Strong competition versus fractional diffusion

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Abstract: Different phenomena can be modeled by elliptic systems involving a number of densities subject to reaction, diffusion and competitive interaction. Relevant particular cases include the Lotka-Volterra competition, widely used in population dynamics and ecology, and the Gross-Pitaevskii one, which appears in the theory of Bose-Einstein condensation. When competition prevails, the densities tend to segregate each other, and a typical question regards the common shared regularity (i.e. uniform Hölder bounds), uniformly w.r.t. the competition parameter. In this talk, I will first review the theory addressing such issue in the case of standard diffusion. Next I will report on some recent results, obtained in collaboration with Susanna Terracini and Alessandro Zilio (Università di Torino), concerning the case of anomalous diffusion, i.e. when the Laplace operator is replaced by the (nonlocal) fractional laplacian.