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Vortex states in nanosuperconductors LIVIU CHIBOTARU, BART DELOOF, Theory of Nanomaterials Group, KU Leuven, VICTOR MOSHCHALKOV, INPAC - Institute of Nanoscale Physics and Chemistry and Nanoscale Superconductivity and Magnetism Group, KU Leuven, THEORY OF NANOMATERIALS GROUP TEAM, NANOSCALE SUPERCONDUCTIVITY AND MAGNETISM GROUP TEAM — The vortex states in nanoscale superconductors are investigated within generalized Bogolubov-de Gennes theory. For symmetric (square-shaped) samples thermodynamically stable vortex phases form symmetry-consistent patterns and no transition to conventional Abrikosov-like vortex patterns occurs till T=0K for sizes not exceeding 25 nm. For vorticity $L = 2$ a giant vortex is stabilized at temperatures in the vicinity of T_c, which transforms into a giant antivortex $L = -2$ and four normal vortices with lowering the temperature. On the other hand, the vortex pattern for vorticity $L = 3$ corresponds to an antivortex $L = -1$ and four normal vortices in the whole temperature domain. The main features of Ginzburg-Landau phase diagram are confirmed. [1] B. Deloof, V.V. Moshchalkov, L.F. Chibotaru, Ann. Phys. 1-6 (2013)/DOI 10-.1002.

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