PHYSIKALISCHES KOLLOQUIUM

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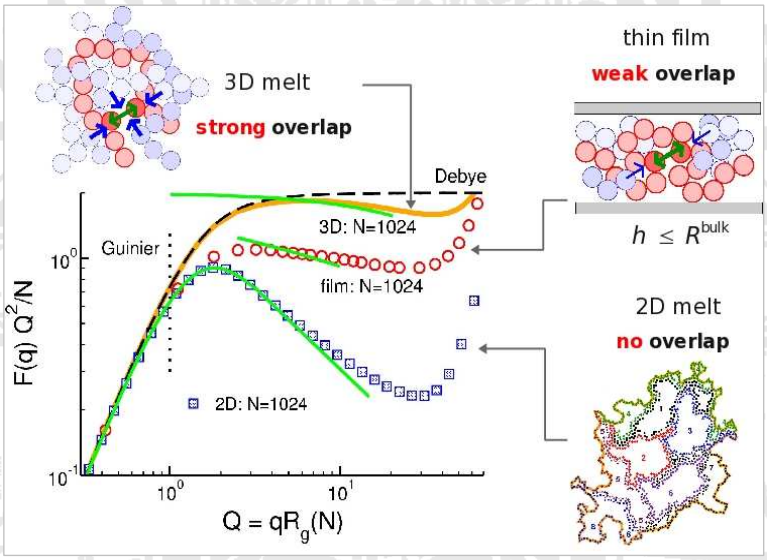
IM GROßEN HÖRSAAL



60 YEARS AFTER FLORY'S IDEALITY HYPOTHESIS: ARE POLYMER MELTS REALLY IDEAL?

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A cornerstone of modern polymer physics is the "Flory ideality hypothesis". This hypothesis states that polymer chains in a three-dimensional (3D) melt have random-walk-like conformations. However, recent theoretical and numerical results suggest that this view is an oversimplification. There are noticable deviations from chain ideality, resulting from the interplay of chain connectivity and the incompressibility of the melt. This interplay leads to a swelling of chain segments and thus to a perturbation of the postulated ideal chain conformation. The swelling manifests itself in several ways. For instance, there are wave-vector dependent deviations from the (so-called) Kratky plateau for the form factor of a chain. We will present an overview of these results and also mention possible consequences for polymer films, i.e., polymer melts which have a finite (nanoscopic) extension in one spatial direction. Finally, we also briefly discuss the extreme case of an ultrathin polymer film, more precisely, of a strictly two-dimensional (2D) polymer melt, where the chains adopt compact, segregated conformations with an irregular (fractal) chain contour.