Barcelona Analysis Seminar **2022–2023**

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Online streaming (Zoom). Click here to join.

Burkholder functional, quasiconvexity and non linear elasticity

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A prime question in the Calculus of Variations is to characterize lower semicontinuous functionals in the vectorial setting. In order to do that, in 1952 Charles B. Morrey introduced the notion of quasiconvexity. He also asked whether a local notion, rank-one convexity, is an equivalent condition. To this day, the answer to this question has eluded the effort of researchers in the planar situation. These notions are relevant in hyperelasticity where the strain energy is required to blow up as the determinant tends to 0. Somehow independently, artists in Geometric functional theory, building on work of Donald Burkholder in relation with martingale inequalities realized that if a concrete functional, the later called Burkholder functional, is quasiconvex at 0, sharp L^p theory for quasiregular maps would follow. In this talk, I will explain a proof of the quasiconvexity of the Burkholder functional when restricted to quasiconformal matrices. The limiting case when p goes to 2, and a novel L^p version of the classical area formula in complex analysis yields new quasiconvex functionals consistent with the requirements of non linear elasticity. This is a joint work with Kari Astala and Aleksis Koski from Helsinki, Jan Kristensen from Oxford and Andre Guerra from ETH.