Martin van Hecke
University of Leiden, The Netherlands

Mechanical Metamaterials

We discuss two strategies to create elastic structures with novel collective mechanical functionalities. First, marginal materials, and in particular marginally-connected elastic networks, give rise to intrinsically-nonlinear mechanical response. I will discuss our current experiments aimed at probing the collective nonlinear response in actual macroscopic elastic networks. Second, I will discuss patterned elastica, such as the famous ''holey sheet,'' that undergo elastic instabilities. I will focus on novel biholar patterned materials and show how the instabilities in these materials can be tuned by external forcing, leading to mechanical responsive metamaterials.