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**Alberto Montero, Daniel Spirn and Dmitry Golovaty\*** ([dmitry@uakron.edu](mailto:dmitry@uakron.edu)). *A variational method for generating cross fields using higher order Q-tensors.*

A cross field is a locally defined orthogonal coordinate system invariant with respect to the cubic symmetry group. These objects are of interest in a variety of settings, from mesh generation to materials science. In this talk, I will discuss the problem of generating an arbitrary cross field that satisfies some prescribed boundary conditions by using a fourth-order Q-tensor theory that is build upon tensor products of projection matrices. We use a Ginzburg-Landau-type relaxation to formulate an appropriate variational problem that allows us to reliably generate cross fields on arbitrary Lipschitz domains. The relaxed framework provides us with tools to study the behavior of the singular set, i.e. the set on which the domain fails to be a cross field. In particular we can use the classical Ginzburg-Landau theory to study singularities of the associated energy. This is a joint work with Dan Spirn and Alberto Montero. (Received August 23, 2021)