Universität Hamburg
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Fakultät für Mathematik, Informatik
und Naturwissenschaften
Fachbereich Mathematik

**Donnerstag, den 15. Oktober 2026, um 14:30 Uhr,**
**MIN-F (Bu 56a) - Hörsaal 3**

## Prof. Dr. Tino Ullrich*
(Technische Universität Chemnitz, Fakultät für Mathematik)

# *Approximation, Sampling and Recovery*

**Zusammenfassung/Abstract:**

Many problems in numerical analysis and data science require the recovery of unknown functions, integrals, or more general functionals from finitely many samples. A fundamental challenge is to discretize continuous quantities, such as norms, integrals, or abstract functionals, using as few sampling points as possible while maintaining stability and accuracy. In this talk we survey on recent advances in stable sampling designs (Marcinkiewicz-Zygmund inequalities) and their role in the recovery for multivariate functions. Combining ideas from classical approximation theory, frame theory and random matrix methods we demonstrate how recent subsampling techniques may be used to preserve stability properties while significantly reducing the number of samples. We relate worst-case sampling recovery errors to benchmark quantities from approximation theory and Banach space geometry, such as Kolmogorov widths and best m-term approximation. In this context, nonlinear decoders inspired by sparse recovery, such as square-root Lasso and orthogonal matching pursuit, yield instance-optimal error bounds in various norms while achieving near-optimal sampling complexity.

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