Workshop on derived categories
16.07.2006–17.07.2006

Speakers:

Alexei Bondal (Moscow)

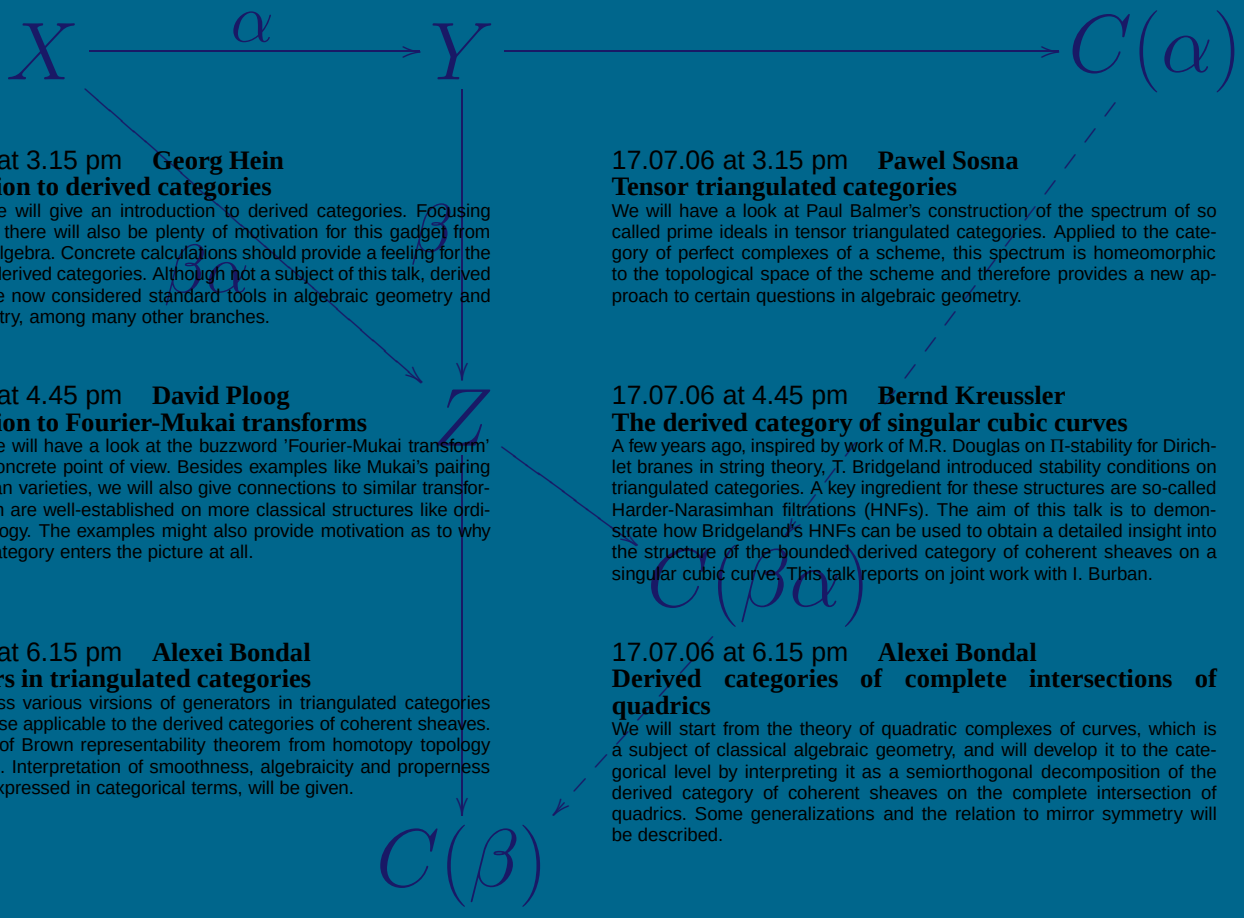
Georg Hein (Essen)

Bernd Kreussler (Limerick)

David Ploog (Berlin)

Pawel Sosna (Berlin)

Location: Freie Universität
Arnimallee 3, 14195 Berlin
Hörsaal 1



16.07.06 at 3.15 pm **Georg Hein**
Introduction to derived categories
In this talk we will give an introduction to derived categories. Focusing on examples, there will also be plenty of motivation for this gadget from homological algebra. Concrete calculations should provide a feeling for the behaviour of derived categories. Although not a subject of this talk, derived categories are now considered standard tools in algebraic geometry and mirror symmetry, among many other branches.

16.07.06 at 4.45 pm **David Ploog**
Introduction to Fourier-Mukai transforms
In this talk, we will have a look at the buzzword 'Fourier-Mukai transform' from a very concrete point of view. Besides examples like Mukai's pairing for dual abelian varieties, we will also give connections to similar transformations which are well-established on more classical structures like ordinary cohomology. The examples might also provide motivation as to why the derived category enters the picture at all.

16.07.06 at 6.15 pm **Alexei Bondal**
Generators in triangulated categories
We will discuss various virsions of generators in triangulated categories especially those applicable to the derived categories of coherent sheaves. An analogue of Brown representability theorem from homotopy topology will be proved. Interpretation of smoothness, algebraicity and properness of varieties, expressed in categorical terms, will be given.

17.07.06 at 3.15 pm **Pawel Sosna**
Tensor triangulated categories
We will have a look at Paul Balmer's construction of the spectrum of so called prime ideals in tensor triangulated categories. Applied to the category of perfect complexes of a scheme, this spectrum is homeomorphic to the topological space of the scheme and therefore provides a new approach to certain questions in algebraic geometry.

17.07.06 at 4.45 pm **Bernd Kreussler**
The derived category of singular cubic curves
A few years ago, inspired by work of M.R. Douglas on Π-stability for Dirichlet branes in string theory, T. Bridgeland introduced stability conditions on triangulated categories. A key ingredient for these structures are so-called Harder-Narasimhan filtrations (HNFs). The aim of this talk is to demonstrate how Bridgeland's HNFs can be used to obtain a detailed insight into the structure of the bounded derived category of coherent sheaves on a singular cubic curve. This talk reports on joint work with I. Burban.

17.07.06 at 6.15 pm **Alexei Bondal**
Derived categories of complete intersections of quadrics
We will start from the theory of quadratic complexes of curves, which is a subject of classical algebraic geometry, and will develop it to the categorical level by interpreting it as a semiorthogonal decomposition of the derived category of coherent sheaves on the complete intersection of quadrics. Some generalizations and the relation to mirror symmetry will be described.

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