

The Tenth Vasil A. Popov Prize

awarded to

Matthew Colbrook

University of Cambridge

Popov Prize Selection Committee

June 19, 2023



The Tenth Vasil A. Popov Prize was awarded to Matthew Colbrook, on June 19, 2023 at the 2023 Foundations of Computational Mathematics (FoCM) conference. .

Matthew (Matt) was recognized for his outstanding contributions to approximation theory, particularly his work on the approximation of spectral properties of operators in infinite-dimensional spaces and the approximation power and trainability of neural networks. Computing approximations of spectra in infinite dimensions has been a significant challenge for mathematicians since the 1950s. Matt has introduced new algorithms that converge and come with explicit approximation guarantees. He has also developed a myriad of techniques yielding optimal approximation results for different spectral properties of operators, classifying when this can and cannot be done in the Solvability Complexity Index Hierarchy, and solving other open problems such as approximating generic spectral measures, geometric spectra, and (data-driven) Koopman operators in dynamical systems. Parallel to this work, Matt has contributed significantly to the problem of approximation power and trainability of neural networks. For example, in a paper published in Proceedings of the National Academy of Sciences (PNAS), Matt and his collaborators have shown that there are problems where stable and accurate neural networks exist, yet no training algorithm can produce such a network.

The Prize, which consists of a pyramid trophy and a cash award of 2000 euros, was presented to Matthew by Albert Cohen of Sorbonne Université, Chair of the Popov Prize Selection Committee. The other members of the Selection Committee are Emmanuel Candes, Wolfgang Dahmen, Karlheinz Grochenig, Pencho Petrushev, Peter Oswald, and Vilmos Totik.

Matthew Colbrook holds an Assistant Professor position at the University of Cambridge.

He received his PhD in September 2020 from the University of Cambridge under the supervision of Anders C. Hansen.

<https://www.ljll.math.upmc.fr/popov-prize/>

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