

Nonlocal operators of order near zero

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We study Dirichlet forms defined by nonintegrable Lévy kernels whose singularity at the origin can be weaker than that of any fractional Laplacian. We show some properties of the associated Sobolev type spaces in a bounded domain, such as symmetrization estimates, Hardy inequalities, or the inclusion in some Lorentz space. We then apply these properties to study the associated nonlocal operator L and the Dirichlet and Neumann problems related to the equations $Lu=f(x)$ and $Lu=f(u)$ in Ω .