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Nota di contenuto	Contents; Introduction and Overview J. V. Jose; References; 1. Early Work on Defect Driven Phase Transitions J. M. Kosterlitz and D. J. Thouless; 1.1. Introduction; 1.2. One-Dimensional Ising Model; 1.3. Vortex Driven Transitions in Superfluid Films; 1.4. Other Systems with Defect-Mediated Transitions; 1.4.1. Two-dimensional magnetic systems; 1.4.2. Isotropic Heisenberg model; 1.4.3. Two-dimensional Coulomb plasma; 1.4.4. Two-dimensional crystals; 1.4.5. Thin film superconductors; 1.5. Scaling Theory; 1.6. Scaling Theory in Analogous Systems 1.6.1. Duality and the roughening of crystal facets 1.6.2. Substrate effects; 1.6.3. Melting of a 2D crystal; 1.6.4. Substrate effects on 2D melting; 1.6.5. Scaling in superconducting films; 1.7. Experiments and Simulation; 1.7.1. Measurements on superfluid films; 1.7.2. Experimental measurements on 2D melting; 1.7.3. Simulations of 2D melting; References; 2. Duality, Gauge Symmetries, Renormalization Groups and the BKT Transition J. V. Jose; 2.1. Introduction; 2.2. Duality Transformations in the 2D XY Model; 2.3. Migdal Kadanoff RG Approximation of the Two-Dimensional XY Model 2.4. Correlation Function Calculations and Renormalization Group

Equations 2.5. Symmetric Breaking Fields, Duality and RG Equations; 2.6. An Early Experimental Confirmation of the BKT Theory; 2.3. Conclusions; Acknowledgments; References; 3. Berezinskii-Kosterlitz-Thouless Transition through the Eyes of Duality G. Ortiz, E. Cobanera and Z. Nussinov; 3.1. Introduction; 3.2. The XY Model: A Paradigm of BKT Phenomenology; 3.2.1. A transfer operator for the XY model; 3.2.2. Hamiltonian form of the XY model; 3.2.3. Duality of the XY model without the Villain approximation  
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Appendix D: The p-Clock Model for  $p = 2, 3$ , and 4 Appendix E: Peierls Argument for the p-Clock Model; References; 4. The Berezinskii-Kosterlitz-Thouless Transition in Superconductors A. M. Goldman; 4.1. Introduction; 4.2. Phenomenological Theory - Mostly Films; 4.3. Experimental Evidence - Films; 4.4. Phenomenological Theory - Arrays; 4.5. Experiments - Arrays; 4.6. Comments on Renormalization Effects; 4.7. Summary; Acknowledgments; References  
5. Berezinskii-Kosterlitz-Thouless Transition within the Sine-Gordon Approach: The Role of the Vortex-Core Energy L. Benfatto, C. Castellani and T. Giamarchi

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## Sommario/riassunto

On the 40th anniversary of the Berezinskii-Kosterlitz-Thouless Theory (BKT), this informative volume looks back at some of the developments and achievements and varied physics applications which ensued from the beautiful BKT vortex-unbinding seminal idea. During the last four decades, BKT theory, which is undeniably one of the most important developments in condensed matter and theoretical physics of the second half of the twentieth century, has expanded widely. It has been used and extended from many different theoretical and experimental perspectives. New and unexpected features have been unc

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