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**FAKULTÄT FÜR MATHEMATIK**
**Dekan Univ.–Prof. Dr. Harald Rindler**

Einladung zur öffentlichen Defensio von

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Thema der Dissertation:

# Bridgeland stability conditions and exceptional collections

Abstract: The "moduli space" of stability conditions was introduced by T. Bridgeland (2002) as an approach to mathematical understanding of certain moduli spaces arising in string theory. He assigned to any triangulated category a complex manifold, whose elements are referred to as Bridgeland stability conditions. Homological Mirror Symmetry predicts a parallel between dynamical systems and categories whereby the stability space is a candidate to play the role of the Teichmüller space. However, global information for the stability space is known in only a handful of examples.

Exceptional collections are structural patterns in triangulated categories observed earlier by Beilinson et. al. The main motivation for the present work comes from a procedure generating stability conditions by exceptional collections, described by E. Macrì in his paper from 2007.

This thesis explores some aspects of the interplay between the two notions in the title and unveils novelties for both sides. On the one hand, the findings concerning stability conditions are new evidences supporting the parallel mentioned above. On the other hand, remarkable relations between exceptional representations of quivers appear in the thesis. It consists of three parts.

In the first part is defined the notion of a *$\sigma$-exceptional collection* so that any full $\sigma$-exceptional collection (if exists) generates $\sigma$, where $\sigma$ denotes a stability condition. The focus here lies on constructing $\sigma$-exceptional collections from a given stability condition $\sigma$ on $D^b(\mathcal{A})$, where $\mathcal{A}$ is a hereditary, hom-finite (over an algebraically closed field) category. One difficulty is due to what we call *Ext-nontrivial couples* (exceptional objects $a, b \in \mathcal{A}$ with non-zero $\mathrm{Ext}^1(a,b)$ and $\mathrm{Ext}^1(b,a)$). A new constraint, *regularity-preserving*, on the category $\mathcal{A}$ is introduced, making this difficulty manageable. Examples of regularity-preserving categories are demonstrated. Finally all stability conditions on the acyclic triangular quiver are shown to be generated by exceptional collections.

The central result in the second part of the thesis is a characterization of the Dynkin/Euclidean/all other quivers on the language of Bridgeland stability conditions.

The third part continues with the study of the entire stability space on the acyclic triangular quiver. The main conclusion here is that it is contractible. This is the first quiver $Q$ different from Dynkin and Kronecker quivers for which the stability space on $D^b(Q)$ is shown to be contractible.

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**Zeit:** Freitag, 15. Mai 2015, 15:00 Uhr

**Ort:** Fakultät für Mathematik, Seminarraum 11, Oskar-Morgenstern-Platz 1