Quantum logic gates using Stark shifted Raman transitions in a cavity Asoka Biswas and G. S. Agarwal
Physical Research Laboratory, Navrangpura, Ahmedabad-380 009, India

abstract We present a scheme to realize the basic two-qubit logic gates such as quantum phase gate and
controlled-NOT gate using a detuned optical cavity interacting with a three-level Raman system. We
discuss the role of Stark shifts which are as important as the terms leading to two-photon transition. The
operation of the proposed logic gates involves metastable states of the atom and hence is not affected by
spontaneous emission. These ideas can be extended to produce multiparticle entanglement.