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Rectifiability of entropy productions for weak solutions of the 2D eikonal equation with supercritical regularity

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Weak solutions of the 2D eikonal equation correspond to unit vector fields m with zero divergence in the sense of distributions. They arise naturally as sharp interface limits of bounded energy configurations in micromagnetics, elasticity or liquid crystal models (e.g. Aviles-Giga). For a given weak solution m , entropy productions are distributions which carry information about singularities and energy cost. If they are signed measures, it is conjectured that they must be concentrated on the 1-rectifiable jump set of m , as they do if m has bounded variation (BV). In a joint work with Elio Marconi, we prove this concentration property under an additional mild regularity assumption, going well beyond the BV setting, and leaving only a borderline case open.

Primary author: LAMY, Xavier (Université de Toulouse)

Presenter: LAMY, Xavier (Université de Toulouse)