Pattern formation and symmetry breaking for a family of functionals and their intrinsic nonlocal curvature

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In this talk, we will introduce a rigorous approach to the study of the symmetry breaking and pattern formation phenomenon for isotropic functionals with local/nonlocal interactions in competition. More precisely, we consider a general class of nonlocal variational problems in general dimension d, in which an isotropic surface term favouring pure phases competes with an isotropic nonlocal term with power law kernel favouring alternation between different phases. Close to the critical regime in which the two terms are of the same order, we give a rigorous proof of the conjectured structure of global minimizers, in the shape of domains with flat boundary (e.g. stripes or lamellae). In order to show such structure we will use nonlocal curvatures which appear naturally in these types of problems. This work is in collaboration with S. Daneri.