DY 3: Critical phenomena and phase transitions

Time: Monday 12:00–13:00   Location: H2

DY 3.1   Mon 12:00   H2

Tricritical dynamix at the demixing-superfluid transition in ^{3}He-^{4}He mixtures — •REINHARD FOLK[1] and GÜNTER MOSER[2] — [1]Institute fot theoretical Physics, University of Linz, Linz Austria — [2]Department for Material Sciences, University of Salzburg, Salzburg, Austria

We calculate in two loop order the dynamical critical behavior at the tricritical point occuring in ^{3}He-^{4}He mixtures. Model F′ introduced by Siggia and Nelson [Phys. Rev. B **15**, 1427 (1977)] - already problematic in one loop order - is shown to lead to a divergence of the mass diffusion D in contradiction to experiments. Within the complex symmetric version this model (model E$^{\star\prime}$) the dynamical critical exponents of the kinetic coefficients can be calculated exactly leading to a mass diffusion going to zero at the tricritical point as $D(t_X) \sim t_X^{1/2}$ (t_X the relative temperature distance at constant concentration) and the thermal diffusion ratio $k_T \sim t_X^{-1}$ diverges proportional to the concentration susceptibility in the experimental region.

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DY 3.2   Mon 12:15   H2

Improved Borel summation of critical exponents and amplitude ratios of the $d = 3$, $n = 2$ universality class — •DANIEL CREMER and VOLKER DOHM — Institut für Theoretische Physik, RWTH Aachen

Borel summations are performed for the critical exponents α and γ of the $d = 3$, $n = 2$ universality class on the basis of seven-loop perturbation series of the φ^4 field theory with an n component order parameter in d dimensions. A new extremum criterion is introduced that reduces the error bars compared to earlier Borel summations [1]. Furthermore, Borel resummed results are presented for the universal amplitude ratios $(1 - A^+/A^-)/\alpha$, R_ξ^+, and R_ξ^T. Our results are compared with experimental data for the lambda transition of ^{4}He [2] and with numerical data for XY type lattice models [3,4].

[1] R. Guida, J. Zinn-Justin, J. Phys. A 31, 8103 (1998).
[2] J.A. Lipa et al., Phys. Rev. B 68, 174518 (2003).
[3] M. Campostrini et al., Phys. Rev. B 74, 14450 (2006).
[4] M. Hasenbusch, J. Stat. Mech. P08019 (2006).

DY 3.3   Mon 12:30   H2

Percolation of Vortex Networks in the $U(1)$ Lattice Higgs Model — •SANDRO WENZEL[1], ADRIAAN SCHAKEL[2], ELMAR BITTNER[1], and WOLFHARD JANKE[1] — [1]Institut für Theoretische Physik, Univer-sität Leipzig, Postfach 100920, 04109 Leipzig — [2]Institut für Theoretische Physik, Freie Universität Berlin, Arnimallee 14, 14195 Berlin

We study the properties of vortex networks in the $U(1)$ lattice Higgs model in $d = 3$ dimensions. Specifically, we investigate network percolation properties at a point in the parameter space of the theory where we see a distinct crossover from confining to non-confining behaviour in local observables, which is not accompanied by a thermodynamic phase transition. Recently, we argued that this crossover can be regarded as a Kertèsz line [1]. The aim of the present study is to explicitly determine the scaling behaviour of those global clusters and to give direct evidence of our previous argument. To get independent and unbiased results for critical exponents we have developed an automated tool in conjunction with multihistogramm reweighting which maximises the data collapse quality. For the clusters under consideration here, we get scaling exponents that are compatible with ordinary percolation theory.
[1] S. Wenzel, E. Bittner, W. Janke, A.M.J Schakel, A. Schiller, Phys. Rev. Lett. **95** (2005) 051601.

DY 3.4   Mon 12:45   H2

Influence of long-range correlated surface and near the surface disorder on the process of adsorption of long-flexible polymer chains — •ZORYANA USATENKO[1,2] and JENS-UWE SOMMER[1,3] — [1]Institute of Polymer Research Dresden,01069 Dresden, Germany — [2]Institute for Condensed Matter Physics, NASU, 79011 Lviv, Ukraine — [3]Institute for Theoretical Physics, Technische Universitat Dresden, 01062 Dresden, Germany

The influence of long-range correlated surface and decaying near surface disorder with correlation function for the defects of the form $\frac{e^{-z/\xi}}{r^a}$, where $a < d - 1$ and z being the coordinate in the direction perpendicular to the surface and r denotes the distance parallel to the surface. We investigate the process of adsorption of long-flexible polymer chains with excluded volume interactions on a "marginal"and attractive wall in the framework of renormalization group field theoretical approach up to first order of perturbation theory in a double(ϵ,δ)- expansion ($\epsilon = 4 - d, \delta = 3 - a$) for the semi-infinite $|\phi|^4$ $O(m,n)$ model with the above mentioned type of surface and near the surface disorder in the limit $m, n \to 0$. We obtained series for bulk and the whole set of surface critical exponents, characterizing the process of adsorption of long-flexible polymer chains at the surface. The polymer linear dimensions parallel and perpendicular to the surface and the behavior of monomer density profiles and the fraction of adsorbed monomers at the surface and in the interior are studied.