

**Pattern formation in local/non-local models
interaction functionals**

Eris Runa

Deutsche Bank

eris.runa@gmail.com

In this talk I will review some recent results on the one-dimensionality of the minimizers of a family of continuous local/nonlocal interaction functionals in general dimension. Such functionals have a local term, typically a perimeter term 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 to model pattern formation, either in material science or in biology. One of the main difficulties in proving the emergence of such regular structures, together with nonlocality, is due to the fact that the functionals retain more symmetries (in this case symmetry with respect to permutation of coordinates) than the minimizers. We will present new techniques and 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 (in general dimension) one-dimensional and periodic.