

Postdoctoral and PhD Positions in Singapore in “Theoretical quantum optics and quantum simulations of many body effects”

The positions are within a newly established research project in the Centre for Quantum Technologies Singapore (CQT) lead by CQT principal investigator Dimitris G. Angelakis.

At the **postdoc** level we are looking for highly motivated candidates who have a strong research background in **theoretical quantum optics**, condensed matter theory and/or quantum information theory. The salary will be between 55K and 90K Singapore dollars (roughly 28K to 45K Euros) and will depend on experience. The positions are available as soon as possible and we accept applications until a suitable candidate is found. Applications should be sent by email to dimitris.angelakis@gmail.com. They should contain a two page (max 1400 words) summary of their past research, a detailed CV and the contact details (email) of two referees. The candidates should ask the referees to email their references within a week of submitting their application. Interviews for short-listed candidates satisfying the required criteria will follow and could be on the form of a visit to Singapore or a telephone interview.

Details of research to be undertaken:

The research to be undertaken will be in the interface of quantum optics, condensed matter and QIP with emphasis in the quantum simulation of quantum many body systems. More specifically, among other directions we would also like to study how efficiently **strongly interacting systems of photons and atoms** can simulate quantum many-body effects found in condensed matter systems. A PhD in physics is required and a strong background in theoretical quantum optics and/or condensed matter theory is essential. The ideal candidate should have knowledge and/or experience in **cavity QED, cold atoms, quantum many body phenomena in general, and the numerical simulation of such systems**. Knowledge of aspects of quantum information will be useful. The candidate should possess programming skills in some of the following Fortran, MatLab, C and Mathematica.

The **PhD position** is related to how **strongly interacting systems of photons** can simulate quantum many-body effects found in condensed matter systems. One possible platform for exploration of these ideas are Coupled Cavity Arrays, where each cavity is strongly interacting with atoms. Another direction is using stationary polaritonic states of light generated when photonic fields are coupled to atomic gases. In general the engineering of many-particle Hamiltonians in this type of coupled atom-photon systems, and the possibilities emerging in explaining a range of condensed matter effects like quantum phase transitions and quantum liquids will be among the possible research topics.

The PhD candidate will ideally have knowledge and/or experience in quantum optics or and basic aspects of quantum information/condensed matter. A specialized MSc qualification in the area of quantum optics, atomic physics and condensed matter physics will be highly appreciated. Programming skills in either Fortran, MatLab, C or Mathematica would also be very helpful.

Inquiries should **first** be sent by email to dimitris.angelakis@gmail.com and should include a detailed CV, a list of publications (if applicable) and contact details (email) of two referees that should email the references to DGA within two weeks. After this initial contact, the candidate will be asked to submit his application at <http://cqtphd.quantumlab.org/>.

The project will be supervised by Dimitris G. Angelakis. The current group consists of two theory postdocs with expertise in quantum optics/CQED and cold atoms and one PhD student with strong links to groups in Europe, especially in the UK.

Information about CQT: The Centre for Quantum Technology is an alliance of research groups hosted at the National University of Singapore. It is headed by Director Artur Ekert with an Advisory Board including J. Ignacio Cirac, Atac Imamoglu, Michele Mosca, David J. Wineland, Jun Ye and Umesh Vazirani. In 2007 the Centre was selected as the first Research Centre of Excellence by the Singapore government
Webpage: <http://www.quantumlab.org/>

Information about Singapore:

Singapore is a small island just off the tip of the Malay Peninsula, about one degree north of the equator. The island is an independent nation, and the city of Singapore itself covers much of the land. The population is about 4.7 million. Western visitors generally regard it as a "high tech" nation

loosely comparable to Tokyo in the sophistication of its infrastructure, although of course it is far smaller and in fact much less crowded.

Environment and weather: Singapore is a tropical island, full of lush flora all year round. It is very humid by Western standards but visitors usually find that they adjust to this within a day or two. The typical temperature is 29 degrees, and this does not vary much over the year.

Language: English is spoken throughout Singapore. It's actually one of the four official languages, which reflect the diverse makeup of the population (Chinese, Indian, Malaysian, Indonesian, and Western).

Life in Singapore: There are all the activities you would expect of a large and vibrant city. The variety and affordability of the restaurants is second to none! In addition, Singapore is a great base from which to explore that entire region of SE Asia. Incidentally many of the researchers in the CQT are keen scuba divers, and frequently go on long weekend trips to explore the reefs and wrecks in the tropical waters around neighbouring Malaysia, Indonesia and Thailand.