

STABLE VECTOR BUNDLE CATEGORIES, NILPOTENT OPERATORS AND MATRIX FACTORIZATIONS

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This is a series of five lectures about stable vector bundle categories for weighted projective lines, its basic properties and applications. It contains joint work with Dirk Kussin and Helmut Lenzing and with David Kedzierski and Helmut Lenzing.

First we recall some basic facts about coherent sheaves on weighted projective lines in the sense of Geigle and Lenzing. Then we study exceptional vector bundles on weighted projective lines and the concepts of mutations. Special attention is given to Auslander bundles and extension bundles.

We define the stable vector bundle category of a weighted projective line by factorizing out in the vector bundle category all morphisms which factor through direct sums of line bundles. We show that this yields a triangulated category, we study injective hulls, projective covers, the suspension functor and other properties including the existence of tilting objects and its endomorphism algebras.

Further we investigate interesting connections of stable vector bundle categories with categories of vector spaces with nilpotent operators and invariant subspaces. Finally we discuss matrix factorizations for indecomposable vector bundles on weighted projective lines of domestic type.

Content of the five talks:

1. Weighted projective lines (basic facts)
2. Exceptional vector bundles
3. Stable vector bundle categories
4. Vector spaces with nilpotent operators and invariant subspaces
5. Matrix factorizations for domestic triangle singularities