The effect of the Hardy potential in some Calderón-Zygmund properties for the fractional Laplacian.[1]

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The goal of this lecture is to study the effect of the Hardy potential on the existence and summability of solutions to the following class of nonlocal elliptic problems,

$$\begin{cases} (-\Delta)^s u - \lambda \dfrac{u}{|x|^{2s}} &= f(x) & \text{in } \Omega, \\ u &= 0 & \text{in } \mathbb{R}^N \setminus \Omega, \\ u &> 0 & \text{in } \Omega, \end{cases}$$

where $(-\Delta)^s$, $s \in (0,1)$, is the fractional Laplacian operator, $\Omega \subset \mathbb{R}^N$ is a bounded domain with Lipschitz boundary such that $0 \in \Omega$ and $N > 2s$. We will mainly consider the solvability and regularity of the solution according to the summability of the datum f and the parameter λ.

Looking for optimal results we will need a weak Harnack inequality for elliptic operators with *singular coefficients* that seems to be new.

The talk is a part of the following article.

References

[1] B. Abdellaoui, M. Medina, I. Peral, A. Primo, *The effect of the Hardy potential in some Caldern-Zygmund properties for the fractional Laplacian*, J. Differential Equations 260 (2016) 8160-8206.

[1]Work supported by Project MTM2013-40846-P, MINECO, Spain