2021 AustMS Medal – citation for Serena Dipierro

Professor Serena Dipierro (University of Western Australia) has made outstanding contributions to the area of analysis and PDEs, with a special focus on the theory of nonlocal operators and free boundary problems. She is a prolific researcher with a large international network of collaborators and has become one of the leaders of her field. In the nine years since the award of her PhD, her publications have amassed over 1100 citations in the MathSciNet database; since moving to Australia in 2016 she has averaged one publication per month, including many in journals of the highest quality.

Dipierro's work aims at establishing regularity properties and geometric features of the interfaces occurring in phase transitions. In addition to their mathematical interest, such questions arise naturally in applications to physics, engineering, mathematical finance and population dynamics.

One of her most influential papers, co-authored with Dávila, Del Pino and Valdinoci and published in 2015 in *Analysis & PDE*, showed the existence of concentrating solutions for nonlinear and nonlocal equations of Schrödinger type. In a paper published in 2018 in *Advances in Mathematics,* Dipierro and Karakhanyan solved a long-standing problem by proving the Lipschitz regularity of minimisers for a two-phase free boundary variational problem. Another fundamental result which experts found especially surprising was that fractional harmonic functions are locally dense in the space of smooth functions; the elegant proof discovered by Dipierro, Savin and Valdinoci was published in 2017 in the *Journal of the European Mathematical Society*. The same authors have written a series of ground-breaking papers demonstrating the unexpected behaviour of nonlocal minimal surfaces at their boundary, the most recent of which was published in 2020 in Crelle's journal.

Dipierro's dedication to the mathematical community is demonstrated by her many leadership roles, including as Head of the Department of Mathematics and Statistics at the University of Western Australia, as a Council member of the Australian Mathematical Society, and as Secretary of the Women in Mathematics Special Interest Group. She represents early and mid-career researchers on the National Committee for Mathematical Sciences, and has supervised three postdoctoral researchers and five PhD students.