Quantum Nano-Optics Group Manual

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Lab Philosophy

We explore novel physics in low-dimensional systems and other condensed matters using a nano-optics approach. We perform both experimental and theoretical studies for our research. We pursue a study that can bring a breakthrough in physics or society, rather than a marginal study.

We establish a democratic and social lab. We should keep in mind that our achievements are possible because of help and courtesy from other group members. We make our best efforts to help our group members to grow physicists who can bring a good impact on scientific communities and our society.

Code of Conduct

Essential policies

As discussed in Lab Philosophy, our group is a democratic and social lab. We refuse a traditional hierarchy in our academic environment. We encourage every group member can discuss his/her thoughts without any hesitations. We believe such an environment can help us to have more creativity.

SeokJae is a group leader, but he will discuss important decision-making with other group members.

Every group member also has the right to request the revision of this lab manual and the group policies.

Especially in Asian culture, senior members or a principal investigator (PI) often order something to junior members based on their hierarchical privileges. In our group, however, we refuse such a hierarchical structure – we should ask politely if we need something for others.

Scientific integrity

We pursue the highest standard of scientific integrity. To achieve our goal, we strongly recommend every member keep his/her resources permanently. Basically, you should write your daily lab notebook in a group wiki [see Lab resources - Wiki]. After your paper is accepted or ready to publish, you should upload all the relevant resources including raw data, notes in theoretical derivation, and codes, scripts, and simulation models (e.g. COMSOL model) in our group repository [see Lab resources - Group repository].

<u>Inclusive community</u>

Our group is an inclusive community. We will not tolerate any form of discrimination, harassment, and hates against race, gender, sexual orientation, religion, economic status, or physical appearance.

<u>Harassment</u>

If you notice any harassment occurring in our group, tell SeokJae immediately. If SeokJae is the cause of the harassment, you can reach out to other faculty members or university departments (withus@inha.ac.kr, 032-860-9344, https://hrc.inha.ac.kr/user/humanrights/)

Responsibilities

<u>Everyone</u>

Everyone should follow the highest standard in scientific integrity. We also make an inclusive community and refuse any form of harassment. The most important thing for us is to keep our physical and emotional well-being – more than science. Also, we should

- Help and train each other. Everyone has his/her own strength. We become stronger when we can share our strengths and grow together. We are not competitors, but collaborators.

- Be transparent on your research project. We keep our lab notebooks and data in personal and group repositories.

- Find the best way to handle any tensions and troubles in our group. If we find something happening behind, let's discuss it with SeokJae or group members.

- Respect other group members. We refuse any kind of hierarchy in our group.

<u>Principal investigator (PI)</u>

As a PI of our group, SeokJae should

- Supervise research projects and discuss group members with experiments, theory, manuscripts, and paper submission.

- Support group members scientifically, emotionally, and financially.

- Provide career guidance and reference letters.

- Have regular group meetings and individual meetings.

- Not harass group members using harsh language, power, and any form of power.

Post-docs

Post-docs should

- Have and develop their own independent line of research. SeokJae will support and advise post-doc research.

- Apply for grants and your next job. Post-docs should have a clear plan and discuss it with SeokJae.

- Participate in conferences, workshops, and seminars, and present their works. Presentations are important in post-doc career development.

- Train graduate and undergraduate students in our group.

Graduate students

Graduates should

- Develop their dissertation studies. Doctoral candidates should set their dissertation title within 3 years.

- Train and help junior graduates and undergraduate students in our group.

- Apply for a scholarship (e.g. NRF).

- Discuss their career goals with SeokJae. You can pursue academia or industry. Feel free to ask SeokJae for a career discussion.

Undergraduate students

Undergraduate interns should

- Assist experiments if they work with other group members (graduates or post-docs).

- Be clean in lab spaces. Keep in mind that undergraduates are often temporary visitors rather than regular group members. Put items in the correct places. It will be appreciated.

General Policies

Hours

Hours in our group are flexible. We encourage to work 40 hours/week at least in the lab like other jobs, but you can choose the best way to maximize your productivity – like a Silicon Valley. If you develop a theory, write a code, prepare a presentation, write a manuscript, you can work at home. What we pursue is to maximize our productivity, not work hours. Let's work smart.

PI office hours

SeokJae will work on a daily basis. His schedule will be announced publicly via Google Calendar [https://calendar.google.com/calendar/u/0/embed?src=c_t42fgem8cotfbrv0fli02jq43k@group.calendar.google.com&ctz=Asia/Seoul]. He also provides Open Office. You don't need to make an appointment. You can just walk into his office. He also welcomes individual meetings with our group members. You can arrange a time via e-mail or Slack.

Meetings

We have a group meeting biweekly. In the group meeting, one of our group members will provide a presentation in 30 min ~ 1 hour. He/she will explain his project from the introduction to the conclusion as in a Ph.D. defense or an invited talk.

We also encourage every group member to have an individual meeting with SeokJae as frequently as possible. You don't need to prepare detailed slides – preparing slides itself is time-consuming work. The purpose of the individual meeting is to discuss your problems in research.

Recommendation letters

SeokJae will write recommendation letters to our group members. You don't need to worry about it – it's SeokJae's responsibility. If you need a reference letter, please let him know as soon as possible. You can provide a CV or any other materials for him. It's also possible to write a draft before he starts to write. It will be very helpful for him to write a good letter.

Open science

We believe transparency will enrich our scientific communities and even society. We will

upload our raw data, notes, and codes relevant to our published paper. To allow version tracking for the materials, we should follow the file name template: "YYYYMMDD_title_v1.format". We also keep our lab notebooks and internal communications (e.g. group meeting slides) in our lab notebook (Goono).

Funding and scholarship

We strongly encourage that students and postdocs apply for funding and scholarship. It is not only financial support but also a good practice to apply and manage their own project.

If you receive funding and scholarship outside the university, e.g. NRF, you can be paid from both the funding agency and our group. We do not adjust the lab payment in your total salary if you get external funding. To be more specific, let say your monthly salary is $1000 from our group. If you get an additional $500 from the funding agency, your total monthly salary is $1500.

Communications

For external communications (e.g. contact to other professors, companies, conference committees, and journal editorial boards), you should discuss it with SeokJae. We also should be on time.

Authorship

The first author is one who conceived a research project and wrote a manuscript. If two or more contribute significantly like the first authors, they will be co-first authors. In the case of the co-first authorship, the sequence of names in the author list will be decided by SeokJae. The final decision for authorship will be done by SeokJae, but reasonable justification will be discussed in a group meeting.

Safety

Physical well-being in research is our primary right and responsibility. We should follow the safety protocol set by Inha University. We should keep our chemical inventory updated. Material safety data and SOP will be uploaded in our group wiki.

Sick leave and COVID-19

If you're sick, you can stay at home. You don't need to feel any push to come to the lab – this

is a bad Korean culture. The only thing you should do before the sick leave is a rearrangement of meeting and equipment appointment as soon as possible.

Especially, if you feel respiratory symptoms (even a slight cold), you should stay at home. Respiratory diseases sometimes often transmit through group members. This strongly affects group productivity. We should minimize the danger of seasonal infections such as cold and flu.

In a pandemic (COVID-19), we should minimize social contact even in the lab space. You don't need to come to the lab on a daily basis. You can perform experiments while keeping a social distancing, but we can minimize the number of people in the same room. Every meeting will be done via Zoom.

Educations

<u>Coursework and extra studies</u>

Students can discuss coursework with SeokJae before a semester starts. The following list is a guide for class attendance relevant to our research.

Graduate students are encouraged to attend the following classes:

- PHY5801~3 광학1~3

- PHY6001 물리광학

- PHY6002 기하광학

- PHY6006 양자광학

- PHY6010 광자학

- PHY6009 수리물리학

- PHY7043 고급광자학

- PHY7044 반도체광학

- PHY7031 반도체물리학

- PHY7035,6 고체물리학1, 2

Undergraduate students who consider joining our group are encouraged to attend the following classes in addition to the major-mandatory classes (e.g. electromagnetics and

quantum mechanics):

- PHY2100 기하광학

- PHY3301 물리광학

- PHY3312 양자광학

- PHY4404 반도체물리학

- PHY4408 첨단반도체 소자물리

- PHY3403 고체물리학

Journal Reading

  We have journal reading on biweekly basis (at least). We're especially interested in intriguing works published in Nature and its sub-journals, Science, Science Advances, and Physical Review Letters.

Graduation criteria

  To graduate, doctoral candidates have to publish 2 papers on international journals. For a master degree, we do not have such graduation criterion.

Lab Resources

Slack

  Slack is our primary contact tool. Don't use Kakaotalk for work-related purposes. It is also good to turn off Slack notifications in nights and holidays. However, we encourage you will be available via Slack in work hours.

Google Drive

  We try to keep our every research-related material permanently. It will help us to establish valuable know-hows in experiments and theories. Lab wiki can be used as a lab notebook.

<u>Google Calendars</u>

You can reserve experimental equipment using Google Calendars. Basically, it's done via first-come first-serve basis, but you're not allowed to book too much. You should discuss it with other group members before you make a reservation.