Institute of Analysis and Number Theory

Mini-Series on Harmonic Analysis and Discrete Geometry. Lecture 3.

23.10.2018, 15.00-16.30

Seminarraum Analysis-Zahlentheorie, Kopernikusgasse 24, 2.OG

Tight frames and equiangular lines

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Unit norm tight frames are objects that play an important role in functional analysis, discrete geometry, signal processing, and even quantum physics. These are collections of unit vectors, which behave like orthonormal bases: they satisfy an analog of Parseval's identity and every vector can be exactly reconstructed from its projections onto the elements of the frame. Tight frames have a number of interesting properties – in particular, they minimize a certain discrete energy. This object is closely intertwined with the following interesting question in discrete geometry: can one draw N lines in a d-dimensional Euclidean space, so that the angle between any two is the same? For which values of N, d, and the angle is this possible? What is the maximal cardinality of a set of equiangular lines for a given dimension? We shall survey the main results and conjectures on these topics.

This is the third lecture in a mini-series of four lectures. All lectures are independent and fully self-contained. No prior knowledge of any of the subjects involved in the talk will be assumed.

P. Grabner, Ch. Aistleitner