



KATHOLISCHE UNIVERSITÄT
EICHSTÄTT-INGOLSTADT

Mathematisches Kolloquium

Riesz bases of exponentials for partitions of intervals

Prof. Dr. David Walnut

George Mason University, USA

Mittwoch, 20.10.2021, KG-A 105, 17.00 Uhr s.t.

Aufgrund der Pandemie wird kein Kaffee und Tee serviert.
Die Teilnahme erfolgt unter Einhaltung der 3G-Regel. Wir werden ca.
3 m Abstand zwischen den Teilnehmern ermöglichen und medizinische
Masken tragen.

Abstract.

Given an interval $I \subseteq \mathbb{R}$, it is well-known that the sequence of complex exponentials $\mathcal{E}(\Lambda) = \{e^{2\pi i\lambda t} : \lambda \in \Lambda\}$, $\Lambda = \frac{1}{b}\mathbb{Z}$, is an orthogonal basis for the Hilbert space $L^2(I)$, for I any interval of length b . A well-studied problem is finding sets Λ , which may be irregular, such that sets $\mathcal{E}(\Lambda)$ form nonorthogonal bases (known as Riesz bases) for $L^2(S)$, for $S \subseteq \mathbb{R}$ not necessarily intervals.

In this talk we show how to construct sets $\Lambda \subseteq \mathbb{Z}$ such that the $\mathcal{E}(\Lambda)$ form Riesz bases for $L^2(I)$, for corresponding intervals I , with the added compatibility property that unions of the sets Λ generate Riesz bases for unions of the corresponding intervals. This work was inspired by a recent breakthrough result of Kozma and Nitzan in which they constructed a Riesz basis of exponentials for $L^2(S)$, S a union of disjoint intervals.

The proof of our result uses an interesting assortment of tools from analysis, probability, and number theory. We will give details of the proof in the talk, together with enlightening examples and a discussion of recent developments. The work discussed is joint with Shauna Revay (GMU and Novetta), and Goetz Pfander (Catholic University of Eichstaett-Ingolstadt).