

Abstract Submitted
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Strong periodic flux pinning in oxygen-ion-irradiated high- T_C superconductors¹ JAVIER VILLEGAS, I. SWIECICKI, J. BRIATICO, R. BERNARD, A. CRASSOUS, Unite Mixte de Physique CNRS/Thales, France, T. WOLF, N. BERGEAL, J. LESUEUR, LPEM, CNRS-ESPCI, France, C. ULYSSE, G. FAINI, CNRS, Phynano Team, LPN, France, X. HALLET, L. PIRAUX, Universite Catholique de Louvain, Belgium — We used oxygen ion irradiation to transfer into high- T_C superconducting thin films the nanoscale pattern of different types of masks (alumina [1] and [2] PMMA templates with ordered arrays of holes). This causes a nanoscale spatial modulation of superconductivity, and strongly affects the magneto-transport in the mixed-state. By tuning the irradiation dose and the array parameters, it is possible to engineer vortex energy landscapes sufficiently strong to govern flux dynamics. This is evidenced by a periodic series of strong magneto-resistance oscillations, the well-known fingerprint of periodic flux pinning. Interestingly, this irradiation technique allows tuning the *geometry* and the *strength* of the pinning potential wells at the nanoscale. This allows the observation of unusually strong matching effects at relatively high fields (up to several kOe). We show that the amplitude of the magneto-resistance oscillations is intimately connected with vortex channeling effects. [1] J.E. Villegas *et al.* Nanotechnology **22** 075302 (2011). [2] I. Swiecicki *et al.* submitted

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