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**The Theta Point Of Long Flexible Polymer Chains: When Does It Exist?<sup>1</sup>**

K. BINDER, Institut für Physik, Johannes-Gutenberg-Universität Mainz, 55099 Mainz, Germany

The standard description of the conformation of a long flexible polymer coil in dilute solution implies a swollen state under good solvent conditions, while deterioration of solvent quality (by decrease of temperature) causes a (gradual) chain collapse below the Theta point. At the Theta point, the chain follows Gaussian statistics, apart from logarithmic corrections. Monte Carlo simulations of the bond fluctuation model will be discussed that provide evidence for a second scenario, where the chain experiences a first order transition from the swollen state to a dense solid phase, provided the range of effective attractive interactions is sufficiently short. This scenario then implies that in solution at finite concentration no vapor-liquid-like phase separation occurs. The analogy between this prediction and the behavior of some colloidal dispersions is discussed.

<sup>1</sup>In collaboration with W. Paul, F. Rampf, and T. Strauch.