QLiC! Lab Handbook

Revision 1: 10/28/2024

1. Background

A. Purpose This document outlines the principles, policies, and expectations of the Quantum Light Control Lab. It is intended that all members of the group understand and align with these guidelines and practices to help foster good working relationships with colleagues, nurture a learning-first mindset, and facilitate high-quality and ethically-responsible research.

B. Editing This document is a constant work-in-progress and things will (and should) evolve periodically through discussion.

2. Meeting goals

The design of this document is founded on the expectations and aspirations of current and potential group members. Achieving and fulfulling these aspirations relies on setting and meeting goals.

- Research is your primary focus in grad school – i.e., you should put time and effort into your research *every day*.
- Concurrently, we will also discuss activities and allocate time towards developing key skills (teaching, communication, etc.) necessary towards your long-term career goals.
- As a federally-funded lab, it is our *moral and ethical responsiblity* to minimize wastage of public money.

3. Work-Life Balance and Well-being

A. Holistic Approach Developing as a professional by setting and reaching the work goals is the central objective – just not at a cost of personal wellness. *Maintaining a good work/life balance* is important for your mental, emotional, and physical well-being, which is also a key priority.

B. Support Several of our individual meetings early in your appointment will focus on understanding and designing a personal development plan, which will be periodically adjusted for aligning with your personal goals. *If you are struggling or life situations are preventing you from working optimally, please inform me as soon as possible.* I can help reorganize your work load and guide you to appropriate resources.

4. Research planning

A key challenge that students face when embarking on research is an "unstructured" calendar. While this poses challenges from a day to day basis as there are no fixed slots booked for a lecture or meeting, the unknown time period for finising the project could cause long-term stress. Here are a list of suggestions that I expect will be beneficial.

- My first suggestion, as an experienced researcher who has gone through the same challenges, is to create a calendar – *identify resarch and learning activities and create a weekly recurring calendar with times allocated for each day of the week.*

- Early in your career (pre-comps), maintain a lab notebook and *allocate a specific task for each activity at the start of the week and review the progress at the end of week.*
- *Discuss these plans* during your weekly meeting and use this information to *set realistic goals/deadlines*. While it will be challenging in the initial few months, you will soon naturalize it into a habit.

5. Mentoring & Research Expectations

A. Regular Meetings & Check-ins

- **Frequency:** At least once per week individual meetings and twice per week check-ins (can be brief).
- **Flexibility:** Schedule may be adjusted based on the student's needs and project demands.
- **Alternative Communication:** In case of unavoidable conflicts, timely communication is expected to reschedule or adjust the format (e.g., virtual meeting, email update).

B. Discussion Topics for Meetings

- **Scope:** Topics include but are not limited to research progress, writing, professional development, work-life balance, and long-term career goals.
- **Focus Areas:** Prioritize immediate project needs, skill development, troubleshooting, and planning for current tasks.
- **Personal Development:** Include discussions around networking, conference participation, and soft skill development (e.g., communication, time management).

C. Preparation and Participation in Meetings

- **Student Preparation:** The student (should) have an idea of what they want to be mentored on, *including specific questions or areas* where they need guidance.
- **Defined Talking Points:** Clearly defined discussion points should be *shared at least a day before the meeting using the Living Document* (see next subsection). This helps streamline the conversation and ensures both parties are prepared.
- **Active Engagement:** Both mentor and mentee are expected to actively participate in the discussion, with the mentor providing constructive feedback and the student engaging with questions and follow-ups.

D. Living Document for Communication & Accountability

- **Documentation:** Maintain a living document (e.g., shared digital notebook) for notes, action items, and talking points for 1-on-1 meetings or other interactions.
- **Collaborative Editing:** Both mentor and student are encouraged to write in the shared document for ease of access and ongoing updates.
- **Accessible Format:** Ensure the document is accessible and updated regularly, serving as a central reference for expectations, feedback, and progress tracking.
- **Action Items:** Clearly define action items and deadlines during meetings, ensuring accountability for both mentor and student.

E. Expected Outcomes

- **Mentor's Expectations:** The broad and specific expectations over different timeframes (e.g., weekly, semesterly, annualy) for the student should be listed, associated tasks identified, and anticipated deadlines set.
- **Student's Goals:** The student should also outline their short-term and long-term goals, both academic and professional, which will be reviewed and refined in the mentoring meetings.
- **Goal Alignment:** Regularly revisit to ensure that we mutually assess the alignment of expectations and goals.

F. Feedback and Adaptation

- **Ongoing Feedback:** Both parties should provide feedback on what is or isn't working as soon as it's realized. Constructive feedback should be *specific and actionable*.
- **Progress Tracking:** The current progress of the activities and tasks in the Living Document should be quantified (at least monthly) to help assess milestones and turning points.
- **Open Communication & Adaptation:** Please feel comfortable to discuss challenges or concerns. The meetings are designed to assist your growth and are free of judgments. Please help me to help you! I am always willing to adapt the mentoring plan as your expectations, career goals, and project evolve.

6. Professional Development

A. Long-term Career Goals and Networking

- **Career Planning:** PhD in Physics, more so in an emerging field such as quantum physics, opens a diverse selection of career opportunities. Building on the Department of Physics IDP and self-assessment, we will annually discuss your long-term goals and identify a route towards achieving these goals, whether in academia or industry.
- **Skill Building:** I highly encourage all students to regularly contemplate and identify professional skills such as presenting research, applying for funding, networking within the field, teaching, developing, or participating in outreach and engagement activities.
- **Opportunities:** Building on your portfolio of interests, I can help you find and implement activities.

B. Communication Skills: Writing & Presenting

- **Research and Writing Guidance:** Our lab is committed to supporting your growth in research skills such as methodology, literature review, and data analysis. Additionally, I will provide structured feedback on your writing, whether for reports, manuscripts, or grant proposals, to help you develop strong scientific communication skills.
- **Steps for effective scientific writing**
  - **Read**: The more you read, the better you write. If you need a book or paper recommendation, ask me and I'll give you a suggestion which is timely, interesting, and beautifully written.

  - **Learn**: Take note of the style of writing in research that you read. Which writers are effective at communicating hard ideas? What can you incorporate from their papers? Note how some published research papers are much better-written than others.
  - **Write**: The more you write and get critiqued, the better you will get. Once we begin working on a project, get started with writing the paper! Think about what the central thesis of the paper should be and what it needs to have in order to communicate this thesis. Plan and fill in the details through discussions. This methodical working will significantly reduce the stress before a deadline.
- **Publication Planning:** We will work together on planning for publications, presentations, and other scholarly outputs to enhance your visibility in the field. This includes discussing potential venues for publication and presentation, as well as timelines and goals for these outputs.

C. Dissemination of Research Findings

- **Publication Goals:** As a lab, our primary goal is to publish research in top-tier journals, striving for robust, high-quality, and insightful contributions to our field.
- **Public Outreach:** Beyond academia, I like to make our research accessible to the general public. To achieve this, I encourage writing accessible summaries or blog posts, and I will support efforts to promote your research through media outreach through University resources. This type of engagement enhances the broader impact of your work and fosters strong, adaptable communication skills.

D. Conference Attendance & Networking

- **Conference Funding and Support:** You are encouraged to attend conferences to share your work and build connections. If you have a paper or poster accepted and do not receive funding from the organizers, lab funding may be available to cover your attendance costs, depending on budget availability.
- **Presentation Preparation:** To ensure you make a strong impression, you should plan to rehearse talks or poster presentations with lab members in advance. This practice helps refine your delivery, clarify key points, and build confidence.
- **Steps for effective presentation:**
  - **Attend departmental seminars and colloquia**: You're lucky to be in grad school. You get to hear the best researchers in the world tell you the cool things they just did. Make a note of the way they communicated difficult concepts verbally and visually. See if you can incorporate their style in your talks.
  - **Participate in reading groups and journal clubs**: Reading groups often require one presenter each week. This is a good way for you to learn about research topics while also developing speaking skills and becoming comfortable with presenting challenging ideas to others.
  - **Be ready**: Do not prepare talks when they are due. Maintain a consistent rate of one or two slides every group meeting. Incorporate feedback from the meetings. This way, you are not always rushing to prepare a presentation. Instead, you can utilize this time to practice and devise ways for effectively communicating your thoughts.

- **Networking and Collaboration:** While at conferences, actively seek networking opportunities with other researchers and industry professionals. Be proactive in initiating conversations and exploring potential collaborations to enhance both your professional network and research prospects.

7. Group expectations

A. Open and Active Communication on Mentoring Needs

- **Mentoring Conversations:** Regular discussions about mentoring needs are encouraged, including the type of guidance needed from the PI, peers, or other members in the lab. This should be a dynamic conversation that evolves as the student gains experience and independence.
- **Gradual Independence:** As time progresses, students are expected to develop and communicate their desired level of independence. This might mean taking on more responsibility for planning, conducting, or leading aspects of a project while consulting mentors as needed. I anticipate that towards the final year of your PhD, you are able to design your own year-long research project that includes a working hypothesis, methods for validation, and time plan.
- **Peer Mentoring:** Encouragement for students to engage in mentoring relationships within the group. More experienced students should be approachable for advice, and newer members are encouraged to reach out for support.

B. Structured Meetings and Time Management for Shared Projects

- **Scheduled Check-ins:** Regularly scheduled meetings for projects involving multiple group members are essential for synchronizing work, adjusting project timelines, and discussing shared goals and challenges.
- **Time Investment Discussion:** Group members should openly discuss and negotiate time commitments and responsibilities for shared projects, ensuring workload balance and accountability.
- **Clear Mentoring Plans:** For shared projects, mentoring responsibilities should be clearly outlined, especially if multiple mentors are involved, to avoid overlap or gaps in guidance.

C. Efficient Use of Shared Resources

- **Resource Management System:** Utilize the lab's system (e.g., shared calendar or software) for booking shared equipment, lab spaces, or materials. Ensure that resources are accessible to all members who need them and that any resource constraints are openly communicated.
- **Advanced Reservation:** Whenever possible, book shared resources in advance to accommodate the needs of others and to avoid conflicts in lab usage.
- **Resource Care:** Treat shared resources with respect, following lab guidelines for maintenance and reporting issues promptly to avoid impacting other members' work.

D. Timely Communication and Responsiveness

- **Communication Expectations:** Respond to group communications within a reasonable timeframe, and do not leave messages unanswered for multiple days unless discussed in advance.

- **Flexible Response Times:** Understand that response times may vary based on the urgency of the matter, but urgent project or safety-related communications should be prioritized.
- **Communication Protocols:** Use designated lab communication channels for consistency (e.g., email, Teams, Overleaf) and communicate anticipated periods of unavailability (such as travel or heavy workload) in advance.

E. Work Schedules and Day Structure

- **Core Lab Hours:** Although flexibility is respected, establishing core lab hours where most members are available for meetings and collaborations can streamline teamwork and mentorship. Moreover, it is important to be prepare for a professional work setting that typically require a 9–5 workday. *Maintain at least 8 hours at your IATL desk/lab.*
- **Flexible Work Hours:** Discussion about preferred working schedules is encouraged to respect individual routines while ensuring sufficient overlap for collaborative work.
- **Work-Life Balance Consideration:** Recognize and support a reasonable work-life balance for all members. While productivity is important, maintaining balance helps sustain long-term engagement and mental health.

F. Communication of Working Styles

- **Preferred Work Style:** Each member should communicate their preferred working style, such as whether they prefer uninterrupted blocks of work time or regular check-ins for feedback and updates.
- **Task and Focus Management:** Discuss how each member approaches task focus, deadlines, and project prioritization. This conversation can help identify complementary working styles that enhance collaboration.
- **Adaptation and Flexibility:** While everyone has their preferred working style, adaptability and respect for others' styles can foster a positive and productive group dynamic.

G. Respect for Lab Culture and Environment

- **Shared Responsibilities:** All members are expected to contribute to maintaining a clean and organized lab space. Shared tasks (such as equipment cleaning, waste disposal, or supply replenishment) should be done regularly and fairly distributed.
- **Inclusive Environment:** Encourage open dialogue that respects diverse perspectives and contributions. Value and support the unique skills and experiences each member brings to the group.
- **Conflict Resolution:** In case of misunderstandings or disagreements, prioritize respectful communication and seek guidance from the PI or a designated mediator if needed.

8. Defining and Documenting success

A. Establishing Goals and Milestones

- **Setting Goals:** At the start of each semester, establish both ideal and minimum goals for each project. The ideal goals represent what success looks like under optimal conditions, while the minimum goals ensure foundational progress even in challenging circumstances.

- **Realistic Goal Setting:** Goals should be ambitious yet achievable, with input from both the student and mentor to align expectations. This balance helps track meaningful progress while staying adaptable to unforeseen challenges.
- **Periodic Check-Ins:** Revisit these goals periodically (e.g., mid-semester) to assess progress, adjust timelines if needed, and redefine goals based on project evolution or unexpected findings.

B. Detailed Documentation of Progress and Outcomes

- **Documenting Successes and Failures:** Keep a detailed record of project outcomes, including both successful and unsuccessful approaches. Documentation of failures is equally valuable for future reference, as it can help others avoid the same pitfalls and build upon past work.
- **Structured Records:** Use a consistent format for recording outcomes, such as a lab journal, where each experiment, iteration, or step is documented with notes on methodology, challenges, and insights.
- **Transparency for Future Lab Members:** Well-documented projects, including both successes and setbacks, contribute to a lab-wide knowledge base. This transparency allows future members to learn from past experiences and build efficiently on previous work.

C. Reflecting on Growth and Learning

- **End-of-Semester Review:** At the end of each semester, reflect on what worked well and what could be improved. Consider how much progress was made relative to the initial goals and the lessons learned along the way.
- **Personal Growth:** Identify skills and knowledge gained over the semester, recognizing areas of personal and professional growth beyond just project outcomes.
- **Feedback Integration:** Incorporate feedback from mentors, peers, and self-assessment to refine future goal-setting and improve project workflows.