Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Experimental demonstration of Luneburg waveguides CHRISTOPHER JENSEN, WILLIAM ZIMMERMAN, DAVID LAHNEMAN, TODD ADAMS, THOMAS GRESOCK, KATHRYN ZANDER, VERA SMOLYANINOVA, Towson University, IGOR SMOLYANINOV, University of Maryland — Transformation optics (TO) gives rise to numerous unusual optical devices, such as novel metamaterial lenses and invisibility cloaks. However, it is very difficult to create metamaterials with low-loss broadband performance, especially in the visible frequency range. In our TO devices we use metal/dielectric waveguides to emulate metamaterial properties [1]. Here we report the first experimental realization of TO Luneburg waveguides [2]. The individual Luneburg lenses in the fabricated design are based on lithographically defined metal/dielectric waveguides. We have studied wavelength and polarization dependent performance of the waveguides. Adiabatic variations of the waveguide shape enable control of the effective refractive index experienced by the TM light propagating inside the waveguide. Our experimental designs appear to be broadband, which has been verified in the 480-633 nm range. These novel optical devices considerably extend our ability to control light on submicrometer scales. [1]. V.N. Smolyaninova, et al., Phys. Rev. B 87, 075406 (2013); [2]. V.N. Smolyaninova, et al., Photonics 2, 440 (2015). This research was supported by the NSF grant DMR-1104676.

Christopher Jensen
Towson University

Date submitted: 06 Nov 2015 Electronic form version 1.4