Given a measurable mapping $T : \Omega \to GL(n)^+$ (matrices with positive determinant), can we find a diffeomorphism Φ such that $D\Phi = T$ away from a set of measure ε? It is well known that if an orientation preserving homeomorphism Φ is differentiable at x, then $\det D\Phi \geq 0$. What about approximately differentiable homeomorphisms? Can we find an orientation preserving homeomorphism Φ that is approximately differentiable a.e., but $\det D\Phi < 0$ a.e.? If the answer is yes, given a measurable mapping $T : \Omega \to GL(n)$ (determinant positive or negative), can we find an orientation preserving homeomorphism Φ that is approximately differentiable a.e. such that $D\Phi = T$ a.e.? Assume that a diffeomorphism (bi-Lipschitz map, homeomorphism) $\Phi : B^n(0,1) \to \mathbb{R}^n$ onto the image can be extended to a diffeomorphism (bi-Lipschitz map, homeomorphism) of a neighborhood of the closed ball. Can it be extended to a diffeomorphism (bi-Lipschitz map, homeomorphism) of $\mathbb{R}^n$? No spoilers in this abstract—if you want to know the answers, come to the talk! Based on joint work with Zofia Grochulska and Paweł Goldstein.

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