

EINLADUNG

zum

HABILITATIONSVORTRAG im Rahmen des JUNIORKOLLOQUIUMS

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“Phase-space geometry and applications in signal analysis”

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Abstract: Classical Fourier analysis studies a function by representing it as a superimposition of basic oscillatory patterns. While the Fourier transform effectively quantifies the contribution of individual frequencies to a function, it does not explain when a certain frequency makes such a contribution, and therefore it is lacking as a tool to understand phenomena whose characteristics evolve with time.

Time-frequency analysis is an attempt to refine Fourier analysis by considering the time and frequency domains simultaneously (phase-space). This is challenging because time and frequency are not truly independent variables, but only approximately independent at large scales. The limit scale where joint time-frequency analysis is possible is given by the so-called uncertainty principle.

I will discuss a number of problems where the uncertainty limit is approached. These include: the design of functional expansions into atoms that optimize phase-space concentration, the description of the configurations of phase-space nodes that allow for such expansions, and the description of the phase-space profile of such optimal atoms.

The results to be presented have also applications in statistics, in the quantification of the performance of spectral estimators, and in signal processing, in the quantification of the amount of information carried by measurements taken by moving sensors.

**Mittwoch, 22. Juni 2016,
15:00 Uhr**

**Fakultät für Mathematik,
Sky Lounge.
Oskar-Morgenstern-Platz 1**

Karlheinz Gröchenig
Harald Rindler