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Title: Concentration-compactness principle for scalar field equations involving the fractional Laplacian.

Authors: Diego Ferraz and João Marcos do Ó.

Abstract: The aim of this work is to study a concentration-compactness principle for homogeneous fractional Sobolev space $\mathcal{D}^{s,2}(\mathbb{R}^N)$ for $0 < s < N/2$. As an application we establish Palais-Smale compactness for the Lagrangian associated to the fractional scalar field equation $(-\Delta)^s u = f(x, u)$ for $0 < s < 1$. Moreover, using an analytic framework based on $\mathcal{D}^{s,2}(\mathbb{R}^N)$, we obtain existence results for a wide class of nonlinearities in the critical growth range.