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Room: UB iA (Universitat de Barcelona)

Free boundary problems with gradient constraints and variational integrals with singular energy functionals, Beltrami equations and limit shapes of random tilings

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We discuss the free boundary problem for minimisers of specific variational integrals, where the integrand or the energy functional satisfies the Monge-Ampere equation $\det D^2\sigma = 1$ inside a convex polygon but behaves very singularly on its boundary.

Such issues arise in the study of scaling limits of different random tilings. Typically, this setting cannot be reduced to an obstacle problem, neither is the corresponding energy integral Frechet differentiable. Yet the geometry of the energy functional together with specific (degenerate) Beltrami equations allows one to give a very precise description of the free boundary; for instance, it arises as the real locus of an algebraic curve.

The talk is based on a joint work with E. Duse, I. Prause and X. Zhong.