Functional Calculus via the extension technique: a first hitting time approach

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In joint work with David Lee[2]

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Abstract

In this talk, I will present a solution to the problem:

"*Which type of linear operators can be realized by the Dirichlet-to-Neumann operator associated with the operator* $-\Delta - a(z)\frac{\partial^2}{\partial z^2}$ *on an extension problem?*´´,

which was raised in the pioneering work [Comm. Par.Diff. Equ. 32 (2007)] by Caffarelli and Silvestre. But I even intend to go a step further by replacing the negative Laplace operator $-\Delta$ on $\mathbb{R}^d$ by an m-accretive operator A on a general Banach space X and the Dirichlet-to-Neumann operator by the Dirichlet-to-Wentzell operator. I show how to prove uniqueness of solutions to the extension problem in the general Banach spaces framework, which seems to be new in the literature and of independent interest. I outline a type of functional calculus using probabilistic tools from excursion theory. With this new method, I am able to characterize all linear operators $\psi(A)$, where ψ is a complete Bernstein function ($\mathcal{CBF}$), resulting in a new characterization of the famous *Phillips' subordination theorem* within this class $\mathcal{CBF}$.

This talks is based on the research results provided in the recent Arxiv submission: 2101.11305.