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Ordered Pinning Arrays with Tunable Geometry via Thermal Effects[1] JUAN TRASTOY, ROZENN BERNARD, JAVIER BRIATICO, JAVIER E. VILLEGAS, Unite Mixte de Physique CNRS/Thales, France, MAXIME MALNOU, NICOLAS BERGEAL, JEROME LESUEUR, LPEM, CNRS-ESPCI, France, CHRISTIAN ULYSSE, GIANCARLO FAINI, CNRS, LPN, France — We have used geometrically frustrated pinning arrays to create artificial vortex-ice [1]. The pinning arrays are fabricated via ion irradiation of high-Tc superconducting films. These arrays present a very unique characteristic: the frustration can be reversibly switched on/off using temperature as a control knob, which allows stabilizing either a vortex-ice or a square vortex lattice. We have further investigated the thermal switching mechanism by studying the matching of the flux lattice to arrays that are incrementally deformed upon fabrication by introducing minute variations of the distance between pins. The array deformation exacerbates the thermal effects, leading to dramatic variations of the vortex distribution as a function of temperature. These results illustrate the strength of the temperature-induced reconfiguration effects, which may constitute a novel knob in fluxtronic devices based on vortex manipulation.

[1] Trastoy et al. Nature Nanotechnology 9, 710-715 (2014).

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