Title:	Design and numerical optimization of Rf pulses for nmr quantum Computing
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Keywords:	RF pulses NMR quantum
Issue Date:	28-Jul-2021
Publisher:	IISERM
Abstract:	Quantum computing is at the leading edge of scientific and technological research of the 21st century. In today's world, scientists have found a good number of approaches towards quantum information processing like superconducting qubits, trapped ion systems, spin based magnetic resonance etc. Out of all these Nuclear Magnetic Resonance has evolved as an excellent test bed for testing of quantum protocols. In this thesis we explored the idea of NMR Quantum Computing. Our study has focused on two different themes. Initially, we explored the concept of pseudo pure state which is widely used while performing NMR Quantum Computation. This thesis provides an entirely new sequence that has been developed for creating a pseudo pure state in a hetero nuclear four qubit system. The latter part of the thesis focuses on the existing problem of low fidelity while per forming quantum computation with large number of qubits. Therefore, we explored and implemented the idea of using Optimal Control Theory for pulses designing. We have focused on using Gradient Ascent Pulse Engineering (GRAPE) for the numerical optimization of pulses. All the experiments have been performed on two qubit homo nuclear system as a test sample. We have also explored the concept of Quantum State Tomography. This concept has been introduced to find the experimental fidelity of the states obtained.
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