Non-Adiabatic Holonomic Quantum Gates in an atomic system
VAHID AZIMI MOUSOLOU, CARLO M. CANALI, School of Computer Science, Physics and Mathematics, Linnaeus University, Kalmar, Sweden, ERIK SJOQVIST, Department of Quantum Chemistry, Uppsala University, Uppsala, Sweden — Quantum computation is essentially the implementation of a universal set of quantum gate operations on a set of qubits, which is reliable in the presence of noise. We propose a scheme to perform robust gates in an atomic four-level system using the idea of non-adiabatic holonomic quantum computation proposed in [1]. The gates are realized by applying sequences of short laser pulses that drive transitions between the four energy levels in such a way that the dynamical phases vanish.