Non-Euclidean elasticity and asymptotic rigidity of manifolds

Abstract:

Liouville's rigidity theorem (1850) states that a map $f: \Omega \subset \mathbb{R}^d \to \mathbb{R}^d$ that satisfies $Df \in \text{SO}(d)$ is an affine map. Reshetnyak (1967) generalized this result and showed that if a sequence $f_n$ satisfies $Df_n \to \text{SO}(d)$ in $L^p$, then $f_n$ converges to an affine map.

In this talk I will discuss generalizations of these theorems to mappings between manifolds, present some open questions, and describe how these rigidity questions arise in the theory of elasticity of prestressed materials (non-Euclidean elasticity). If time permits, I will sketch the main ideas of the proof, using Young measures and harmonic analysis techniques, adapted to Riemannian settings.

Based on a joint work with Asaf Shachar and Raz Kupferman.