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Mahi R Singh* (msingh@uwo.ca), Department of Physics and astronomy, University of Western Ontario, London, Ontario N6G 3K7, Canada. *Nonlinear density matrix method and its application to nanophotonics*. Preliminary report.

There is considerable interest in studying the nonlinear quantum optics of photonic nanowires [1]. Optical nanowires are generally fabricated from compound-glass fibers and semiconductors [2]. In this paper photonic quantum wires are made from two photonic crystals where one crystal is embedded into the other. We study the quantum optics of nanowires using the nonlinear density matrix method. The density matrix elements are calculated in the steady state and numerical simulations are performed for the two-photon absorption phenomenon. We anticipate that the mathematical method developed in the present paper can be used to make new types of all-photonic computers. [1] Mahi R. Singh, J. Phys. C (2008, communicated). [2], Y. Nakayama, P. J. Pauzauskis, A. Radenovic, R. M. Onorato, R. J. Saykally, J. Liphardt & P. Yang, Nature 447, 1096 (2007). (Received August 18, 2008)