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Recipe for Topological Polaritons[1] TORSTEN KARZIG, CHARLES-EDOUARD BARDYN, Caltech, NETANEL LINDNER, Technion, GIL REFAEL, Caltech — The interaction between light and matter can give rise to novel topological states. This principle was recently exemplified in Floquet topological insulators, where *classical* light was used to induce a topological electronic band structure. Here, in contrast, we show that mixing *single* photons with excitons can result in new topological polaritonic states — or "topolaritons". Taken separately, the underlying photons and excitons are topologically trivial. Combined appropriately, however, they give rise to non-trivial polaritonic bands with chiral edge modes allowing for unidirectional polariton propagation. The main ingredient in our construction is an exciton-photon coupling with a phase that winds in momentum space. We demonstrate how this winding emerges from spin-orbit coupling in the electronic system and an applied Zeeman field. We discuss the requirements for obtaining a sizable topological gap in the polariton spectrum.

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