

**Prize Talk** PRV II Tue 13:00 HSZ/0002  
**Polymers / Soft Matter as Model Systems for Physics** —  
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Polymers, long chain molecules, comprise important materials of our daily life, being it simple commodities with all their advantages and disadvantages or high-tech materials in electronics or medicine, etc. Furthermore, bio-polymers such as cellulose or DNA are central constituents of living organisms. Thus, polymers have been subject of applied physics since their discovery. That, however, changed with de Gennes'  $n \rightarrow 0$  theorem, showing that the inverse chain length  $1/N$  can be mapped onto the distance  $|T-T_c|/T_c$  from the critical point in a

$n$ -vector spin model. At about the same time computer simulations became powerful tools to study critical phenomena, complemented by experiment, most notably neutron scattering for polymers. All this marked the start of polymers becoming versatile systems to study critical phenomena.

Polymers/Soft Matter are susceptible to small molecular stimuli. Thus, minute shifts in local interactions easily turn into macroscopic property changes. Here generic physical concepts meet chemical details, making polymers so versatile. The talk will review a few examples, where such effects lead to physically interesting phenomena (active systems, glass transition, nanoporous materials). Finally, new challenges imposed by soft matter will shortly be discussed.