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Enrico is Professor and Australian Laureate Fellow at the University of Western Australia. His research interests include nonlocal and fractional differential equations, partial differential equations, and dynamical systems.

Title of the talk
Long-range phase coexistence models and (non)local minimal surfaces

Abstract of the talk
The classical theory of phase transition describes the coexistence of two phases separated by a thin interface. Ferromagnetic materials aim at minimizing such an interface, thus producing a classical link with the theory of surfaces with minimal perimeter.

Recently, phase coexistence models based on long-range particle interactions have been considered and their interface has been linked to either surfaces of minimal perimeter or of minimal nonlocal perimeter, depending on the type of interaction under consideration.

These novel objects, namely the surfaces of minimal nonlocal perimeter, present new phenomena and many open problems of fundamental type.

We will discuss some recent results on the theory of long-range phase transitions from the point of view of fractional elliptic equations and present some findings related to the nonlocal minimal surfaces which describe their interfaces at a large scale.