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A Switchable Magnetized Plasma Cloak[1] JESSE RODRIGUEZ, BEN WANG, MARK A. CAPPELLI, Stanford University — Dirac-like conical dispersion with double degeneracy at the Γ symmetry point can be exploited to cloak objects embedded in a photonic crystal. Here we describe two configurations for a switchable cloaking device that is based on transmission at such a point in a square lattice two-dimensional magnetized plasma photonic crystal. Finite difference time domain simulations are used to identify the plasma and geometric parameters for Dirac-like dispersion. The transverse electric (TE) configuration results in good closure on the transmitted phase fronts and cloaking due to wavefront reshaping. The dispersion shows the expected three-fold degenerate linear branch crossings at the Dirac-like point as seen in square lattice dielectric photonic crystals. We also explore a transverse magnetic (TM) configuration which is much more promising as the photonic crystal response in the vicinity of the Dirac Point appears to behave as a zero index material (ZIM). The required plasma conditions needed for this plasma cloak should be achievable with plasma discharges that have been used in the past to study the response of non-magnetized plasma photonic crystals with the additional requirement of a high-strength electromagnet (∼0.2 T-0.6 T).

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