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Negative refraction without absorption: coherence effects, gain and local field corrections JÜRGEN KÄSTEL, MICHAEL FLEISCHHAUER, TU Kaiserslautern, Kaiserslautern, Germany, GEDIMINAS JUZELIUNAS, ITPA of Vilnius University, Vilnius, Lithuania, SUSANNE F. YELIN, University of Connecticut, Storrs, CT, USA; ITAMP, Cambridge, MA, USA, RONALD L. WALSWORTH, Harvard University and ITAMP, Cambridge, MA, USA — Negative refraction of electromagnetic radiation is currently one of the most active areas of photonics research. Despite remarkable recent progress, a key challenge remains the realization of negative refraction *without absorption*. We discuss different ways to alleviate this problem: the coupling of an electric and a magnetic resonance together with quantum interference effects similar to EIT; compensation of absorption by introducing gain media. Futhermore surprisingly Clausius-Mossotti local field corrections for magneto-dielectric media in the high density limit result always in negative refraction with vanishing absorption.

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