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FMR Study of Quasicrystalline Arrays of Antidots in Permalloy Films[1] VINAYAK BHAT, JUSTIN WOODS, BARRY FARMER, LANCE DE LONG, Department of Physics and Astronomy, University of Kentucky, TODD HASTINGS, Department of Electrical and Computer Engineering, University of Kentucky, JOSEPH SKLENAR, JOHN KETTERSON, Department of Physics and Astronomy, Northwestern University — We have used electron beam lithography to pattern permalloy films of thickness 25 nm with ***quasiperiodic,*** five-fold rotationally symmetric Penrose tilings of antidots (AD). Two samples were fabricated with AD kites and darts having long (d_1) and short edges (d_2) equal to 1620 nm or 810 nm, and 1000 nm or 500 nm, respectively, with fixed Py line width of 100 nm. We have studied broad-band (RF frequencies 10 MHz <f <15 GHz, DC applied fields -3.5 kOe <H <3.5 kOe) and narrow-band FMR (f = 9.7 GHz, 0 <H <8 kOe) for various angles between the in-plane DC field and the array edge. BBFMR spectra for f <4 GHz exhibit rich, highly reproducible structure, in spite of low-field (|H|<500 Oe) hysteresis, including a ***frequency-independent*** (implying localized) mode near H = 0 Oe. Both low-field FMR data and dynamic simulations exhibit two-fold rotational symmetry instead of the expected five-fold symmetry, which we attribute to an unsaturated state. Higher-field (|H|<12 kOe) simulations exhibit ten-fold rotational symmetry, which we attribute to the symmetry of the demagnetization fields.

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