

Spontaneous emission modification in photonic structures

Ch. P. Mavidis^{1,2,*}, M. Kafesaki^{1,2}, E. N. Economou^{1,3}, C. M. Soukoulis^{1,4}

¹*Institute of Electronic Structure and Laser, FORTH, 71110 Heraklion, Crete, Greece*

²*Department of Materials Science and Technology, University of Crete, 71003 Heraklion, Crete, Greece*

³*Department of Physics, University of Crete, 71003 Heraklion, Crete, Greece*

⁴*Ames Laboratory and Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011, USA*

Photonic structures, such as photonic crystals and metamaterials, have the potential to tailor the spontaneous emission rate [1-2] of emitters embedded into them or placed in their vicinity, due to modified density of electromagnetic modes that they offer. This can have great impact on the performance photonic devices such as antennas, light sources and quantum information processing platforms.

In this work we examine the modified emission rate in different photonic crystal and metamaterial structures. For each system, rates are calculated numerically as a function of frequency for different emitter orientations, locations and system sizes, by employing the Finite Difference Time Domain Method (FDTD) and the Boundary Element Method (BEM).

Depending on the specific geometry and the material composition of the structures, large inhibition or enhancement (compared to free space) of the emission rate is observed in most of the systems analyzed,

References

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* mavidis@iesl.forth.gr