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Hexagonal barium ferrite thin film-based millimeter wave phase shifters ZIHUI WANG, YOUNG-YEAL SONG, YIYAN SUN, JOSHUA BEVIVINO, MINGZHONG WU, V. VEERAKUMAR, TIMOTHY FAL, ROBERT CAMLEY, DEPARTMENT OF PHYSICS, COLORADO STATE UNIVERSITY TEAM, DEPARTMENT OF PHYSICS, UNIVERSITY OF COLORADO AT COLORADO SPRINGS TEAM — There is a critical need for the extension of current microwave magnetic device physics and technology into the millimeter (mm) wave regime. In order to meet this need, one important strategy is in the use of high-anisotropy barium hexagonal ferrites. The high anisotropy for the hexagonal ferrites can be used to realize operational devices in the 30-100 GHz regime without the need for high external bias fields. This presentation reports on the first demonstration of a hexagonal ferrite thin film-based planar millimeter-wave phase shifter. The device made use of an M-type barium hexagonal ferrite (BaM) thin film and a coplanar waveguide geometry. The film was prepared by pulsed laser deposition. The phase tuning relied on ferromagnetic resonance in the BaM film. The device showed a phase tuning rate of 43 $^\circ$/(mm·kOe) and an insertion loss of 3.1 dB/mm in the on-resonance regime. In off-resonance regimes, the device showed smaller loss and smaller tuning rates. The experimental results were confirmed by theoretical calculations.

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