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First-principles method for high- Q photonic crystal cavity mode calculations

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(Submitted on 12 Apr 2012)

We present a first-principles theory to compute radiation properties of ultra-high quality factor photonic crystal (PC) cavities using a basis of bound PC waveguide states. This method is used to compute the far-field radiation pattern and quality factor of cavity modes ~ 100 times more rapidly than conventional finite-difference time domain methods. Our method provides a simple rule for engineering the PC cavity far-field radiation pattern in high Q cavities.

Subjects: **Optics (physics.optics)**

Cite as: [arXiv:1204.2855v1](https://arxiv.org/abs/1204.2855v1) [physics.optics]

Submission history

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[v1] Thu, 12 Apr 2012 23:01:38 GMT (1935kb,D)

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