

Novel nonlinear nanophotonic phenomena

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We present two photonic crystal enabled platforms, exhibiting novel active optical phenomena. First, using a detailed theoretical and numerical analysis, we show how a Purcell-effect inspired nonlinear nanophotonic scheme could enable optimal and compact THz sources via optical difference frequency generation. Second, we show how electromagnetic one-way edge modes analogous to quantum Hall edge states, originally predicted by Raghu and Haldane in gyoelectric photonic crystals, can appear in more general settings. In gyromagnetic YIG photonic crystals operating at microwave frequencies, time-reversal breaking is strong enough that the effect is readily observable. We present our experimental results on this novel phenomena.