

THEMATIC SESSION: Analysis and PDEs

### **Lower semicontinuity via Stoilow factorization**

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The variational integrals appearing in problems from Elasticity Theory and Geometric Function Theory often have a growth behaviour that makes it very difficult to establish lower semicontinuity results, and hence prove existence of minimizers, under the natural condition of quasiconvexity as introduced by Morrey in 1952. Instead other conditions have been used, notably polyconvexity, and while this condition allows for the treatment of some realistic models it is known that it is far from being a necessary condition for lower semicontinuity. In this talk we define a slight strengthening of the quasiconvexity condition for functionals defined on two-by-two matrices that we show in important special cases is equivalent to quasiconvexity (in fact even to rank-one convexity). With this condition it is possible to use results from the theory of planar quasiconformal maps to prove lower semicontinuity of the corresponding variational integrals.

This is joint work with Kari Astala (Helsinki), Daniel Faraco (Autonoma Madrid), André Guerra (ETH) and Aleksis Koski (Aalto)