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Stretched Polymers in Random Environment

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Stretched polymers are realized as nearest neighbour trajectories on an integer lattice Zd, subject either to a pulling force (drift) or to a constraint of having the end-point at a distant hyper-plane. Each vertex of the lattice bears a random non-negative charge, which gives rise to random Gibbsian weights as sums of all the charges, weighted by local times, along polymer trajectories. Contrary to what happens in the case of directed polymers, stretched polymers may bend and self-intersect. As a result, the model does not have natural under-lying martingale structures, and even the simplest issues, which are straightforward in the directed case, become non-trivial.

I shall describe recent results which, in the annealed case, give an essentially complete description of the ballistic phase and, in the quenched case, imply diffusivity at weak disorder in dimensions d¿3 and path localization at strong disorder (in the sense of existence of microscopic atoms).

Based on joint works with Yvan Velenik and Nikos Zygouras.