Density of a projection of a random vector

M. Rudelson
Department of Mathematics,
University of Michigan

Consider an \( n \)-dimensional random vector with independent coordinates having a bounded density. Would a projection of this vector on a given linear subspace have a bounded density as well? In the simplest one-dimensional setting, this problem reduces to the question whether a linear combination of independent random variables with bounded density has a bounded density as well. While the affirmative answer is intuitively obvious, it has not been established until recently. We will show how Fourier analysis provides a positive solution to both one-dimensional and multidimensional problem.

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