

Fields Medal Lecture Series

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The sphere packing problem: work of Maryna
Viazovska

Siddhi Pathak

The sphere packing problem asks how densely can you cover the n -dimensional Euclidean space with non-overlapping identical spheres. This simple question, with a clear answer in dimension 1, turns out to be deceptively formidable in higher dimensions. It was resolved by Thue in 1892 for dimension 2, and more than a century later, by Hales in 2005 for dimension 3, via a creative computer-assisted proof. For all higher dimensions, the problem remained unanswered, until 2017, when Maryna Viazovska solved it in dimension 8 using striking new connections of various fields in mathematics. Subsequently, her ideas have also resulted in the resolution of the problem in dimension 24 by herself along with H. Cohn, A. Kumar, S. D. Miller and D. Radchenko. She was awarded the Fields medal in 2022 for her contributions to above questions and extremal and interpolation problems in Fourier analysis. In this talk, we aim to give an overview of the ideas involved in the sphere packing problem and Maryna's contribution to it.

This talk will be accessible to a general audience.