

Symmetry breaking and structure of minimizers for local/nonlocal interaction functionals

Sara Daneri

Gran Sasso Science Institute
L'Aquila, Italy

e-mail: sara.daneri@gssi.it

In this talk I will review some recent results obtained in collaboration with E. Runa and A. Kerschbaum on the one-dimensionality of the minimizers of a family of local/nonlocal interaction functionals. Such functionals have a local term, typically the perimeter or its Modica-Mortola approximation, which penalizes interfaces, and a nonlocal term favouring oscillations which are high in frequency and in amplitude. The competition between the two terms is expected by experiments and simulations to give rise to periodic patterns at equilibrium. Functionals of this type are used in physics and biology to model pattern formation, either in material science or in biology. The difficulty in proving the emergence of such structures is due to the fact that the functionals are symmetric with respect to permutation of coordinates, while minimizers are not. We will present results showing that for two classes of functionals (used to model generalized anti-ferromagnetic systems, respectively colloidal suspensions), both in sharp interface and in diffuse interface models, minimizers are one-dimensional and periodic, in general dimension.