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Geometrically frustrated honeycomb and ladder lattices of nanoscale ferromagnetic islands JIE LI, XIANGLIN KE, RUIFANG WANG, WILLIAM MCCONVILLE, CRISTIANO NISOLI, PAUL LAMMERT, VINCENT CRESPI, PETER SCHIFFER, The Penn State University — We have studied arrays of interacting single-domain ferromagnetic islands which are arranged on lattices such that the interactions between the islands are frustrated by the geometry of the arrays. While previous studies in our group [1] have focused on a frustrated square lattice, we now report results on lattices with the honeycomb geometry and with a topologically equivalent ladder geometry in which the islands meet in vertices of three islands. Each permalloy island measures approximately 80nm by 220nm with a thickness 25nm, and is evenly spaced with lattice spacing ranging from 225nm to 425nm for honeycomb lattice and from 320nm to 880nm for ladder lattice. Magnetic force microscopy measurements of the arrays after demagnetization demonstrate that the interactions between the islands are frustrated and that the correlations between islands decrease with increasing spacing of the islands. A detailed analysis of the correlations between the islands will be presented. This research has been supported by the Army Research Office. [1] R. F. Wang, C. Nisoli, R. S. Freitas, J. Li, W. McConville, B. J. Cooley, M. S. Lund, N. Samarth, C. Leighton, V. H. Crespi, and P. Schiffer, Nature 439, 303 (2006).

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