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Degenerate four-wave mixing with defocusing nonlinearity JASON FLEISCHER, WENJIE WAN, SHU JIA, Princeton University — We experimentally demonstrate four-wave mixing (FWM) effects in a defocusing nonlinear photorefractive medium, in both one and two dimensions. By using a rectangular crystal, we observe the nonlinear generation of new (spatial) frequencies as a function of propagation distance. Both position-space and momentum-space images are taken, allowing a detailed study of dynamical energy transfer. For degenerate FWM, consisting of a cos(kx) profile superimposed on a k=0 background, there is a direct energy cascade to higher momenta (smaller spatial scales). For the asymmetric case, sum- and difference-frequency generation leads to complex patterns. In two dimensions, interactions also lead to a change in the spatial geometry. Numerical simulations show excellent agreement with the experimental results.

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