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**Classical and nonclassical Levy Laplacians.** (English. Russian original) Zbl 1155.35482

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Author's abstract: "Comparatively recently, it was discovered that the Yang-Mills equations are equivalent to the Laplace equation with Laplacian virtually coinciding with the operator introduced at the beginning of the past century by Paul Levy [see *I. Ya. Aref'eva, I. V. Volovich*, Generalized functions and their applications in mathematical physics, Proc. int. Conf., Moscow 1980, 43-49 (1981; [Zbl 0504.53054](#)); *L. Accardi, P. Gibilisco, I. A. Volovich*, Russ. J. Math. Phys. 2, No. 2, 235-250 (1994; [Zbl 0904.58011](#))]; [*R. Léandre, I. A. Volovich*, Infin. Dimens. Anal. Quantum Probab. Relat. Top. 4, No. 2, 161-172 (2001; [Zbl 1049.58037](#))] and the references therein). In [loc. cit.], some modifications of the Laplace-Levy operators were also introduced. In what follows, we refer to the operators introduced by Levy as classical Levy Laplacians and to their modifications, as nonclassical Laplacians. In this paper, we describe a general method for defining and studying both types of operators, which makes it possible to extend results on Levy Laplacians to nonclassical Laplacians (of course, with natural modifications). We define an infinite family of Laplacians, whose elements are classical Levy Laplacians and the nonclassical Laplacian related to the Yang-Mills equations (it is natural to call the remaining elements nonclassical Laplacians of corresponding orders) and describe the relationship between these Laplacians and quantum random processes. The suggested constructions use functionals on a space of operators, which we call Cesàro traces and define by using suitable Cesàro means. Simultaneously, we consider Volterra Laplacians and find analogies between them and Levy Laplacians."

Reviewer: [Nils Ackermann \(México\)](#)

#### MSC:

- [35R15](#) PDEs on infinite-dimensional (e.g., function) spaces (= PDEs in infinitely many variables)
- [46G05](#) Derivatives of functions in infinite-dimensional spaces
- [81S25](#) Quantum stochastic calculus

Cited in 7 Documents

#### Keywords:

[Yang-Mills Equation](#); [Levy Laplacian](#); [Cesàro Trace](#)

**Full Text:** [DOI](#)

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