FRACTIONAL HARDY EQUATIONS WITH CRITICAL AND SUPERCRITICAL EXPONENTS

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In this talk I will discuss the existence/nonexistence, qualitative properties and the asymptotic behavior of the positive solutions to the problem

$$\begin{cases} (-\Delta)^s u - \theta \dfrac{u}{|x|^{2s}} = u^p - u^q \quad \text{in} \quad \mathbb{R}^N, \\ u \gneqq 0 \quad \text{in} \quad \mathbb{R}^N, \\ u \in \dot{H}^s(\mathbb{R}^N) \cap L^{q+1}(\mathbb{R}^N), \end{cases}$$

where $q > p \geq \frac{N+2s}{N-2s}$, $N > 2s$, $\theta \in (0, \Lambda_{N,s})$ and $\Lambda_{N,s}$ is the sharp constant in the fractional Hardy inequality. We classify the singularity of solutions at 0 and discuss the decay behavior at infinity in the supercritical case and we show that this behavior varies according to the range of q, p. To find this asymptotic behavior of solutions, we use a representation result that allows to transform the original problem into a different nonlocal problem in a weighted fractional space.

It's a joint work with Debdip Ganguly and Luigi Montoro.

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