Quantum Computing using Photons AHMED ELHALAWANY, MICHAEL LEUENBERGER, University of Central Florida — In this work, we propose a theoretical model of two-quantum bit gates for quantum computation using the polarization states of two photons in a microcavity. By letting the two photons interact non-resonantly with four quantum dots inside the cavity, we obtain an effective photon-photon interaction which we exploit for the implementation of an universal XOR gate. The two-photon Hamiltonian is written in terms of the photons’ total angular momentum operators and their states are written using the Schwinger representation of the total angular momentum.