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**Magnetic domains and defects in ferromagnetic liquid crystal colloids realized with optical patterning**<sup>1</sup> ANDREW HESS, QINGKUN LIU, IVAN SMALYUKH, University of Colorado Boulder — A promising approach in designing composite materials with unusual physical behavior combines solid nanostructures and orientationally ordered soft matter at the mesoscale. Such composites not only inherit properties of their constituents but also can exhibit emergent behavior, such as ferromagnetic ordering of colloidal metal nanoparticles forming mesoscopic magnetization domains when dispersed in a nematic liquid crystal. Here we demonstrate the optical patterning of domain structures and topological defects in such ferromagnetic liquid crystal colloids which allows for altering their response to magnetic fields. Our findings reveal the nature of the defects in this soft matter system which is different as compared to non-polar nematic and ferromagnetic systems alike.

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