Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Impurity mode techniques applied to photonic crystal slabs ARTHUR MCGURN, Western Michigan University — A theoretical treatment is given of the modes of a photonic crystal slab containing an impurity. The photonic crystal slab is formed by embedding an hexagonal lattice array of dielectric cylinders in a background slab of uniform dielectric medium. This creates a free standing slab with a periodic patterning. The solution of Maxwell's equations for the modes of the slab are given as an expansion in the waveguide and radiative modes of a uniform slab of dielectric medium. The density of modes in frequency space is presented for the photonic crystal slab in the absence of an impurity. The impurity modes for a single site impurity introduced into the center of the photonic crystal patterning are computed using Green's function methods. Bound state impurities and in band resonances are studied and used to explain recent experimental results on photonic crystal light sources.

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Date submitted: 13 Dec 2005 Electronic form version 1.4