The mechanical properties of elastic materials like rubber and collagen depend on the topology of the network of polymer strands which make up the material. This topology is that of a random embedding of an extremely complicated random graph.

In this talk, we discuss the theory of Gaussian random embeddings of graphs (much of which is classical), give a simplified and clarified picture of the existing theory, and derive new results on the expected geometry of a random embedding of a fixed graph. These results predict experimental results of Tezuka et al. for synthetic polymers of known graph type.

We then use our theorem to numerically study the expected geometry of a simple model of random graphs relevant to the “t-rex” polymer system of Honda et al. (Received September 11, 2019)