get to know the institute: possibly master thesis?

Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882

Conditions

- **2 weeks after the lab**, the report has to be handed in to the tutor / supervisor of the lab
- Marked by supervisor with
  “+” (above average) / “0” (passed) / “-” (failed)
- If the preparation/report/lab was marked as „-“, you have to repeat or replace the lab (in the following semester)
- After enough LU have been collected, your study achievement **(labs I & II)** will be acknowledged electronically in the CAS Campus system (after 2nd semester, can take some time)
- **Please register for the KSOP O&P Lab online on the CAMPUS system in the *summer term*, otherwise your credits cannot be booked!!!**

Schlossplatz 19 | 76131 Karlsruhe (Germany) | Phone: +49 (0)721 608 7880 | Fax: +49 (0)721 608 7882