

Josephson quantum interference in anisotropic superconducting antidot lattices

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We study quantum interference effects for the onset of full superconductivity in anisotropic antidot lattices as a function of temperature, magnetic field and current. We identify a new regime which differs from both the regime of classical matching of vortex structure with the underlying lattice geometry and the regime of ‘Hofstadter’ physics for the onset of superconductivity. In this nonlinear regime, where the parts have already established superconducting order parameter, the system is well described by the Frenkel-Kontorova model for Josephson coupling through multiple weak links. Above a certain field strength, the system crosses over into the usual classical regime of pinning-depinning of Abrikosov vortices.