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On a non-local shape optimization problem related with swarming

I will describe recent work with Rustum Choksi and Ihsan Topaloglu on a shape optimization problem where the energy functional is given by an attractive/repulsive interaction potential in power-law form. A natural conjecture is that balls minimize this energy for large mass, and minimizers fail to exist if the mass falls below a certain critical threshold. We have partial results that support this view. Time permitting, I will discuss recent progress due to Frank and Lieb, and open questions.