Dr. Ingrid Daubechies



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Ingrid Daubechies has a Ph.D. in Theoretical Physics. She has spent most of her career on bringing mathematical techniques and analysis to bear on applications not only from physics, but also in signal processing, brain imaging, geophysics, biological morphology, and art conservation and analysis, as well as on research in mathematics.

She is presently a professor at Duke University. During the isolation caused by the pandemic, she has spent part of her time on the realization, together with 23 other mathematicians and artists, of an art installation that seeks to communicate the wonder, the beauty and the whimsy of mathematics -- see mathemalchemy.org

Title: Discovering low-dimensional manifolds in high-dimensional data

Abstract: This talk reviews diffusion methods to identify low-dimensional manifolds underlying high-dimensional datasets, and illustrates that by pinpointing additional mathematical structure, improved results can be obtained. Much of the talk draws on a case study from a collaboration with biological morphologists, who compare different phenotypical structures to study relationships of living or extinct animals with their surroundings and each other. This is typically done from carefully defined anatomical correspondence points (landmarks) on e.g. bones; such landmarking draws on highly specialized knowledge. To make possible more extensive use of large (and growing) databases, algorithms are required for automatic morphological correspondence maps, without any preliminary marking of special features or landmarks by the user.