CNRS congratulates Alessio Figalli, winner of the 2018 Fields Medal

The 2018 Fields Medal has been awarded to Alessio Figalli, a CNRS researcher since 2007 currently seconded to ETH Zurich (Swiss Federal Institute of Technology). This distinction, the most prestigious prize in the realm of mathematics, was bestowed in recognition of his work in calculus of variations, optimal control, optimization and partial differential equations. Caucher Birkar (born in Kurdistan, British citizen), professor at Cambridge University, Peter Scholze (Germany), professor at University of Bonn and Akshay Venkatesh (born in India, Australian citizen), professor at Stanford University are also Fields 2018 medal winners.

Held every four years, the International Congress of Mathematicians is the most important scientific event in the discipline. One of its highlights is the awards ceremony for the Fields Medal, the most prestigious distinction in the world of mathematics, honoring researchers under the age of 40. One of the four winners this year is Alessio Figalli, an Italian mathematician born on April 2, 1984 in Rome.

In 2005, while a student at the respected Scuola Normale Superiore in Pisa, Figalli was invited by Albert Fathi for a long-term residency at ENS Lyon. With his master's degree from Pisa completed in 2006, he extended his residency at ENS Lyon to prepare a thesis, co-supervised by Luigi Ambrosio and Cédric Villani. He finished the work in an exceptionally short time, completing his defense in October 2007. Even before his thesis defense, in September 2007, he joined CNRS as a researcher at the Laboratoire Jean-Alexandre Dieudonné (CNRS/Université Nice Sophia Antipolis). Seconded from CNRS in October 2008, he served as a Hadamard[1] professor at the Centre de Mathématiques Laurent-Schwartz (Ecole Polytechnique/CNRS) until August 2009, meanwhile obtaining his authorization to supervise research (February 2009). He then became a professor at the University of Texas at Austin (September 2009 to August 2016) before assuming his present post as a professor at EHT Zurich. In a remarkable set of circumstances, Figalli is a former student of Cédric Villani, winner of the Fields Medal in 2010, who in turn studied with Pierre-Louis Lions, a Fields Medal laureate in 1994 — a rare and prestigious scientific "pedigree."

Alessio Figalli's work focuses on optimal transport theory, which involves identifying the least expensive means of transporting an object from one place to another, given a certain cost. Beyond their applications in economics, the theory and techniques of optimal transport have become more widely studied and now are used to address some of the most difficult questions in the fields of partial differential equations, fluid mechanics, geometry, probability and functional analysis. In particular, Figalli investigates the regularity theory of optimal transport applications[2] and its links to the Monge-Ampère equation (upon which he has

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1 A post offered for a maximum of three years to young mathematicians with high potential.
2 For more information on optimal transport, see the website [Images de maths](#).

written a reference book[3]). Also an expert in functional and geometric inequalities, a field in which he has proven a great many quantitative stability results, Figalli studies theories with a wide range of applications, from analyzing the displacement of droplets in a cloud to studying the form of crystals subjected to constraints. More recently, he began working on random matrix theory, whose goal is to understand certain properties of matrices made up of random variables. The applications of this theory include integrable systems, quantum chaos and quantum gravity in two (or more) dimensions via string theory, to name only three examples.

Alessio Figalli has received a number of high-level grants, in particular an ERC Consolidator Grant from the European Union to pursue his studies on regularity and stability in partial differential equations. He was awarded the Peccot-Vimont Prize of the Collège de France in 2011, followed by the European Mathematical Society Prize in 2012, and was a guest speaker at the 2014 International Congress of Mathematicians, in the "Analysis and Applications" section.

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Ludovic Rifford, professor at the University of Nice, Laboratoire Jean-Alexandre Dieudonné (CNRS/Université Nice Sophia Antipolis). One of the main co-authors working with Alessio Figalli, he is also a specialist in optimal control and control theory:

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3 The Monge-Ampère equation and its applications. Zurich Lectures in Advanced Mathematics. European Mathematical Society (EMS), Zurich, 2017. x+200 pp. ISBN 978-3-03719-170-5.

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