Title: Polyconvex integrands in the calculus of variations.

Abstract: In nonlinear elasticity theory, ones deals with functionals of the form $\mathbf{u} \to I(\mathbf{u}) = \int_\Omega \big(W(\nabla \mathbf{u}) + \mathbf{u} \cdot \mathbf{F}\big) dx$ where W is a function defined on the set of $d \times d$ matrices, $W(\xi)$ fails to be a convex function of ξ but is rather a convex function of the minors of ξ. Motivated by the study of Ogden material we consider functions satisfying $\lim_{\det \xi \to 0^+} W(\xi) = \infty$. For these functionals, identifying the Euler–Lagrange equations satisfied by the minimizers of I remains an open outstanding problem in the calculus of variations. Furthermore, the current state of the art in the calculus of variations dramatically fails to predict the uniqueness of the minimizers of I in many interesting cases. In this talk, we introduce a series of problems which we hope will contribute to a better understanding the above issues. This talk is based on a joint work with R. Awi.