Seminar: Noncommutative Hodge structures

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Meeting time: Thursdays 10.15-12.00

First Meeting: Thursday, April 14

Location: MI, N 0.007 - Neubau

Description: Hochschild homology and periodic cyclic homology provide analogs of Hodge cohomology and de Rham cohomology for differential graded categories. The apparent question is then to what extent there is a noncommutative analog of classical Hodge theory based on these invariants. In this seminar we discuss various recent developments:

(1) There is a Hochschild-to-periodic cyclic spectral sequence which is the analog of the Hodge-to-de Rham spectral sequence. To obtain a Hodge filtration on periodic cyclic homology we need degeneracy criteria. We will discuss the recent work of Kaledin [2] which shows that the spectral sequence degenerates for smooth and proper differential graded categories.

(2) The second ingredient of a Hodge structure is given by a rational lattice. To this end, we discuss the recent work of Blanc [1] which implements a noncommutative version of complex topological K-theory for differential graded categories. In this context there is a natural Chern character map from topological K-theory to periodic cyclic homology and the lattice conjecture claims that the image provides a rational lattice.

(3) A general proposal for a definition of noncommutative Hodge structures together with examples in the context of mirror symmetry is provided in [3]. If time and energy permits, this will be discussed in a last, open ended, part of the seminar.

References