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Interference and Chaos in Metamaterials Cavities NATALIA LITCHINITSER, University at Buffalo, The State University of New York, JORGE JOSE, Indiana University — Optical metamaterials are engineered artificial nanostructures that possess optical properties not available in nature. As metamaterials research continues to mature, their practical applications as well as fundamental questions on wave propagation in these materials attract significant interest. In this talk we focus on wave propagation and interference in chaotic wave cavities with negative or near-zero index of refraction and in double-slit configurations. In this context, we explicitly consider an incomplete two-dimensional D-cavity previously studied, which shows chaotic ray propagation together with scars. We have addressed the question as to how that type of wave propagation is modified by adding metamaterials in these chaotic cavities. We find that the wave interference patterns show significant qualitatively and quantitative changes depending on the effective parameters of the cavity, illumination conditions (planes waves versus beams), and geometry of the system. We will discuss possible experimental setups where these results may be validated.

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