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## The Dirichlet problem for nonlocal Lévy-type operators

We consider nonlocal operators of the form

$$Lu(x) = PV \int_{\mathbb{R}^d} (u(x) - u(x+y))\nu(dy),$$

where  $\nu$  is a Lévy measure. Such operators are the generators of the semigroup corresponding to a Lévy process with jump intensity  $\nu$ .

For symmetric Lévy measures  $\nu$ , and bounded open sets  $D$  we show that the Dirichlet problem

$$\begin{cases} Lu = f & \text{in } D, \\ u = g & \text{on } D^c, \end{cases}$$

has a weak solution whenever  $f \in L^2(D)$  and  $g$  can be extended to a function from a certain Sobolev space.

We also discuss, under some assumptions, the sufficient and necessary conditions under which  $g$  possesses such an extension.

The talk is based on joint works with Krzysztof Bogdan, Tomasz Grzywny, and Katarzyna Pietruska-Pałuba [1, 2, 3].

## References

- [1] Krzysztof Bogdan, Tomasz Grzywny, Katarzyna Pietruska-Pałuba, and Artur Rutkowski, *Extension theorem for nonlocal operators*, ArXiv e-prints (2017).
- [2] Krzysztof Bogdan and Artur Rutkowski, *Trace and regularity for nonlocal Sobolev spaces*, 2018.
- [3] Artur Rutkowski, *The Dirichlet problem for nonlocal Lévy-type operators*, *Publicacions Matemàtiques* **62** (2018), no. 1, 213–251.