

## Dr. Cristiana De Filippis

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Cristiana De Filippis (b. 1992) is a Professor of Mathematics at the University of Parma, Italy. Her research focuses on the regularity theory of elliptic and parabolic partial differential equations, with particular emphasis on problems arising from the Calculus of Variations. In 2023, she was elected to the inaugural cohort of the European Mathematical Society Young Academy (EMYA). She was awarded the 2020 Iapichino Prize from the Italian National Academy, the 2023 Bartolozzi Prize from the Italian Mathematical Society, the EMS Prize in 2024, the 2025 SIAM Early Career Prize in Analysis & PDE, and a 2025 ERC Starting Grant.

Title: Nonuniform Ellipticity and Nonlinear Potentials

Abstract:

The representation formula for the Poisson equation gives an explicit expression of solutions in terms of the data, yielding zeroth- and first-order pointwise bounds via convolution with suitable Riesz potentials. Their mapping properties allow for a sharp regularity transfer from data to solutions, so that nonlinear PDEs can be treated, up to the  $C^1$ -level as they were linear. I will then discuss a novel potential-theoretic approach to the (ir)regularity of solutions to certain nonuniformly elliptic PDEs arising in geometric and physical models. From recent, joint work with Jan Kristensen (Oxford) and Giuseppe Mingione (Parma).