

Fault-tolerance Quantum computation and Quantum Error Correction

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Resumen:

Quantum computing has become a noteworthy topic in academia and industry. The multinational companies in the world have been obtaining impressive advances in all areas of quantum technology during the last two decades. These companies try to construct real quantum computers in order to exploit their theoretical preferences over today's classical computers in practical applications. However, they are challenging to build a full-scale quantum computer because of their increased susceptibility to errors due to decoherence and other quantum noise. Therefore, quantum error correction (QEC) and fault-tolerance protocol will be essential for running quantum algorithms on large-scale quantum computers. The overall effect of noise is modeled in terms of a set of Pauli operators and the identity acting on the physical qubits (bit flip, phase flip and a combination of bit and phase flips). In addition to Pauli errors, there is another error named leakage errors that occur when a qubit leaves the defined computational subspace. As the location of leakage errors is unknown, these can damage even more the quantum computations. Thus, this talk will briefly provide quantum error models.

Sobre Samira Sayedsalehi:

Samira Sayedsalehi is an Assistant Professor at the Department of Computer Engineering in the South Tehran Branch of the Islamic Azad University (Tehran, Iran). She is currently performing a Visitor Professor at the Computer Architecture and Automation Department within UCM. She got her PhD in 2012 in the Department of Computer Engineering at the Islamic Azad University in Tehran (Iran). Her current main research interests are related with Quantum Dot Cellular Automata and Quantum Computing, specially with Quantum Error Correction techniques. She has published more than 30 papers in international recognized conferences and journals and has around 1400 citations in Google Scholar.