

### **Theme 3: variational**

#### **Shape Optimisation for nonlocal anisotropic energies**

**Lucia Scardia**

We consider shape optimisation problems for sets of prescribed mass, where the driving energy functional is nonlocal and anisotropic. More precisely, we deal with the case of attractive/repulsive interactions in two and three dimensions, where the attraction is quadratic and the repulsion is given by an anisotropic variant of the Coulomb potential.

Under the sole assumption of strict positivity of the Fourier transform of the interaction potential, we show the existence of a threshold value for the mass above which the minimiser is an ellipsoid, and below which the minimiser does not exist. If, instead, the Fourier transform of the interaction potential is only nonnegative, we show the emergence of a dichotomy: either there exists a threshold value for the mass as in the case above, or the minimiser is an ellipsoid for any positive value of the mass.

This is joint work with Riccardo Cristoferi and Maria Giovanna Mora.