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Small volume fraction limit of a nonlocal isoperimetric problem with confinement

The nonlocal isoperimetric problem that I will consider in this talk arises as the sharp interface limit of Ohta-Kawasaki functionals introduced to model microphase separation of diblock copolymers. In our problem there is an additional term which penalizes one phase hence forces the other block copolymer phase into a confinement region. Using Γ-convergence we will identify the first- and second-order effective energies in the asymptotic limit of small volume fraction and strong confinement. Depending on the choice of penalization we will show that the second-order limit of these energies will be given by attractive-repulsive nonlocal interaction energies of weighted Dirac-delta functions corresponding to the concentration of mass into point particles. This is a joint work with S. Alama, L. Bronsard and R. Choksi.