

Colloque M3 « Giant molecules »

Thématique: Matière molle

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In the visible world, giants are both large in size and few in number. They immediately attract our attention, whether a seven-foot tall athlete, a fifteen-hundred-mile wall in China, or a hundred-foot long blue whale. Early in the twentieth century the discovery of giants in the invisible world of molecules created excitement among scientists. These giant molecules are called polymers. They fascinate us not because they are scarce, but because they are everywhere about us. Just as polymers are huge, such is polymer science.

We remind that historically a major stepping stone connecting polymer physics with the general statistical mechanics of phase transitions was provided by the profound discovery by de Gennes in 1972 that the n -vector magnetic spin problem with $n=0$ is equivalent to the excluded-volume polymer chain problem discussed first by Flory in 1949 and later formalized by Edwards in terms of path integral methods exactly 50 years ago in 1965. The entire machinery developed for understanding critical phenomena thus could be imported and the concept of scaling entered polymer science. Being rather successful this continues to dominate the thinking of many polymer scientists.

The aim of this colloquium is to provide a platform focusing on the state-of-the-art polymer physics research in France focusing on universal scaling relations both for static and dynamical properties of long polymer chains of various architectures. We wish to cover a broad scope of current problems covering fundamental theoretical and computational work as well as new experimental techniques and industrial challenges.

Some questions addressed:

- Polymers at surfaces and interfaces
- Spin-coating and glassy behavior of thin polymer films
- Topological interactions: linear polymer melts vs. melts of rings
- Transient self-assembled polymer aggregates and physical gels
- Computational methods for polymer physics

Invited speakers:

- Elie Raphael, ESPCI Paris: *Stability and dynamics of polymer films*
- Christian Ligoure, Montpellier: *Transient telechelic polymer networks*
- Julian Oberdisse, Montpellier: *Small-angle scattering and simulation studies of polymer nanocomposites: from model to industrial systems*
- Benoît Schnell, MICHELIN, Clermont-Ferrand: *Current industrial applications*