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Unbinding of giant vortices in states of competing order[1] CHRIS HOOLEY, Scottish Universities Physics Alliance, University of St Andrews, UK, JON FELLOWS, University of Birmingham, UK and University of Warwick, UK, SAM CARR, JÖRG SCHMALIAN, Institut für Theorie der Kondensierten Materie and DFG Center for Functional Nanostructures, Karlsruher Institut für Technologie, Germany — We consider a two-dimensional system with two order parameters, one with O(2) symmetry and one with O(M), near a point in parameter space where they couple to become a single O($2 + M$) order. While the O(2) sector supports vortex excitations, these vortices must somehow disappear as the high symmetry point is approached. We develop a variational argument which shows that the size of the vortex cores diverges as $1/\sqrt{\Delta}$ and the Berezinskii-Kosterlitz-Thouless transition temperature of the O(2) order vanishes as $1/\ln(1/\Delta)$, where Δ denotes the distance from the high-symmetry point. Our physical picture is confirmed by a renormalization group analysis which gives further logarithmic corrections, and demonstrates full symmetry restoration within the cores.

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