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Simulations Of Nanomagnet Clusters With Perpendicular Uniaxial Anisotropy For Multilevel Data Storage QIJUN XIAO, Umass, Amherst, Physics Dept., ROBERT KROTKOV, Umass, Amherst, Physics Dept., MARK TUOMINEN, Umass, Amherst, Physics Dept., UMASS, AMHERST, PHYSICS DEPT. TEAM — Digital data storage technology generally relies on a binary storage paradigm. In this work we explore a different scheme that exploits the stepwise, *multilevel* total magnetization of a small cluster of interacting nanomagnets. The magnetization of a cluster can be resolved more easily than that of a single nanomagnet, due to the larger lateral size. Micromagnetic simulations, based on the Landau-Lifshitz-Gilbert (LLG) equation with parameters representative of Co_3Pt, reveal that magnetostatic interactions within a cluster produce a rich multilevel magnetic response, each level providing a stable remanent magnetization state. This work describes simulations used to investigate a multilevel data storage unit based on a hexagonal cluster of interacting uniaxial single domain nanomagnets. The accessibility and stability of the discrete magnetization states are studied. The switching properties of the nanomagnet clusters can be tuned by modifying the geometry, providing the ability to engineer desirable magnetic properties.

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