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Optimized Photonic Crystal Accelerating Cavities[1] CARL BAUER, GREGORY WERNER, Center for Integrated Plasma Studies, University of Colorado, JOHN CARY, Center for Integrated Plasma Studies, University of Colorado and Tech-X Corp., Boulder, CO — Through computer simulation, a 2D photonic crystal (PhC) cavity formed from a truncated triangular lattice of dielectric rods is optimized to confine a single accelerating mode efficiently. Photonic crystals have the ability to reflect radiation within only certain frequency ranges, called bandgaps; the bandgaps are determined by the geometry and material of the PhC and so are tunable. For truncated PhCs, reflection is incomplete. Therefore, the confinement of bandgap frequencies to a cavity within a truncated PhC is weakened by the severity of the truncation. For a cavity made of 18 dielectric rods in a truncated triangular lattice arrangement, the desired accelerating cavity mode is weakly confined. Adjusting the positions and sizes of the dielectric rods away from the original lattice configuration within an optimization procedure gives unintuitive structures, ultimately increasing the confinement of the accelerating mode by a factor of 100.

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