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**Simulation of Magnetic Configurations in Mesoscale Permalloy Dots Abstract** ELISE KNUTSEN, BARRY COSTANZI, KEVIN CLELLAND, EVAN ARCH, LOGAN PLASCH, Carleton College — The magnetic behavior of electrons can be clearly modeled at extreme length scales. However, at sizes in the hundreds of nanometers, the mesoscale, the behavior is difficult to predict due to the competition between the classical magnetostatic forces and the quantum exchange forces. Due to the large number of interacting spins, these systems cannot be easily modeled analytically, necessitating a numeric technique. We use Mumax3 micromagnetic simulation to determine the magnetic states of square permalloy ($Ni_{80}Fe_{20}$) dots that are 100's of nm on a side. Understanding magnetic materials at this scale is critical for the future development of spintronic devices and to understanding the fundamental physics of middle-scale systems which are neither strictly classical nor quantum.

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