



Prof. U. B. Tewari Distinguished Lecture Series in Mathematics

Department of Mathematics and Statistics

Indian Institute of Technology Kanpur



Title: Applications of the Fourier transform to Hausdorff dimension

Dates: 7, 8, 9, 11 November 2024 **Time:** 03:30 PM (IST)

Venue: L-14 (Lecture Hall Complex, IIT Kanpur)



Prof. Pertti Mattila

Abstract

Starting from Kaufman's work in 1968 and Falconer's in 1982 on orthogonal projections of general Borel sets, there have been many applications of the Fourier transform to geometric problems involving Hausdorff dimension.

In addition to orthogonal projections, such topics include Hausdorff dimension of line sections, of intersections of Borel sets in general positions, and of distance sets. During roughly the last ten years related questions on radial projections have been studied intensively by Orponen, Shmerkin and others. This work is connected with the Furstenberg set problem and has been a partial ingredient in its recent solution by Ren and Wang. There are also connections to the Kakeya problem. The lectures will aim to give an overview of some of the results, methods and ideas in this scenario.

About the Speaker

Pertti Mattila is a Finnish mathematician and a leading figure in geometric measure theory and fractal geometry. His pioneering contributions continue to influence ongoing research and shape the future directions of harmonic analysis, complex analysis, and geometric measure theory. He has explored the geometric and measure-theoretic properties of fractal sets, contributing significantly to the development of this rich and intricate field. Mattila is the author of several influential books and numerous research papers. His books "Geometry of Sets and Measures in Euclidean Spaces: Fractals and Rectifiability" and "Fourier Analysis and Hausdorff Dimension" are widely cited.

Pertti Mattila obtained his Ph.D. in Mathematics from the University of Helsinki in 1973. He has held academic positions at various institutions, including a postdoctoral position at the Institute for Advanced Study at Princeton University, and professorships at the University of Jyväskylä, and the University of Helsinki. Currently, he is affiliated to the Centre of Excellence in Analysis and Dynamics Research at the University of Helsinki. He has been invited to speak at numerous international conferences, including the International Congress of Mathematicians (ICM) in Berlin in 1998, and has received several awards and honors for his work, including the Magnus Ehrnrooth Foundation Prize (200), given by Finnish Society of Science and Letters.

About the Series

The lecture series is in honour of Prof. U.B. Tewari (1944-2019) for his outstanding contributions in mathematics. This annual event is generously established by his family, friends, and former students. Each year, a distinguished mathematician is invited to deliver a comprehensive short course consisting of 4-5 lectures spread over a two-week period in a forefront area of Mathematics. This year's lecture is the third in the series, and it includes a short course designed to engage researchers and graduate students.