



Centre for Quantum Engineering
and Photonics Technology

2024

First Round of Open Positions

Brilliant Minds, Quantum Computer Research Group



Job Description

About the Center for Quantum Engineering and Photonics Technology

The Center for Quantum Engineering and Photonics Technology at Sharif University of Technology is at the forefront of groundbreaking research and innovation in the field of quantum technologies in Iran. Our mission is to explore the fundamental principles of quantum mechanics and harness them for practical applications. Located in the heart of scientific discovery, our center brings together brilliant minds, cutting-edge facilities, and a collaborative spirit. Within our center, we house several specialized research groups, each contributing to the advancement of quantum science and technology: Quantum Computer Group, Quantum Algorithm Group, Quantum Communication Group, Quantum Sensing Group and Photonics Group.

Chairmen: Prof. Alireza Bahrampour

Vice-chair and Executive Manager: Dr. Abulfazl Bahrampour

Establishment Year: 1393 AH



Centre for Quantum Engineering and Photonics Technology

The Quantum Computer Research Group

At the heart of our center lies the Quantum Computer Research Group, known as *Brilliant Minds Group*, a dynamic team of experts dedicated to advancing quantum computing. Our group has access to well-equipped and advanced quantum technology laboratories, which sets us apart.



Here's what makes our group exceptional:

1. Visionary Research:

- We're not just building computers; we're shaping the future. Our group focuses on developing quantum computers in various physical platform that can solve complex problems beyond the capabilities of classical computers.
- From software to hardware design, we explore uncharted territories in computation.

2. Interdisciplinary Approach:

- Quantum computing is inherently multidisciplinary. Our members come from diverse backgrounds—physics, computer science, electrical engineering, and more.
- Collaboration is our strength. We thrive on cross-disciplinary interactions, fostering an environment where ideas flow freely.

3. Teamwork and Innovation:

- We believe that breakthroughs happen when brilliant minds collaborate. Our team works closely, sharing insights and pushing the boundaries of what's possible.
- Whether it's a late-night brainstorming session or a quantum circuit design challenge, we tackle it together.

4. Qualifications We Value:

- Passion for quantum technologies: If you're fascinated by the weird and wonderful world of quantum mechanics, you'll feel right at home.
- Adaptability: Quantum computing is evolving rapidly. We seek team members who embrace change and thrive in an ever-shifting landscape.
- Problem-solving prowess: Quantum problems require creative solutions. If you love tackling puzzles, you'll fit right in.
- Curiosity: Our group encourages curiosity-driven research. Ask questions, explore, and discover.

Head of Group: Dr. Morteza Nikaeen

Email Address: Nikaeen.morteza@gmail.com

Join Us!

Are you ready to be part of a quantum revolution? Join the Quantum Computer Research Group at the Center for Quantum Engineering and Photonics Technology. Together, we'll unlock the power of qubits and redefine what's computationally possible.

General Requirements:

Candidates for the available positions should meet the following qualifications:

- **BSc, MSc, or Ph.D. Degree:** Possess a Master's, or Doctoral degree in Physics, or Bachelor's, Master's, or Doctoral degree Electrical Engineering, or Computer Engineering.
Limited Positions: We currently have limited openings in the fields of Mechanical Engineering, Materials Engineering, Chemical Engineering, and Human Resource Management.
 - **Strong Problem-Solving Skills:** Ability to troubleshoot and optimize complex systems.
 - **Excellent Communication Skills:** Ability to collaborate effectively with a multidisciplinary team and present research results.
 - **Documentation skills:** The candidate should possess a strong ability to create, maintain, and organize accurate records and information. These skills are crucial, as they encompass everything from writing reports to keeping records and ensuring that their research outcomes are easily accessible.
 - **English language skills:** English language is the primary language of communication in scientific and technical fields. Therefore, candidates should have strong English language skills.
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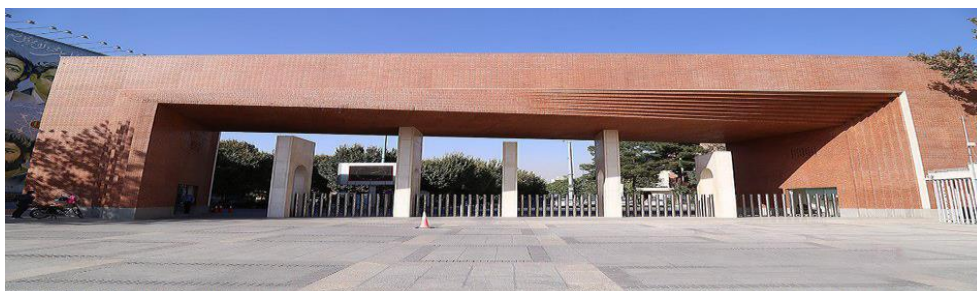
Position Type:

On-site and full-time is our default, but in exceptional cases, remote work and part-time are acceptable.

Your job contract is initially for one year, but it can be extended for several years as a permanent position. After a successful interview, you will be hired for a 3-month trial period. Upon successful completion of the trial period, your one-year contract will be finalized. During the trial period, you will receive 70% of your permanent contract salary.

Work Location:

Centre for Quantum Engineering and Photonics Technology, Sharif University of Technology, Tehran, Iran.



Open Positions for Physicists:

1. Quantum Research Scientist

Role Overview:

As a Physicist, you will play a pivotal role in the simulation and development of theoretical models for cavity/circuit quantum electrodynamics, which involves the interaction between photons and both natural and artificial atoms. You should be able to collaborate effectively with Electrical Engineers to conduct high-level research.

Responsibilities:

- Conduct theoretical and numerical analysis of cavity/circuit quantum electrodynamics.
- Perform analytical and numerical analysis of the dynamics of open quantum systems and quantum coherence.
- Collaborate with Electromagnetic Engineers to Address Technical Challenges in Designing Superconducting Quantum Circuits.

Qualifications:

- A Doctorate degree in Physics.
 - Mastery of quantum optics and open quantum systems.
 - Proficiency in Python, Qiskit Metal, and QuTiP.
 - Experience in conducting research projects related to the interaction between photons and atoms.
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2. Nanofabrication Specialist

Role Overview:

As nanophysics, nanoelectronics and materials science scientists, you will play a crucial role in fabrication and characterization of the superconducting circuits. You should be capable of interacting with physicists and electrical engineers to conduct high-level research.

Responsibilities:

- Fabricate essential components of superconducting circuits, such as the coplanar waveguide resonator and Josephson junction.
- Characterize and test the coplanar waveguide resonator and Josephson junction.
- Collaborate with electrical engineers and physicists to improve the performance of integrated superconducting quantum circuits.

Qualifications:

- Hold a Doctorate or Master's degree in nanophysics, nanoelectronics, or materials science.
- Possess mastery and hands-on experience with optical lithography and electron beam lithography techniques.
- Have mastery and hands-on experience with thin film deposition techniques such as sputtering and physical vapor deposition.
- Be familiar with superconducting materials.
- Have experience conducting research projects related to nanofabrication structures.
- Have experience specifying, purchasing, installing, and qualifying a wide range of nanofabrication equipment (lithography, deposition, etch, metrology, inspection).
- Demonstrate strong attention to detail, persistence, follow-through, and the ability to work with minimal supervision.

3. Free-Space and Fiber Optics Specialist

Role Overview:

In the context of implementing high-efficiency nonlinear optical processes in free-space, we have open positions requiring the following skills.

Responsibilities:

- Alignment of Various Optical Cavities for Optical Processes such as Second Harmonic Generation (SHG) and Optical Parametric Oscillator (OPO).
- Implementation of Single-Photon sources and Entanglement setups, leveraging techniques such as SPDC (Spontaneous Parametric Down-Conversion) processes.
- Designing and simulating optical setups in the field of nonlinear optical processes and quantum optics experiments and conducting research on cutting-edge experiments

Qualifications:

- Familiarity with experimental optical setups, including free-space and fiber optics.
 - Experience in designing, simulating, and constructing various optical cavities.
 - Familiarity with optical design software.
 - Understanding of theoretical foundations of nonlinear phenomena and quantum optics.
 - Enthusiasm for learning, research, and teamwork.
 - Graduate degree (master's or higher) in physics with a focus on optics and photonics.
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4. Quantum Optics Specialist

Role Overview:

Essential for a detailed theoretical and experimental understanding of quantum optics in the investigation and design of optical setups.

Responsibilities:

- Comprehensive understanding and mastery of various methods for implementing photonic quantum computations.
- Thorough review of experimental papers and design of mini-experiments related to photonic quantum computations.
- Theoretical research contributions to advance the field.
- Design and implementation of optical setups.

Qualifications:

- Proficient in the theoretical foundations of quantum optics
- Familiarity with quantum computation and information science.
- Proficiency in Laboratory Optical Equipment
- Enthusiasm for learning, research, experiments and teamwork.
- Doctoral degree (Ph.D.) in physics or related fields.

5. Nano-scale Fabrication Specialist for Integrated Photonics

Role Overview:

Given the importance of integrated photonics in photonic quantum computers, a thorough investigation of nano-scale fabrication techniques for optical devices is crucial. Research in this area is highly valuable.

Responsibilities:

- Design and Simulation of Diverse Photonic Components in Photonic Chips
- Identify Techniques for Overcoming Challenges in Optimal Design and Fabrication of Photonic Quantum Computer Chips.
- Investigate methods to address challenges related to ultra-low losses, stability, and other critical factors.
- Explore innovative approaches for designing and manufacturing quantum chips that enable efficient photon manipulation and information processing.

Qualifications:

- Proficient in nano-scale optical fabrication technology.
 - Familiarity with nano-fabrication Lab equipment.
 - Understanding of the theoretical foundations of quantum optics.
 - Enthusiasm for learning, research, and teamwork.
 - Graduate degree (master's or higher) in physics, nanotechnology, or related fields
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Open Positions for Electrical Engineers:

1. Fields and Waves Telecommunications Field Engineer

Role Overview:

As a *Fields and Waves Telecommunications Field Engineer*, you will play a pivotal role in the design, simulation, and development of RF/MW integrated circuits. You should be capable of interacting with physicists to conduct high-level research.

Responsibilities:

- Design, simulate, and optimize transmission lines and coplanar waveguide resonators, which are essential components for designing integrated circuits.
- Characterize and analyze RF/MW integrated circuits.
- Collaborate with Physicists to Address Technical Challenges in Designing Superconducting Quantum circuits.

Qualifications:

- Master's degree in Telecommunications Engineering.
 - Proficiency in Python, Ansys (HFSS and Q3d), and Sonnet software.
 - Experience in conducting research projects related to RF/MW integrated circuits.
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2. Specialist in Analog Electronics for Instrumentation Engineering

Role Overview:

This role encompasses the design and fabrication of Radio Frequency (RF) components tailored to the control and measurement layer of quantum computers. It also involves the characterization of superconducting circuits using RF equipment, in close collaboration with the group's physicists.

Responsibilities:

- Design and Construction of analog microwave devices for controlling qubits, including Arbitrary Wave Generator, IQ Mixer, Local Oscillator.
- Characterization of superconducting circuits using RF equipment in close collaboration with the group's physicists.

Qualifications:

- Proficient in analog circuit design.
- Proficient in the setup, specification, testing, and characterization of RF circuits and devices.
- Proficient in simulation and circuit design software including Altium, Pispice.
- Experience in PCB circuit fabrication and assembly.
- Learning spirit, research work, and teamwork.
- Graduated with a Master's degree or higher in electrical engineering with an analog focus.

3. Digital Electronics Engineer for Quantum Control Systems

Role Overview:

Design and Development of the control & measurement layer of quantum computers.

Responsibilities:

- Developing FPGA Code for the Control System of Quantum Computers.
- Synchronization and clock management of different FPGA boards.
- Designing a central controller for Quantum Computers. including setting up High Frequency DAC, ADC.

Qualifications:

- Proficient in microcontrollers and FPGA
 - Proficient in programming in C++, Python
 - Familiar with high-frequency circuits
 - Learning spirit, research work, and teamwork
 - Graduated with a master's degree or higher in electrical engineering with a digital focus
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4. Specialist in Analog Electronics Engineering for Optical Quantum Computing

Role Overview:

Responsible for development of homodyne optical detectors and single-photon detectors. Also involved in designing drivers for various active electronic components and implementing linear control systems.

Responsibilities:

- Fabrication of high-bandwidth, low-noise homodyne detectors suitable for quantum optics experiments.
- Construction of single-photon detectors with low dark counts.
- Design of drivers for electronic components such as fiber stretchers, electro-optic phase modulators (EPCs), and piezo devices.
- Implementation of linear control systems for optical setups (e.g., Pound-Drever-Hall locking).
- Implementing of active electro-optical components.

Qualifications:

- Proficiency in analog circuit design.
 - Basic programming knowledge and familiarity with simulation software (e.g., Altium, PSpice).
 - Experience in PCB design and assembly.
 - Graduate degree (bachelor's or higher) in electrical engineering with a focus on analog electronics.
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5. Specialist in Digital Electronics Engineering for Optical Quantum Computing

Role Overview:

Responsible for clock synchronization and management of optical components, central controller design, construction of a time tagger, and other optical experiment necessities.

Responsibilities:

- Synchronization and clock management for optical setups, including detectors, lasers, and electro-optic components.
- Design and Implementation of a Central Control Unit for Simultaneous Control, Detection and Feed-Forward operations of Optical Components in Optical Quantum Computing Implementations.

Qualifications:

- Proficiency in microcontrollers and FPGAs.
 - Programming skills in C++ and Python.
 - Enthusiasm for learning, research, and teamwork.
 - Graduate degree (master's or higher) in electrical engineering with a focus on digital electronics.
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Administrative Manager \ HR Generalist

Role Overview:

The Administrative Manager will be a key member of the Group, providing comprehensive support in various aspects of human resources, administration, communication and content production. This role involves assisting the group head with managing the official affairs of the group, email correspondence, proposal preparation, report evaluation, presentation creation.

Responsibilities:

1. **Communication Support:** Assist the group head in drafting and editing emails, ensuring clear and professional communication with internal and external stakeholders.
2. **Proposal Preparation:** Aid in the preparation of proposals, ensuring they are compelling, well-written, and aligned with the group's objectives.
3. **Report Evaluation:** Review and evaluate reports submitted by group members, providing constructive feedback and ensuring adherence to quality standards.
4. **Content Production:** Create and edit content for various platforms, ensuring it aligns with the group's objectives and brand image.
5. **Presentation Creation:** Prepare presentation slides for meetings, conferences, and other events, ensuring they effectively convey the intended message and are visually appealing.
6. **Official Affairs Management:** Handle the official affairs of the group, including scheduling meetings, maintaining records, and coordinating with other sections of the center.
7. **Privacy Policy Compliance:** Familiarize with and ensure adherence to the privacy policy of the group, safeguarding sensitive information and maintaining confidentiality at all times.

Qualifications:

1. **Education:** Bachelor's degree in Business Administration, Communication, or a related field. A background in Science, Technology, Engineering would be advantageous.
2. **Experience:** At least 1 years of experience in an HR or administrative role, preferably within a technical or scientific environment.
3. **Skills:** Excellent written and verbal communication skills, strong organizational abilities, and proficiency in MS Office or similar software.
4. **Personal Traits:** Attention to detail, ability to multitask, and a proactive approach to problem-solving.
5. **Desirable:** Familiarity with the field of quantum technology would be a plus, but is not mandatory.

Welfare Services and Financial Facilities

Salary Amount: Our offered salary depends on your various skills and abilities, which are determined by a scoring protocol during the interview. If your score is high, your salary scales accordingly.

At our center, we are committed to providing comprehensive welfare services and financial facilities to support our employees. Here are the key offerings:

1. **Sport Club:** We encourage physical well-being by providing access to sports club in Sharif University or nearby locations. Whether it's a game of tennis, or a friendly basketball match, our sports facilities are here to keep you active and healthy.
2. **Swimming Pool:** After a productive day at work, take a refreshing dip in the swimming pool provided near your workplace. Swimming is not only great exercise but also a wonderful way to relax and unwind.
3. **Lunchtime Meetings:** We not only provide a diverse range of options to cater to your taste and dietary preferences during lunchtime meetings but also create an opportunity for members to engage in free conversations about social, scientific, and other topics.
4. **Medical Insurance:** Your health matters to us. We provide comprehensive medical insurance coverage for both you and your spouse (if married). Rest assured that your well-being is our priority.
5. **Retirement Insurance:** Planning for the future is essential. Our retirement insurance ensures financial security during your golden years. We're here to support you as you build a stable foundation for retirement.
6. **Low-Interest Loans:** Need financial assistance? Our low-interest loans are designed to help you meet personal or emergency expenses without burdening you with high interest rates.
7. **End-of-Project Rewards:** Recognizing your hard work and dedication, we offer end-of-project rewards. Your contributions matter, and we celebrate your achievements.
8. **Success Fee:** When you succeed, we succeed. Our success fee program incentivizes outstanding performance and encourages you to excel in your role.



Remember, these welfare services and financial facilities are part of our commitment to your well-being and professional growth. We value you as an integral part of our team.

Application Process:

Interested candidates should submit their CV, a cover letter detailing their relevant experience, and contact information for at least two references.

Application Process: To apply for the position, please submit your Curriculum Vitae (CV) and a cover letter to the email address: Nikaeen.morteza@gmail.com.

Email Subject Line: Please ensure to write the name of the position(s) you are applying for in the subject line of your email. This will help us to process your application more efficiently.

Contact Information: Should you have any inquiries or require further information, please do not hesitate to reach out to the head of our group, Dr. Nikaeen, at Nikaeen.morteza@gmail.com.

Deadline: We encourage interested candidates to apply promptly.

Interview Process: Upon receiving your application, we will review it and reach out to schedule one or more interviews. The interview process includes both general and scientific discussions related to the position.

We look forward to receiving your application and thank you for your interest in our group.

