Spectral Theory and Dynamics of Quantum Systems

GRADUIERTENKOLLEG 1838

Guest Lecture


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## Born--Jordan time-frequency analysis

January 13, 2016
9:45 h, Room 8.526
University of Stuttgart, Pfaffenwaldring 57


Abstract:
Born-Jordan quantization originates from Heisenberg's matrix mechanics, leading to sharp time-frequency localization of signals of finite energy. The related Born-Jordan transform provides an attractive alternative to the short-time Fourier transform. We characterize the Born-Jordan time-frequency distribution within Cohen's class: the three characterizing properties are

(1) scale invariance (i.e. dilation invariance),
(2) time locality, and
(3) mapping the Dirac comb signal (“ticking-of-a-clock”) to the Dirac grid in the plane.

We show how this can be applied in acoustic signal processing, quantum mechanics and medical sciences. Computationally, the Born-Jordan approach is as complex as using spectrograms (which doubly suffer from the Heisenberg uncertainty and from arbitrariness of choosing time analysis window, resulting in inferior localization; spectrograms violate properties (1), (2), (3) above).